OULU BUSINESS SCHOOL

Sharmin Farah

CO-CREATED BUSINESS MODELS OF CONNECTED HEALTH SERVICES

Master's Thesis

Department of Management and International Business

December 2019

UNIVERSITY OF OULU   ABSTRACT OF THE MASTER'S THESIS
Oulu Business School

Unit			
International Business and Management			
Author		Supervisor	
Farah, Sharmin		Ahokangas, Petri	
Title			
Co-Created Business Models of Connected Health Services			
Subject	Type of the degree	Time of publication	Number of pages
International Business Management	Master's Degree	2019	136+3

Abstract

Because of the advancement of technology, healthcare has been developed along with different sectors such as education, entertainment, and business. 'Connected Health' term comes for changing the patient-provider relationship by using technology which is also called 'e-health'. As a developed country like Finland who is the pioneer of e-health has been participating a project called inDemand for the purpose of changing healthcare to provide co-created experience for patients. Their main objective to identify and solve the needs relates to health entities by enhancing the capacity of them and creating opportunity for private organization. This thesis is a part of this project.

This study aims to find out the process for a co-created business model for connected health services. The study concentrates on two parts- business model and co-creation. It deals with different concepts of business model and co-creation, their way of doing along with components and the impact of them in healthcare.

The study has a qualitative nature and it applies the case study method for conducting the research. In this method, empirical data is collected based on semi-structured thematic interviews by face-to-face and Skype. Participants were chosen from those organizations which are the stakeholders of inDemand project for getting overall idea about their way of doing the co-creation process.

The findings of the thesis outline that there should be a combination of components from the business model and co-creation for conducting the process of co-creation of business model. The components are-customers, target customer segments, selling, marketing, and distribution channel activities, value proposition, value creation and extraction, value network and competition, products/services, pricing, cost structure and revenue model, processes, resources and practices, dialogue, access, risk benefits and transparency and shared purpose. In this research, the theoretical contribution confirms the results of the study.

The results can help the case companies to properly blend the components and at the same time, to motivate all stakeholders along with customers or patients to participate in the co-creation process. Future research will continue to identify the process of co-creation over a large population to see the indifferences among every sample.

Keywords	
Business Model, Co-Creation, IoT, Value Creation, Value Proposition, Connected Health	
Additional information	

CONTENTS

FIGURES AND TABLES

ABBREVIATIONS

eHealth	Electronic Health
5G	Fifth-Generation Wireless
IoT	Internet of Things
e-business	Electronic Business
IS	Information Systems
S-D logic	Service-dominant logic
R&D	Research and Development
EMR	Electronic Medical Record
ATM	Automated Teller Machine
NVP	Net Present Value

SaaS   **Software as a Service**

IPR   **Intellectual Property Rights**

DART   **Dialogue, Access, Risk-benefits, and Transparency**

1   INTRODUCTION

This thesis shows the exploratory framework by combining the process of business model and co-creation in connected health. To present this framework, different components of business model and co-creation are explored for reaching the answer to the research question. This study is also a part of InDemand project which is based on a model on which healthcare organizations and companies co-create eHealth solutions. The project is also called the new Horizon 2020 project for co-creating eHealth solutions and "the model will be implemented in 3 pilot regions: Murcia Region (Spain), Paris Region (France), and Oulu Region (Finland)". The project deals with demand-driven and co-creation approaches (ec.europa.eu, 2017). Thus, this chapter shows research phenomenon and context, research objective and research question and research structure.

1.1   Research Phenomenon and Context

Health is one of the important determinants of a person's life. With the continuous improvement in technology, healthcare is improving along with other sectors like education, entertainment, and business. Conventional health and wellbeing solution providers are likely to adjust service offerings and their business models with technological advancement which is continued over next years by 5G, IoT (Internet of things), wearable devices, etc. (Gomes, Ahokangas, and Pikkarainen, 2017). According to Caulfield and Donnelly (2013), 'Connected Health encompasses terms such as wireless, digital, electronic, mobile, and telehealth and refers to a conceptual model for health management where devices, services or interventions are designed around the patient's needs, and health-related data is shared, in such a way that the patient can receive care in the most proactive and efficient manner possible. All stakeholders in the process are 'connected' by means of timely sharing and presentation of accurate and pertinent information regarding patient status through smarter use of data, devices, communication platforms, and people'. It is changing the relationship of patient-provider by technology-enabled, integrated care delivery which enables remote communication, diagnosis, treatment, and monitoring. Healthcare organizations facilitate patient-provider connectivity anytime and anywhere by making more accessible and potentially less expensive services (Delottie.com, 2019).

The term is also called 'e-health'. According to The Digital Economy and Society Index (DESI, 2019) from ec.europa.eu, almost half of the people in Finland used e-health services means they use online health services without going to hospitals or meet doctors. Based on Finland's expertise in digital and mobile technology, Finland has become pioneer in e-health. And, Finland also has the strongest health technology economies in the world. For the purpose of providing great patient satisfaction, Finland is always created, improved and applied new technologies, medical devices, artificial intelligence and deep learning in healthcare (Business Finland, 2019).

Because of converting healthcare towards a co-created experience for patients (indemandhealth.eu, 2019), Finland has joined a project called InDemand which aims at identifying and solving the needs of health entities by increasing the capacity of them as well as create an opportunity for private organizations (ec.europa.eu, 2017). The thesis is conducted as a part of this project. There are two themes of this thesis which are- business model and co-creation. Like any other sector, healthcare sector needs business model as business model helps any enterprise to create, deliver value to customers and convert payment as profits (Teece, 2010). A business model is a plan for any organization for generating revenues and profits as well as for the successful operation of the firm. It refers a term that is used for describing the key components of a given business and popular among e-businesses and e-business research (Hedman and Kalling, 2003). Magretta (2002) said "A good business model remains essential to every successful organization, whether it's a new venture or an established player". Chesbrough (2010) mentioned that business models help companies to commercialize new ideas and technologies. The same idea also comes from the article by liveri, Ahokangas, Komi, Tihinen and Valtanen (2016). They said that business model serves as a tool for technology development and economic value creation. Zott, Amit and Massa (2011) said business model focuses on both value creation and value capturing. Jansson, Ahokangas, liveri, Perälä-Heape and Salo (2014) referred that for ecosystem thinking, business model is important and the focus of creating value shifts through internal activities to create value through external relations in the design of networked or ecosystemic business models. This value networks and ecosystems are recognized as an important part of open innovation cooperation. Teece (2010) said "Developing a successful business model is insufficient to assure competitive advantage as imitation is often easy: a differentiated (and hard to imitate)-yet effective and efficient-business

model is more likely to yield profits. Business model innovation can itself be a pathway to competitive advantage if the model is sufficiently differentiated and hard to replicate for incumbents and new entrants alike". So, if a business model is perfectly designed, it can give the organization a competitive advantage. On the other hand, the word "co-create" means to create (something) by working with one or others. It is a management initiative which brings different parties together to get jointly-valued outcome. Value is closely related to the co-creation. According to Prahalad and Ramaswamy (2002), the industrial infrastructure and the entire business system have been shaped by a company-centric, efficiency-driven view of value creation for more than 100 years. The major themes for the organization are growth and value creation (Prahalad and Ramaswamy, 2004b). Prahalad and Ramaswamy (2002) stated that because of Information and communication technology, organizations are shifting their value-creation focus from firm-centric to personalized customer experiences. The core of value creation and value extraction is the interaction between the firm and the consumer and dialogue, access, risk-benefits, and transparency are considered as the building blocks of value co-creation (Prahalad and Ramaswamy, 2004b).

There are some research which indicated that co-creation in healthcare occurs when collaborative interaction between the individual and their health provider/providers and the active involvement of the individual is linked to the efficient management of chronic diseases such as, cancer and when there is "growing acknowledgment within health care that treatment plans and related activities can extend beyond interactions with doctors to include broader aspects of the individual's life such as lifestyle and beliefs (McColl-Kennedy et. al, 2012). Gallan et. al (2013) said: "Encouraging the patient to share relevant information— including current status, desired outcomes, and goals, and comfort with risk—are of particular importance in cocreating a valuable customer experience". All those research focuses either on collaborative interaction or process of co-creation. But rarely the researcher finds any research which shows how the co-creation of business model is done in developing connected health services. So, the researcher is interested in co-creation which is also the part of InDemand project by combining it with business model for identifying how they can help in developing connected health services. For this purpose, the researcher will evaluate the process of business model as well as co-creation and combine both for connected health.

1.2 Research Objective and Research Question

This study intends to fill the gap of identifying how the process of co-creation of business models can help in developing connected health services and comparing the co-creation of business models of the two regions- Spain and Finland (Oulu). The purpose of the study is to develop a framework for identifying the co-creation of business models in developing health services. There are two objectives to this study. They are- theoretical and empirical. The theoretical objective is to develop a theoretical framework combining business model and co-creation based on the collected resources (articles) and the empirical objective is to collect and analysis secondary and primary data in developing health services from the two regions- Spain and Finland (Oulu) for identifying co-creation of business models in connected health which will be used in future research.

The main research question of this study is in the following-

How could the co-creation of business models help in developing connected health services?

For answering the main research question, the researcher is going to utilize business model as the starting point as it can contribute to the whole development of eHealth technology by determining an implementation strategy involving all important stakeholders within a value-driven dialogue or what the technology should accomplish (Limburg et. al., 2011). A business model will help to build a framework for identifying co-creation of business models in developing connected health services. The visible result of the study will be showing the way of co-creation of business models in connected health which will help the inDemand project to validate the business model in future. On the other hand, semi-structured interview is chosen based on the themes of this study which is selected from theoretical context (chapter 2). The themes will be-Business Model and Co-Creation which will be divided into three parts. They are-Business Model, Processes and Governance. The full questionnaire including the themes is illustrated in Appendix 1.

1.3   Research Structure

The second chapter will review the existing literature on business models and co-creation. At first, business model will be analyzed. Business model origin and definition will be summarized for providing a clear concept about it. Then, components and the process of business will be discussed for giving a view that how a business model works. After that, business modelling tools will be identified for showing how a business model is constructed. Finally, the contribution of business model in connected health is discussed for providing a big picture.

In the next part in chapter 2, definition of co-creation will be discussed, and components will be identified. After defining and identifying elements of co-creation, the process of creating co-creation and the contribution of co-creation in connected health will be examined. Lastly, co-creation and business will be combined and summarized to provide a clear view of the thesis topic.

In the subsequent chapter which is chapter 3 will cover the method, design, ways of data collection and the steps of data analysis in detail for providing a transparent view by linking theoretical and empirical context. After having a clear picture of the research methodology, the collected data will be analyzed based on the theoretical themes in chapter 4.

In the final chapter, chapter 5, the empirical findings will be combined with the theoretical themes. Differences will be found out based on both theoretical and empirical perspectives and the answer to the research question. Considering the importance, reliability, and validity of the study will be tested along with theoretical, managerial implications, limitations and future research possibilities will be given.

2   RESEARCH CONTEXT

The research context chapter is divided into three parts based on the theme of the study. The first part will discuss the concept of business model, the second part will present the co-creation and the final part will conclude with the summary of the co-creation of business models.

2.1   Business Model

In this chapter, the business model concept will be presented as a phenomenon in business literature. The concept of a business model and its development are related to the rise of the New Economy from 1998 to 2001 (Wirtz, 2011). So, it has been a popular topic since the 1990s in business literature. But the researcher could not find any historical background of business model about how it is evolved and from where it came from. From the scientific articles of Amit and Zott (2001) and Timmers (1998), it can be said that business model was being popularized after the evolution of Internet and e-commerce during 1990s.

In this chapter, a brief evolution of the business model will be discussed along with the variety of definitions of the business model. Next, the researcher will present the different components of the business model which will assist the main theme of the study that is the co-creation of business model for the connected health services in the inDemand project. The researcher will also present how the business model is created and finally, it will conclude with the discussion of the business model for connected health care.

2.1.1   Business Model Origin

The business model has a long background in the academic literature. According to Wirtz (2011), its concept and development are related to the New Economy from these four years (1998-2001). He stated that Osterwalder, Pigneur, and Tucci (2005) discovered that the term business model was first used introduced in an article in 1957 by Bellman and Clark. Wirtz (2011) also said that in 1960, Jones used the title and the abstract of a paper in an article and other usages could be found in McGuire (1965),

the Manson Research Corporation (1966) and Walton (1966) publications. But, in those articles, different authors used them in different circumstances with different meanings rather than used them specifically. So, there was a lack of common research focus as well as common understanding.

Wirtz, Pistoia, Ullrich, and Göttel (2016) said from the articles of Jones (1960) and McGuire (1965) that business model term can be found initially in literature time in an undefined manner. After that, it has been found in the framework of Information Technology which is mainly used as a sense of business modeling (process models). They also stated from Konczal (1975) who only mentioned for the further use of the business modeling regarding apply business models as management tools. For the next consecutive years, business modeling continued as an operative activity for system modeling and strongly defined by functional aspects.

Wirtz (2011) stated from Osterwalder, Pigneur and Tucci (2005) that in the mid-1970s, the actual origin of the business model concept can be found to the beginnings of business informatics where the term was used with the business modeling mostly. He also stated from Lehmann-Ortega, Scgiettl (2005) that the term could be found in information technology journals includes the Journal of Systems Management and specialist magazines such as the Small Business Computer Magazine. The business model term emerged in related to the terms of from the field of computer and system modeling in the scientific literature (e.g., Computerized Models, Computer Assisted Modeling and Information System) just before the beginnings of the 1990s. So, it can be said that business models appeared from information modeling and information production (Teece, 2010).

Wirtz (2011) said that the growing practical importance of information technology drove to an intense interest in business models between 1990 and 1995. Despite being the main point was computer and system modeling, other themes started to do impact to a greater extent for understanding the term of business models. He also mentioned from Ghaziani and Ventresca (2005) that the term business model was used more in a strategic context and other terms including revenue model or relationship management. The concept of the business model got the attraction from the companies with the evolution of the Internet. The term was used in publications remarkably with

the rise of e-commerce along with the Internet. It became popular among corporations, media, and firms of the New Economy and their investors even though it only came in specialist literature before. The importance of the concept of business model related to the New Economy was also appeared by press coverage in economic magazines.

Wirtz (2011) mentioned the usage of the term business model in the financial press between 1995 to 2015. Before 2000, it was used rarely. Because of the Internet boom, it was spread widely and from 2005, the term has been used increasingly. In 2008, it has been increased remarkably though the trend becomes down in the following two years. There was a sharp increase from 2011 to 2013 and in 2014 and 2015, constant high press coverage was reported.

Along with that, scientific literature started to pay more attention to the business model concept. Wirtz (2011) shows the development of business model research based on the three basic perspectives- technology, organization and strategy over the course of time. It is portrayed in figure 1.
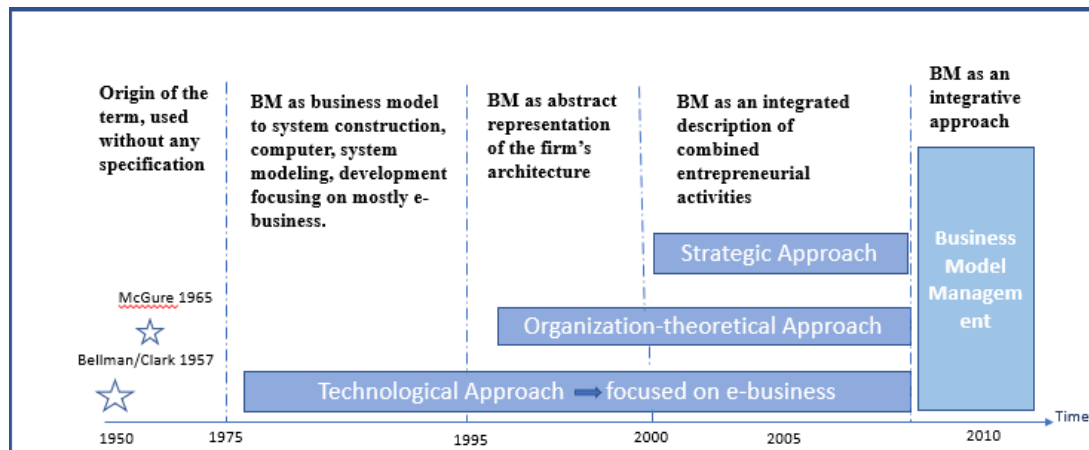
Figure 1: Development of Business Model Concept (adapted from Wirtz 2011: 24 and Wirtz et. al, 2016)

Wirtz et. al (2016) said that most of the business model articles were based on the above three perspectives and the authors mentioned the fundamental works and aspects of all three basic perspectives in their articles (e.g., Afuah and Tucci, 2003; Amit and Zott, 2001; Chesbrough, 2006; Chesbrough and Rosenbloom, 2002; Johnson et al., 2008; Magretta, 2002; Tikkanen et al., 2005; Wirtz et al., 2010; Zott and Amit, 2010).

Another study found from Osterwalder, Pigneur and Tucci (2005) who have identified five phases in the evolution of business model literature. The five phases are based on those kinds of literature which are focused on the business model concept. Table 1 shows the five-phased of the evolution of the business model concept.

Table 1: Business Model Concept Evolution (adapted from Osterwalder, Pigneur and Tucci 2005:6)

Stage	Activity	Outcome	Key Authors
1st	define & Classify business models	definitions & taxonomies	Rappa (2001), Timmers (1998)
2nd	list business model components	"shopping list" of components	Linder & Cantrell (2000), Magretta (2002), Amit & Zott (2001)
3rd	describe the business model element	components as building blocks	Afuah & Tucci (2001; 2003), Hamel (2000), Well & Vitale (2001)
4th	model business, model elements	reference models & ontologies	Gordijn (2002), Osterwalder & Pigneur (2002)
5th	apply the business model concept	applications & conceptual tools	

In the first phase of the classification, Osterwalder, Pigneur and Tucci (2005) states that it was the phase when the business model became important and authors defined the business model term and classifications (Timmers 1998; Rappa 2001). In the next phase, authors began to complete the definitions by suggesting the elements which can be part of business models. But they were simple "shopping lists" where they were referring only to the components of a business model (Chesbrough and Rosenbloom 2000; Linder and Cantrell 2000; Petrovic, Kittl et al. 2001; Magretta 2002). It was only in the third phase where the authors gave detailed descriptions of these components (Hamel 2000; Weil and Vitale 2001; Afuah and Tucci 2003). Osterwalder and Pigneur's (2010) business model canvas is one of the popular business models where they combined nine components including- value proposition, revenue streams, cost structure, customer relationships, channels, customer segments, key activities, key resources, and key partnerships. Ahokangas, Juntunen and Myllykoski (2014b) have recently introduced a tool named a business model wheel which is more relevant for action-based business modeling. This tool is influenced by Locus, Focus and Modus view of the business modeling. Unlike the value proposition in the business model canvas (BMC), business opportunity is at the core of the consideration in the business model wheel. With that at the core, BMW asks the company what, how and why, depending on their environmental location (internal or external) questions to the business activities.

In the next phase, researchers started to model the conceptual components and tested those more precisely. As a result, this work is driven to the proposition of business model meta-models in the form of reference models and ontologies (Gordijn 2002; Osterwalder 2004). In the final phase, those reference models are being applied in the management and in the information system application.

Al-Debei and Avison (2010) mentioned in their article that the business model concept is viewed in the context of different domains by some researchers. Most of the research into business models in the information system field based on eBusiness and eCommerce and there have some attempts for developing convenient classification schemas. Such as definitions, components and classifications into eBusiness models have been recommended (Alt and Zimmermann, 2001; Afuah and Tucci, 2003). They also stated about other researchers who have applied business model concept in the

areas of business management and strategy (Linder and Cantrell, 2000; Magretta, 2002), the telecom sector including mobile technology along with its services (Bouwman et al.,2008; Al-Debei and Fitzgerald, 2010), software industry (Rajala and Westerlund, 2007), and eGovernment (Janssen et al.,2008).

The concept of the business model is a candidate for replacing the industry as a unit of analysis (Osterwalder, Pigneur and Tucci, 2005). According to Zott, Amit and Massa (2011), business model has been mainly used for addressing or explaining three issues: (1) e-business and the use of information technology in organizations; (2) strategic issues, such as value creation, competitive advantage, and firm performance; (3) innovation and technology management.

The business model concept is viewed differently by different authors. The next section for defining the business model will provide a more concrete idea about the business model.

2.1.2   Defining Business Model

Business models are essential to ecosystem thinking because they have an important role in differentiating open innovation from earlier research on inter-organizational collaboration in innovation (West and Bogers, in press). Teece (2010) and Chesbrough (2010) mentioned that the purpose of a business model is to create and capture the value and it is the tool for innovation commercialization.

Ahokangas and Myllykoski (2014a) mentioned in their article business models have been mentioned as an "architecture" (Teece, 2010; Timmers, 1998), a "recipe" (Baden-Fuller and Morgan, 2010; Sabatier, Mangematin and Rousselle, 2010) a "design" (Smith, Binns and Tushman , 2010) representing the firm's core logic, a "narrative" (Magretta, 2002; Geroge and Bock 2011) a "cognitive map" (Chesbrough, 2010) or an "actualization of decisions and actions" (Tikkanen, Lamberg, Parvinen and Kallunki, 2005) for competitive advantage within academic literature. Business models have been linked to the fundamental challenges for the process of gaining competitive advantage and profits of a firm by creating and capturing value (Smith, Binns and Tushman, 2010; Zott, Amit and Massa, 2011). According to Teece (2010), the business

model has to meet customer needs and be non-imitable for reaching a competitive advantage because successful business models aim to be imitated very quickly. Ahokangas and Myllykoski (2014a) mentioned an example from Zott and Amit (2010) that the overall objective of the firm's business model is to exploit the business opportunity as it is built upon a business opportunity for gaining competitive advantage (Teece, 2010; Zott, Amit and Massa., 2011). Morris, Schindehutte, and Allen (2005) mentioned that the business model develops continuously through specification, refinement, adaptation, revision, and reformulation so it is never static. So, for adopting or building a view of the business model, content (i.e., the "what") and process (i.e., the "how") aspects have become important in business (Zott, Amit and Massa, 2011).

The above-mentioned description shows the viewpoint of different authors which provides a basic understanding of the business model though it also makes vagueness about the definitions for having so many meanings. Here, fourteen definitions from different authors in a chronological order based on the time when the study was established are portrayed in the following. Those studies published in the same year; the researcher has illustrated them based on the alphabetical order of the first author of the paper by the last name. In the table, the left column has shown the citations and the right column has presented the definition.

Table 2: Variations of Business Model Definitions

Author	Definition of a Business Model
Timmers (1998)	"The business model is an architecture for the product, service and information flows, including a description of the various business actors and their roles; and a description of the potential benefits for the various business actors; and a description of the sources of revenues"
Chesbrough & Rosenbloom (2002)	"We offer an interpretation of the business model as a construct that mediates the value creation process"
Magretta (2002)	"Business model answers the questions such as who is the customer, what does the customer value, how do we make money in this business, what is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost."
Osterwalder, Pigneur, and Tucci (2005)	"A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offer to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams."
Shafer, Smith, and Linder (2005)	"Business is fundamentally concerned with creating value and capturing returns from that value, and a model is simply a representation of reality. We define a business model as a

	representation of a firm's underlying core logic and strategic choices for creating and capturing value within a value network."
Tikkanen, Lamberg, and Parvinen (2005)	"We define the business model of a firm as a system manifested in the components and related material and cognitive aspects. Key components of the business model include the company's network of relationships, operations embodied in the company's business processes and resource base, and the finance and accounting concepts of the company."
Voelpel, Leibold, Tekie and Von Krogh (2004)	"The particular business concept (or way of doing business) as reflected by the business's core value proposition(s) for customers; its configured value network to provide that value, consisting of own strategic capabilities as well as other (e.g. outsourced/alliance) value networks; and its continued sustainability to reinvent itself and satisfy the multiple objectives of its various stakeholders."
Chesbrough (2007)	"The business model performs two important functions: value creation and value capture. First, it defines a series of activities, from procuring raw materials to satisfying the final consumer, which will yield a new product or service in such a way that there is net value created throughout the various activities. Second, a business model captures value from a portion of those activities for the firm developing and operating it."
Zott & Amit (2007) and Zott & Amit (2011)	"A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities. A business model elucidates how an organization is linked to external stakeholders, and how it engages in economic exchanges with them to create value for all exchange partners." "The business model has been mainly employed in trying to address or explain three phenomena: 1) e-business and the use of information

	technology in organizations; 2) strategic issues, such as value creation, competitive advantage, and firm performance; and 3) innovation and technology management." (2011:8)
Johnson, Christensen, and Kagermann (2008)	"A business model consists of four interlocking elements (customer value proposition, profit formula, key resources, key processes) that taken together create and deliver value."
Storbacka & Neonen (2009)	"Business models are defined as configurations of interrelated capabilities, governing the content, process, and management of the interaction and exchange in dyadic value co-creation."
Teece (2010)	"A business model articulates *the logic*, the data, and other evidence that support a value proposition for the customer, and a viable structure of revenues and costs for the enterprise delivering that value. It's about the benefit the enterprise will deliver to customers, how it will organize to do so, and how it will capture a portion of the value that it delivers."
Demil and Lecocq (2010)	"Business model is the way activities and resources are used to ensure sustainability and growth."
Onetti, Zucchella, Jones, and Mcdougall-Covin (2012)	"The business model as the way a company structures its own activities in determining the *focus, locus,* and *modus* of its business."

The above table shows the variations of business model definitions which provide a clear idea about the business model. The definition from Osterwalder, Pigneur and Tucci (2005), "A business model is a conceptual tool…. with which financial

consequences" is broad enough to embrace the different business model reflections that emerged in different fields such as, e-business, IS, computer science, strategy or management (Pateli and Giaglis, 2003). A literature review using the term business model shows a continuum between actors using the term simply to refer to a company's way of doing business (e.g. Galper 2001; Gebauer and Ginsburg 2003) and authors emphasizing the model aspect (e.g. Gordijn 2002; Osterwalder 2004). These two points of view differ because the former generally refers to a company's way of doing business, while the latter refers to conceptualizing a company's way of doing business for reducing complexity to an understandable level. In other words, the quest for business models is to identify the elements and relationships which describe the business a company does. Thus, it is best to understand the business model concept as a conceptual view of a particular aspect of a particular company (Osterwalder, Pigneur and Tucci, 2005).

On the other hand, Nenonen and Storbacka (2010) stated, although all researched studies suggest different definitions for business models, some similarities can be identified. First, *customer value creation* is one of the major elements of most business model definitions. Customer value creation is examined under different terms like 'value creation design', 'value proposition' or 'create value', but the main content of these terms remains the same: the business model must explain how the firm creates value for its customers. Second, *the earnings logic* is also referenced in different definitions of the business model (with terms like 'profit potential', 'revenue model', 'revenue logic', 'capture value', 'profit formula', or 'returns for stakeholders'). It can, therefore, be concluded that the business model should also explain how the firm is profiting from its operations. Third, many definitions of the business model explain the firm's *value network* with terms like 'structure of value chain', 'value network', 'links to external stakeholders', or 'transactional links to exchange partners'. Thus, the literature review findings show that the business model construct should be also "externally oriented and illuminate the relationships" that the firm has in its value network with the different actors. Fourth, different definitions of business model discuss the firm's *resources and capabilities* (with terms like 'core competency', 'resource', 'asset', or 'processes', 'activities'). It can, therefore, be concluded that the firm's resource and capability base should also be illustrated by a comprehensive business model framework. Finally, some types of *strategic decisions, choices or*

principles are discussed by most of the business model definitions which are analyzed. These decisions are discussed in terms of 'target market', 'target customer', 'position within value network', 'competitive strategy', or 'rules'. The literature review, therefore, shows that the construct of the business model can also explain the firm's major strategic decisions.

Different definitions discuss different views from different authors. But the main theme is the same in the business model- that is value creation. For creating value, the business model has to have some elements or components. In the next section, elements or components of business model are discussed.

2.1.3   Components of Business Model

In the previous section, the researcher has shown different viewpoints of authors towards the business model concept. Like the variations in the business model, many studies also differ in the components of the business model. Researchers have similarly different views on the various business model components like as the differences in the definition of business models.

Here, in the following paragraphs, the researcher will present the most commonly used components or elements of a business model with one statistical table which have appeared in various publications. She accumulates four different journal publications that have presented logical meaning and definition of the business model. Shafer, Smith and Linder (2005) reviewed relevant literature and found 12 definitions from established publications among the years of 1998-2002. Though those definitions are not accepted from the business community because of the emergence from different perspectives such as e-business, strategy, technology, and information systems of the viewpoint of different authors by seeing those in different angels. From these 12 definitions, they found 42 different business model components: unique building blocks or elements. Shafer, Smith and Linder (2005) showed an affinity diagram from Pyzdek, (2003) by reducing its 20 different components. They classified the business model components which were mentioned twice or more in the definitions by this diagram. The affinity diagram showed four major categories, such as strategic choices, creating value, capturing the value and the value network.
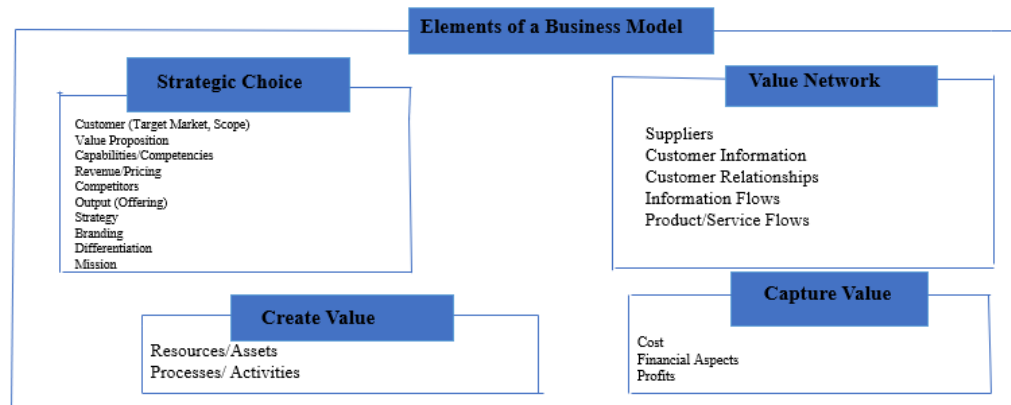
Figure 2: Components/Elements of Business Model Affinity Diagram (Adapted from Pyzdek, 2003 via Shafer, Smith and Linder, 2005: 202)

Similarly, Morris, Schindehutte and Allen (2005) analyzed 19 definitions and showed tabular presentation of a total of 24 different items as possible components along with 15 receiving multiple notions. The most frequently mentioned components are- firm's value offering (11), economic model (10), customer interface/relationship (8), partner network/ roles (7), internal infrastructure/ connected activities (6), and target markets (5).

In 2011, Zott, Amit and Massa (2011) published an article for the recent developments and future research on a business model where they discussed the emergence of the business model, components in the light of the e-business model and found four different themes of the business model. They read 133 publications and ended up with the result of analyzing 103 publications.

Onetti et. al (2012) did a broad analysis among the above authors. They reviewed 70 definitions published from 1996 to 2009. Their research was inspired by Shafer, Smith and Linder (2005). For avoiding redundancy, they reduced articles and used 48 definitions for analysis. They reviewed the components from Shafer, Smith and Linder (2005) and reduced it to 26 components. It is portrayed in the following table.

Table 3: Business model components (Adapted from Shafer, Smith and Linder, 2005 via Onetti et. al, 2012)

Components	1996-2002	2002-2009	Total
Mission/objectives			
Mission	2	3	5
Value Creation	6	6	12
Sustainability	6	5	11
Exploitation	1	1	2
Innovation	1	5	6
Corporate Identity/Reputation/Culture	2	3	5
Strategy			
Strategy	2	4	6
Value Proposition/Offering	12	20	32
Competitors/Competitive Environment	3	6	9
Differentiation/Cost Leadership/Pricing	9	10	19

Focus			
Processes/Activities/Value Chain	10	15	25
Resources/Assets	5	11	16
Competencies/Capabilities	5	5	10
Modus			
Partners/Actors/Suppliers/Value Network	11	19	30
Customers/Customer Relationship	10	18	28
Information flows	3	3	6
Transaction	1	5	6
Infrastructure/Infrastructure Management	6	6	12
Functionalities/Supporting Processes	2	1	3
Technology	2	4	6
Locus			
Location	0	1	1
Finance			
Revenue	11	13	24
Costs	2	9	11
Profit	3	8	11
Financial aspects	3	8	11

Cash flow	1	1	2

For this master's thesis, the researcher has considered the above 26 components from Onetti et. al (2012) which is more constructed over the other three articles. In this table, the researcher has included, and summarized information based on 48 definitions of different authors. She has divided this table into two clusters. The first column shows data from 1996 to 2002 and the second column provides data from 2002-2009. This table portrays a clear insight which components of business model has mostly mentioned in academic publication and which components have received less attention.

There are three components that have been mentioned more than any other components. They are- value proposition/offering, partners/actors/suppliers/value network and customers/customer relationship. Along with three components, there are eleven more components that have an important role in the business model. The researcher has chosen those because they are the most mentioned components in academic publications.

Here is a list of fifteen business model components of the business model.

- o Value Proposition/Offering
- o Partners/Actors/Suppliers/Value Network
- o Customers/Customer Relationship
- o Processes/Activities/Value Chain
- o Revenue
- o Differentiation/ Cost Leadership/Pricing
- o Resources/Assets
- o Infrastructure/Infrastructure Management
- o Value Creation
- o Cost
- o Profit
- o Financial Aspects

o Competencies/Capabilities

o Competitors/Competitive Environment

o Technology

The researcher has organized this list chronologically from the highest total to the lowest total. She has also included technology though it has a lower total because she has considered it as one of the vital components of business model for the interest of this study. This list of components will be later used to form the data collection interview framework which will help to co-create the business model for connected health services.

According to the list, value proposition, value network, and customers are the most important elements for defining the business model. Other components like processes, revenue or revenue model, pricing, infrastructure, value creation, cost, and profit are also compulsory for structuring the business model.

Besides, Voelpel et. al (2004) identified three generic elements in business models- new customer value proposition (which could also involve new customer base), a value network (re) configuration for that value creation and leadership capabilities which ensure the satisfaction of relevant stakeholders. Osterwalder (2004) stated that there are three streams of business model which is critical to business including, firstly, the value stream- identifies the value proposition for the business partners and the buyers; secondly, the revenue stream- a plan which is for assuring revenue generation for the business; and thirdly, the logical stream- addresses various issues which are related to the design of the supply chain for the business (Mahadevan, 2000). On the other hand, he mentioned from the article of Afuah and Tucci (2003) that explained the business model concept which should include answers to a number of questions of business model which is given in the following table:

Table 4: Components of a business model (Adapted from Afuah and Tucci, 2003 via Osterwalder, 2004:31)

Components	Questions for all business models
Customer Value	The firm must ask itself whether it offers its customers something unique or at a cheaper price than its competitors.
Scope	A company must define which customers it offers value and what set products and services embody that value.
Pricing	Pricing refers to how the value it offers is determined by a firm price.
Revenue Stream	A firm has to ask itself where the income comes from and who is going to pay for what value and when. In each market, it must also define margins and determine what drives them.
Connected Activities	The connected activities decide which set of activities the firm has to carry out in order to offer its value and when. It explains the connection between activities.
Implementation	A company must ask itself what the best organizational structure, systems, people, and

	environment for the connected activities is. The fit between them must be defined.
Capabilities	A firm needs to find out what its capabilities are and what capacity gaps need to be filled in. It is necessary to ask itself whether there is anything unique about these capabilities that allow the firm to offer the value better than other firms, making it difficult to imitate them.
Sustainability	A company should know "what it is about the firm that makes it difficult for other firms to imitate". It has to define how it can continue to make money and maintain a competitive advantage.

Osterwalder (2004) also mentioned from Stähler (2001; 2002) that a business model has four components. Firstly, value proposition means a business model includes a description of the value receives from the business by a customer or partner (e.g. a supplier). Secondly, the product which is between the firm and the customer. Thirdly, architecture means a business model includes the description of value creation architecture. And finally, revenue model, the basis and sources of income of the firm are described by the business model and the value and sustainability of the business are decided by the revenue model.

Though there are different components of the business model, a business model can perform better if it combines all the components for offering products and services to the customers.

2.1.4   How Business Model is Created

For the creation of a business model, Neonen and Storbacka (2010) proposed a business model framework that includes three types of components. Such as design

principles, resources, and capabilities. They proposed it to describe the managerial opportunities of a focal firm to influence value co-creation.

Design principles They are the first component of the creation of the proposed business model. Neonen and Storbacka (2010) mentioned from Baldwin and Clark (2006, p. 3) define designs as 'instructions based on the knowledge that turn resources into things that people use and value'. They also said, "In the proposed business model framework the design principles guide the organizational capabilities in such a way that resources can be optimally integrated in the value co-creation processes."

Resources It is the second component of the proposed business model framework. Neonen and Storbacka (2010) stated from Vargo and Lusch (2008), "The importance of resources in value co-creation is highlighted e.g. in the S-D logic, which states that the application of operant resources, i.e. service, is the fundamental basis of exchange and that all social and economic actors are resource integrators." They referred from Vargo and Lusch (2008) that resources of a firm can be classified into operand and operant resources where operand resources are tangible, static which require some action to make them valuable and operant resources are intangible, dynamic which are able to create value.

Capabilities It is the third component of the proposed business model framework. Neonen and Storbacka (2010) stated from Day (1994, p. 38) who defines capabilities as "complex bundles of skills and accumulated knowledge, exercised through organizational processes, that enable firms to coordinate activities and make use of their [resources]". A way is referred by Ramirez and Wallin (2000) and Blois and Ramirez (2006) by Neonen and Storbacka (2010) are for categorizing capabilities whether the creation of value is focused internally or externally. Here, internal capabilities are for improving the efficiency and operational performance of key business processes and relational (inter-organizational) capabilities are for effectively manage practices that are related to the content and structure of interaction and exchange between supplier and customer.

All the proposed components of creating a business model are present in four dimensions including, market, offering, operations, and management. And, this

business model framework has twelve interrelated elements which are shown in the following table:

Table 5: Business Model Framework (Neonen and Storbacka, 2010: 7)

	Design Principles	Resources	Capabilities
Market	Market & customer definition	Customers & Brand	Market & customer management
Offering	Offering design & earnings logic	Technology Offering	Management & R&D
Operations	Operations design Infrastructure	Suppliers & Partners	Sourcing, production & delivery
Management	Management system	Human & financial resources	Management & leadership

In this business model framework, *market-related design principles* are market and customer definitions which are for answering to questions for example, how the firm defines its market, how the firm positions within that market, what is the firm's go-to-market or channel strategy, what are the firm's target customers based on its customer definition, and how the firm has segmented its existing and potential customer base. Customers and brands are the main market resources related to markets. Market and customer management can be defined as the main market-related capabilities. Such as customer and market insight processes (Day, 1994) market-making and shaping, sales and account management, customer experience management, customer relationship management, and customer service management. In this framework, the design principles which are related to offering are called offering design and earnings logic.

Offering design shows the offering components available and the possible offering configurations and earnings logic shows how the firm makes a profit from its operations, and it is affected by the firm's pricing logic, cost structure, and asset structure. Technology and the related intellectual property rights are the main offering-related resource and offering management and R&D are the main offering-related capabilities. The operations design includes the design principles which guide the firm's operations. The firm's infrastructure, suppliers and partners are the main resources that are linked with operations. The firm's infrastructure also contains information and communication technology infrastructure and the geographical coverage of the firm. Operations capabilities are how the firm does its sourcing, production and delivery processes.

The design principles which are related to management is called a management system. The management dimension of the business is human and financial resources. Management and leadership are the main management capabilities. Capabilities that are related to management and leadership can be found from planning and control processes, human resource development processes and the firm's strategy process. Neonen and Storbacka (2009) suggested that "the effectiveness of a business model in value co-creation is defined by the internal configurational fit between all business model elements and the external configurational fit between provider's and customers' business models".

On the other hand, Dubosson-Torbay, Osterwalder, and Pigneur (2002) suggested an eBusiness Model framework which is divided into four main components. Such as, 1) the products and services a firm offers, representing a substantial value to a target customer (value proposition), and for which he is willing to pay, 2) the relationship capital the firm creates and maintains with the customer, in order to satisfy him and to generate sustainable revenues, 3) the infrastructure and the network of partners that are necessary in order to create value and to maintain a good customer relationship and 4) the financial aspects that can be found throughout the three former components, such as, cost and revenue structures.
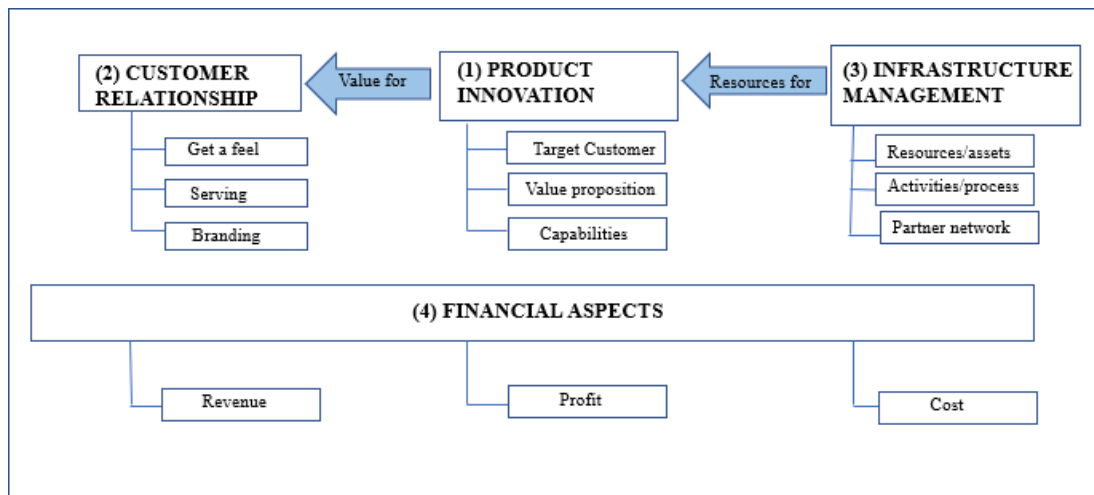
Figure 3: eBusiness Model Decomposition (Adapted from Bertolazzi et. al., 2001 via Dubosson-Torbay, Osterwalder and Pigneur, 2002:18)

By the suggested eBusiness framework can help managers to design a new business model and also ask the right questions, for example, "what is exactly my value proposition? How do I get a good feeling about the needs of my target market? To deliver the intended added value to the market, what would be the required and most appropriate resources and assets?" (Osterwalder et. al, 2002 from Bertolazzi et. al, 2001)

Thus, a company can choose how a business model is created as the business model of a company is an important portrayal of how the business is done by a company. In spite of the business size or the industry where the business operates, a business model specifies how an organization creates and delivers products or services, specific business processes, infrastructure, customer acquisition strategies and the intended customer base (Investopedia, 2019).

2.1.5   Business Modeling Tools

Business modeling tools provide a structural framework for creating a business model for the business. In the following, the researcher will describe some important business modeling tools. She will start with Gary Hamel's Business Model Bridge Model, continue with business model canvas and lean canvas and finally with the business model wheel.

Gary Hamel's Business Model Bridge Model

Gary Hamel is the founder and the chairman of Strategos and also a Visiting Professor of Strategic and International Management at the London Business School, and the Thomas S. Murphy Distinguished Research Fellow at Harvard Business School (Hamel, 2000). He talked about business innovation in his article. He said that the major entity that is being analyzed for innovation is not a product or a technology but a business concept in the new economy. Those who have the capacity to redefine their existing business models (business concepts, put into action) for creating new value for customers, rude surprises for competitors and new wealth for investors. Hamel (2000) said that a business model includes four major components such as- core strategy, strategic resources, customer interface, and value network.

Core strategy includes a company's business mission (the objective of the company's strategy), its product or market scope (where the company competes) and its basis for differentiation (how the company competes and how differently) are the elements that consist a company's core strategy. Hamel (2000) provides some questions for developing ideas for business concept innovation including, "Is our business mission as relevant to customers as it might have been in years past? Do we have a business mission that is sufficiently distinguished from the missions of other companies in our industry? Could we offer customers something closer to a 'total solution' to their needs by expanding our definition of product scope?".

Strategic Resources A significant competitive advantage can be achieved if the company has specific resources. And if the resource base change completely, it can be a source of business concept innovation. Hamel (2000) said these resources include three elements, such as, core competencies (what a company knows), strategic assets (what a company owns), and core processes (what a company actually does). The innovation in this area leads to some of the questions for example- "What are the deep benefits that our core competencies allow us to deliver to customers? How could we deploy those benefits in new ways or in new settings? Could our strategic assets be valuable in other industry settings?" etc.

Customer interface. Because of the Internet, there is a radical shift for the ways to reach consumers by the producers. The channels that a company uses for reaching customers, the information that it provides them, the way it manages the dynamics of and communication within its customer relationships and the way it structures prices, all are changed remarkably in the recent history. And it will be continued to change in the age of revolution. For the innovation, Hamel (2000) provided some questions including, "Could we make the process of fulfillment and support substantially easier or more enjoyable for customers? Have we given our customers the information they need to make empowered and intelligent purchasing decisions?"

Value network. The value network includes the suppliers, partners, and coalitions that surround the firm and complementing and amplifying the resources. Hamel (2000) provided some questions for business concept innovation ideas. They are- "How effectively are we using suppliers as a source of innovation? What opportunities might be available to us if we could 'borrow' the assets and competencies of other companies and marry them with our own?".

There are three "bridge" components that are linked by the above four major components.

Configuration. It is the unique way to intermediate between a company's core strategy and its strategic resources which combines and interrelates competencies, assets, and processes for a particular strategy. Hamel (2000) provided some questions for it. They are- "Have we configured our assets, skills, and processes in unique ways? Can we imagine very different configurations than what we have at present?".

Customer benefits. It is the bundle of benefits that are being offered to the customer- how customer-derived needs are being satisfied by intermediating between the core strategy and the customer interface. Two questions are provided by Hamel (2000) which business concept innovators will ask themselves. They are- "Are you delivering benefits that customers don't really care about? Can you change the benefit bundle in ways that will surprise customers and frustrate competitors?".

Company boundaries. By intermediating between a company's strategic resources and its value network are those decisions that have been made about the work a firm does and what it contracts out to its value network. When a firm changes the boundaries between what the firm will do for itself and what it will hire others to do, it will be an important contributor to business concept innovation.

There are four factors to determine the profit potential which are based on the business model. They are-

- Efficiency
- Uniqueness
- Fit
- Profit Boosters

In this model, it is clearly seen that Hamel (2000) used "innovation" and "opportunity" words that show the process of understanding the business model. Along with the description of the factors of the business model, he mentioned ten design rules for innovation, new innovation solution and the wheel of innovation.
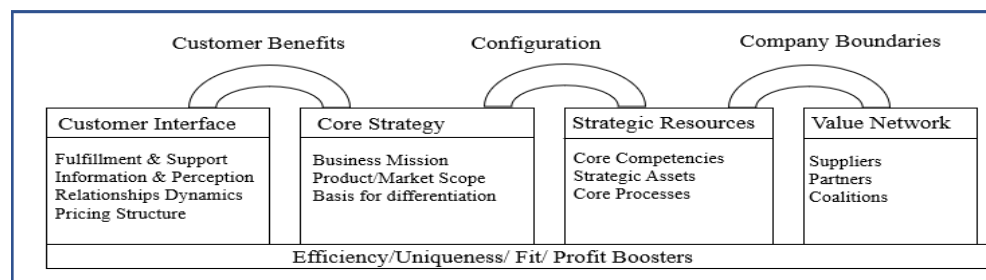
Figure 4: Business Bridge Model (Hamel, 2000: 4)

Business Model Canvas

The business model canvas is a strategic management and lean startup template for developing new or documenting existing business models. Osterwalder and Pigneur (2010) developed business model canvas which consists nine building blocks.

They are-

- **Customer Segments**
- **Value Propositions**
- **Channels**
- **Customer Relationships**
- **Revenue Streams**
- **Key Resources**
- **Key Activities**
- **Key Partnerships**
- **Cost Structure**

Customer Segments refers to those groups of people an organization wants to serve. Customers are the center of any business model. For satisfying the customers, the company needs to divide the customers into specific segments based on the common needs, common behaviors or other attributes. One or several large or small customer segments are defined by the business model. There are different types of customer segments including mass market, niche market, segmented, diversified and multi-sided platforms (multi-sided markets). Once the customer segments are decided by the organization in which they want to serve, then the business model can be designed for serving particular customer needs (Osterwalder and Pigneur, 2010). **Value Proposition** "describes the bundle of products and services that create value for a specific Customer Segment". It is the reason why a customer chooses one company over another. It can solve a specific problem or customer need. Newness, performance, customization, 'Getting the job done', design, brand/status, price, cost reduction, risk reduction, accessibility, convenience/usability are the elements for creating customer value. **Channels** or mediums refer "how a company communicates with and reaches its Customer Segments to deliver a Value Proposition". They are considered as customer touchpoints that play a crucial role in the customer experience. Channels have five different phases including awareness, evaluation, purchase, delivery, and after-sales which can help an organization to have great customer experience and increase revenues.

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
	Key Resources		Channels	
Cost Structure		Revenue Streams		

Figure 5: Business Model Canvas (Osterwalder & Pigneur, 2010:44)

Customer Relationships refers to "the types of relationships a company establishes with specific Customer Segments". A company must define the type of customer relationship which it wants to build with each Customer Segment. There are several types of relationships that can help a company to create its relationship with a particular customer segment. Such as personal assistance dedicated to personal assistance, self-service, automated services, communities, and co-creation. **Revenue Streams** describes "the cash a company generates from each Customer Segment (costs must be subtracted from revenues to create earnings)". They are considered arteries of business models. A company needs to create one or more Revenue Streams for each Customer Segment by answering this question 'For what value is each Customer Segment truly willing to pay?'. Osterwalder and Pigneur (2010) said that a business model can engage with two different types of Revenue Streams. They are- Transaction revenues which can result from one-time payments and recurring revenues which can result from ongoing payments to either delivering a Value Proposition to customers or providing post-purchase customer support. They also provide some ways to generate revenue streams including asset sale, usage fee, subscription fees, lending/renting/leasing, licensing, brokerage fees and advertising. **Key Resources** refers "the most important assets required to make a business model work". Key resources are the requirement of every business model which helps an organization by creating and offering Value Proposition, reaching markets, maintaining relationships with Customer Segments and earn revenues. They can be physical, financial, intellectual or human. **Key Activities** describes "the most important things a company

must do to make its business model work". Key resources and key activities both vary depending on the type of business model. It can be classified including production, problem-solving and platform/network. **Key Partnerships** refers "the network of suppliers and partners that make the business model work". For enhancing the company business models, reducing risks or acquiring resources, companies create partnerships. Osterwalder and Pigneur (2010) categorized four different types of partnerships. Such as, Strategic alliances which are between non-competitors, Coopetition which are strategic partnerships between competitors, Joint ventures which are for developing new businesses and Buyer-supplier relationships which is for assuring reliable supplies. And, finally **Cost Structure** describes "all costs incurred to operate a business model". While operating a particular business model, most important costs are incurred. All the activities such as creating and delivering value, maintaining Customer Relationships and generating revenue cause costs. After deciding Key Resources, Key Activities and Key Partnerships, such costs can be easily calculated. Costs should be reduced in every business model. Many business models can fall into two cost structures including cost-driven and value-driven in which first one focuses on minimizing costs and the other one focuses on value creation.

Lean Canvas

It is inspired by the Business Model Canvas. Ash Maurya (2012) created and licensed and named it Lean Canvas. He started it with the worksheets at the end of Steve Blank's book: "The Four Steps to the Epiphany". It refers to a business model validation tool. It helps the organization to document business models, measure progress and communicate learning with organization's internal and external stakeholders. It is a very suitable tool for startup founders. It is a 1-page canvas and also a transformational tool. Rather than focusing on alternative approaches like in business model canvas, it is based on customer-centric approach. It also has nine components like business model canvas. They are- Problem, solution, unique value proposition, unfair advantage, customer segments, key metrics, channels, cost structure, and revenue streams.

In those components value proposition, customer segments, channels, cost structure, and revenue streams are common with business model canvas which described earlier.

He paired problems and customer segments because it can drive the rest of the canvas. He said the Unique Value Proposition (UVP) is the most important component and at the same time, it is hard to get it right. So, UVP needs to be different and the difference needs to matter. He points that at first, the problem should be identified and then customer segment should be targeted so that UVP can be carefully designed. He also points out it needs to be perfect right away; it can be started with the guess and then go over from there. After having the problem, customer segments and UVP, it is needed to formulate the top features or capabilities to each problem. He emphasizes to bind a solution to a problem as late as possible. When an organization is in the process of "Customer Discovery/Interview", it forces them to establish a path to reach to the customers. And it is very important to find, build and test a significant channel to reach the customers. He marks that in case of revenue streams and cost structure, an organization should be sincere about it so that it can set the right expectations, raise customer commitment, start generating cash flow, lets it tackle one of the riskier parts of its business model. Key metrics refer to key activities like the business model canvas. The hardest and complex component of this canvas is unfair advantage. Maurya (2012) suggests if startup business wants to build a successful business, it needs to think how it can be unique than others and how it can make its uniqueness matters. There are some examples of unfair advantage. They are- insider information, the right "expert" endorsements, personal authority.

So, the lean canvas is a next-generation modeling tool which adapted from the business model canvas based on identifying the problem and the whole model is built based on it. It also helps entrepreneurs to learn continuously. And it is not a static tool like business model canvas.

Problem	Solution	Unique Value Proposition	Unfair Advantage	Customer Segments
Top 3 problems	Top 3 features	Single, clear and compelling message which defines why you are different and worth buying	Can't be duplicated or bought easily	Customers which are targeted
	3		**7**	
1	**Key Metrics** Key activities which you measure **6**	**2**	**Channels** Way to reach customers **4**	**1**
Cost Structure Customer Acquisition Costs Distribution Costs Hosting People, etc. **5**		**Revenue Streams** Revenue Model Life Time Value Revenue Gross Margin **5**		

Figure 6: Lean Canvas (Maurya, 2012: 42)

Business Model Wheel

Ahokangas, Juntunen, and Myllykoski (2014b) developed a business model tool named Business model wheel (BMW). It is more appropriate for action-based business modeling. This tool is influenced by Onetti et al.'s (2012) Locus, Focus and Modus view to business modeling. The business opportunity is the center in the business model wheel whereas the value proposition is at the heart of the consideration in business model canvas (BMC). When, what, how, why and where are the main questions of BMW to the business activities of the company by keeping opportunity at the center.

Business modeling is considered as an opportunity centric cyclic process. The concept of business model is provided by the business model canvas which brings tremendous momentum in the practice of business model as models. On the other hand, the business model wheel is introduced by Ahokangas et al. (2014b) where they contend that business opportunities as the heart of business modeling rather than value proposition. This viewpoint to business model looks at the way a company does business which depends on what opportunity is there in the market to exploit. Usually companies want to find an opportunity that suits their resources and competencies, and, in some cases, companies lack a good enough market opportunity in spite of having resources and offers for the market. So, they need to find new opportunity and

coordinate their overall business model with it by keeping the business opportunity at the center in such cases (Gomes et al., 2015)

According to Ahokangas et al. (2014b) marks a business model wheel template helps what companies are offering to their customers regarding products/services and value proposition, how and where they are planning to do that in practice and why do they think they can do it profitably. It covered the following element: "(1) what, comprising offering, value proposition, customer segments, and differentiation, (2) how, covering key operations, basis of advantage, mode of delivery, and selling and marketing, (3) why, describing base of pricing, way of charging, cost elements, and cost drivers, and (4) where are all these items located, internally or externally to the firm".
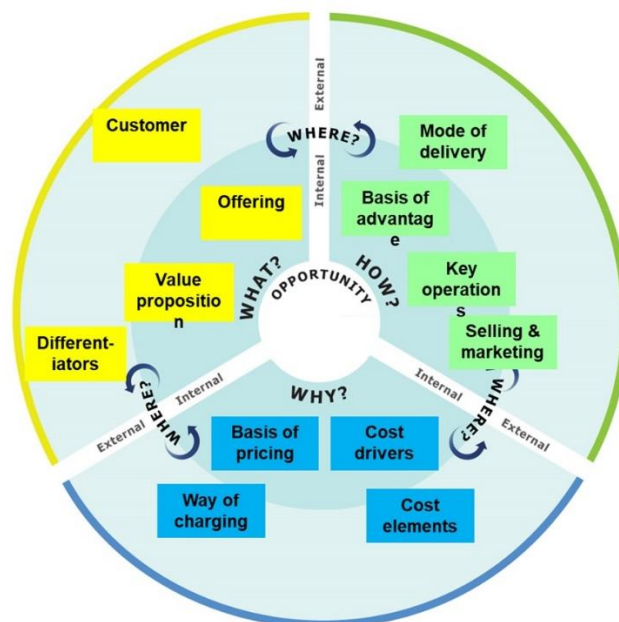
Figure 7: Business Model Wheel (Ahokangas, Juntunen and Myllykoski, 2014b)

So, the business model wheel tool is a transformational tool that helps companies to change their business model elements for being a successful company. Changes can be occurred based on the four elements of the business model wheel- what, how, why and where. The main focus point in this tool is business opportunity instead of value proposition. Companies need to find new opportunity and put it in the center by aligning it with their business model for staying profitable and competitive in the market.

2.1.6   Business Model for Connected Health

As the focus of lean canvas and business model wheel are closely related- one is problem identification and another one is to identify a business opportunity, the researcher has considered both are most appropriate for designing a business model. In the case of the thesis, following the same way-finding the research gap (problem identification) and opportunity creation at the center and creating a value proposition based on that. If business models for connected health can be designed in such ways, they will be successful.

Vertical-Horizontal-Oblique Business Model in Connected Health

Ahokangas (2015) mentioned from Messerschmitti and Szyperski (2003) who explained that ICT ecosystems and introduced a model of the roles which is within the ICT businesses. Based on this model, He presented three business model which can be employed in the ICT sector. **A vertical business model** is the first traditional generic model that can be employed by most infrastructure and technology providers. They think they need to create value for their customers for being competitive. So, they can live in value creation economy which is trapped inside their own selected verticals.

A horizontal business model is the second traditional generic business model that is employed by most service-oriented and consumer business companies. For being competitive they need to serve, grab customers and reach beyond different customer segments so that they can capture as much as the value from their customers. Such as, mobile operators pay attention to ARPU (average revenue per user) which is a measure of their success. Like those companies that use vertical business models, these companies also live in value capture economy and their main task is to exploit the customers and protect their existing position against competition. They are becoming more cost-aware and not being innovative because of being at the earlier stages of their development. According to Starak (2004), because of lack of options companies at first are forcefully vertical and when infrastructure matures, they go for horizontal. However, the story of internet era has been quite opposite than it. Internet or IT enabled businesses start with horizontal business models and then become vertical companies after adopting vertical business model.

For fast-growing and service-oriented companies, an **oblique business model** is appropriate which is the third emerged generic business model. By using this model, these companies can able to utilize the third parties resources in their business. For entering the market, many apps and web service providers have used this strategy. Such as, "Apple's iPod was among the first ones to create an oblique business model by basically combining memory stick (product) to content (service) distributed to masses: cheap hardware with very versatile content, bypassing completely the more old-fashioned music distribution logic employed by the music industry". MyData is a good example of an oblique business model that likely gathers data from multiple platforms and sources to obtain individual details. MyData is defined as personal health data which is lawfully and virtually controlled by individual people. Individual users can control access to the data by the other parties. Now only hospitals, clinics, treatments can be actually allowed. (N4s.Dimecc.Com, 2019)

For the rise of the sharing economy concept in which resource efficiency plays an important role, the oblique business models are started to boost in it. The number of the oblique business models is increasing rapidly, winning market share and also considering as a threat to the established or incumbent companies' horizontal and vertical business models.

Besides the above models, a holistic business model for the drug supply chain which is based on IoT is discussed by Liu and Jia (2010). The idea of an overall healthcare sector fits with their framework. As their work is focused on only one side of the industry, it is easy to connect all the points in which business opportunities are created and exploited. And the concept of this study shows base to look the industry with a layered business vision.

Service-Oriented Architecture and 4C Internet Business Model Typology

The concept of layered business vision is related to Service-oriented architecture (SOA) which presents a business activity with a specified outcome. This SOA can be combined with the 4C business model typology which is introduced by Wirtz in 2000. Wirtz (2011) mentioned in his book from Fritz (2004, p.160), "In German literature, Wirtz's 4C net business model approach attracted the biggest interest for the B2C

area". It is a new typology of business models that are integrated and applicable in electronic business. It contains four basic types of elements- content, context, commerce, and connection (Wirtz, 2011).

Wirtz, Schilke & Ullrich (2010) mentioned that these types of business models are useful to allow managers of hybrid/integrated firms for appreciating their specific characteristics and combining these insights for drawing implication which is most suitable for their specific situation.

According to Koch (2005), for changing market conditions, SOA can provide opportunities for businesses to respond more quickly and more cost-effectively. This architecture helps to reuse at the macro (service) level than the micro (classes) level. If it combines with 4C internet business models, it will give a better result in the healthcare sector. In the following, 4C internet model layers with combining the SOA layers are portrayed.

Table 6: Connecting the 4C model (Wirtz et. al, 2010) and Service-Oriented Architecture of IoT (Allied Consultants, 2016)

4C Model Layer	Value Proposition	Revenues	SOA layer
Content	Providing convenient, user-friendly online access to different types of contents	Mostly online advertising	**Interface Layer**
Commerce			**Sensing Layer**

	Providing a cost-efficient exchange platform for business	Sales revenues, commissions	
Context	Providing structure and navigation for Internet users to reduce complexity	Mostly online advertising	**Service Layer**
Connection	Providing the prerequisites for the information exchange	Online advertising, subscription, time-based billing, volume-based billing	**Networking Layer**
			Sensing and Interface layer

The first 4C Internet model is **content-oriented**. According to Wirtz et. al (2010), it is focused on the collection, selection, compilation, distribution and/or presentation of online content. Such as The Wall Street Journal Online. They provide convenient, user-friendly online access to different types of content. Like other firms, healthcare is also using this model for promoting its online advertisement by its IoT platforms.

The second model is **commerce-oriented** which is focused on the initiation, negotiation, payment and delivery aspects of trade transactions by using online media. For example, Amazon and Dell provide cost-efficient transactions for buyers and sellers of goods and services. Companies that are using this type of business model create direct revenue streams in the form of sales revenues or indirect revenue streams such as, commissions. In the case of IoT enabled healthcare, patients will able to order prescribed medicines online if the pharmacies enable the cost-efficient transactions on their websites like Amazon and Dell.

A context-oriented business model is the third internet business model which is focused on sorting and/or aggregating available online information. Google is using this type of model. This layer helps the Internet users to navigate through the abundance of websites and select those that fit their specific needs by increasing transparency and reducing complexity. Their business is based on indirect revenue streams such as online advertising like content business model. The example of this model for IoT enabled healthcare, it could be- hospitals can provide suggestions for chronic diseases, general health issues or some other type of diseases by professional medical platform based on sensed data. Users can navigate the specific solutions for their problems by using one platform.

A connection-oriented business model is the fourth internet business model which is focused on physical and/or virtual network architecture. Such as, Earthlink gives the physical communication between an end-user and the Internet or virtual 'interconnection' level such as emailing or instant messaging. This business model is based on both direct revenue sources (subscription, time or volume basis) and indirect, transaction-independent revenue sources. The prerequisites of IoT enabled healthcare can be data communication networks, network providers, network equipment providers, smart devices, sensors, and actuators.

The layers of the 4C Internet business model (Wirtz et. al, 2010) can be combined with the layers of service-oriented architecture. Business models can be built for the content layer by using both interface and sensing layer technologies or can use one of them. In the commerce layer, sensing and service layers can be used together or individually. Both service and networking can be used together or individually in the context layer.

And, in the connection layer, networking, sensing, and interface layers can also be used together or individually.

There are some examples of business model which are using in connected health. They are given below.

Examples of IoT enabled Healthcare or connected health

According to Slade (2018), the Internet of Things (IoT) can be what the doctor ordered. Lower medical costs, improving quality and making healthcare more personal, accessible and affordable for patients if hospitals adopt IoT healthcare solutions. He marks that digital healthcare has huge potential to reach $158B USD by 2022 compared with $41B USD in 2017 which is projected with the market for IoT healthcare solutions. For reaching this, the devices need to be connected with the cloud and healthcare organizations can receive visibility with operational status and help them to respond quickly to current conditions.

Microsoft has developed a Microsoft Azure cloud platform for facilitating the cloud-based delivery of various healthcare services (Business Insider, 2016). By this intelligent, trusted and secure health cloud platform healthcare organizations can able to transform and enhance patient's health outcomes. It develops connected solutions that can engage patients and empower care teams and improve clinical and operational efficiency by saving costs (Microsoft Azure, 2018). IBM also declared to invest approximately $3 billion in IoT, and some money would go in the healthcare sector (Business Insider, 2016).

Kimble (2015) marks about the Apollo Telemedicine Networking Foundation which is a nonprofit organization started by the Apollo Hospitals Group (India's largest private healthcare organization) that has the goal to offer a successful telemedicine working model for the developing world. It is capable of providing continuous access to the sophisticated medical support systems by connecting Apollo hospitals with rural health centers and now become India's largest telemedicine provider.

The Arizona State Telemedicine Program by the Arizona State legislature was established in 1996. It gives medical services to 20 communities and educational material to 34 communities and also provides support for new telemedicine projects development. The Centro Unico di Prenotazione based on Italy is a system that allows patients to book, reschedule, cancel and pay for visits to specialists or tests requested by their doctor. The system serves many of Umbria region's pharmacies, medical specialists and laboratories.

My Nutrition is based in Canada. It is a web and mobile communications platform that is created to connect nutritionists with their clients. A nutritionist can do the consultation by videoconferencing, instant messaging, telephone, secure email, or the nutritionist's own website. TeleMed-Escape (Italy) is an electronic managing system which sends test results with digital sign, are accepted as valid document for medically and legally, directly to patients and doctors either by a computer using Postesalute (the e-health unit of Poste Italiane, the Italian postal service) or on paper via Postel (Poste Italiane's print-and delivery service) (Kimble, 2015).

Moreover, the Motiva telemedicine remote monitoring program is introduced by Phillips which is based on its device technology by providing integrated service. For reducing cardiovascular disease and improving patient care, AstraZeneca partnered with the United States-based health system Geisinger for developing an e-health initiative. On the other hand, Erhard, Ortolani, Wintermantel, Anscombe and De Bres-Riemslag (2013) mentioned that smaller companies and start-ups are also providing variety of services, such as an Italian e-health company named Telbios serves national and local payers by telemedicine services. Anonymous, confidential consultation is provided by Pfizer's online male health clinic on user's convenience.

Based on the above examples, it can be said that not only the pharmaceutical companies, but also large and small companies are trying to focus a patient-centric approach in their business models.

2.2   Co-Creation

For developing competitiveness and success in the market in this rapidly changing environment, innovation is the essential element for the organizations. Innovation is a broad concept that includes any new idea or approach that can be applied in different ways for creating value to the organizations, communities, governments, or even the general good of humanity. So, it can be said that innovation is closely related to value creation. As now, no organization is not local anymore and individuals, organizations, governments, and economies are networked and interdependent, Hippel, Ozawa and Jong (2011) mentioned that there is a need for "co-innovation" approach which can create value or experience for all stakeholders including consumers by applying new ideas or approaches from various internal and external sources. Lee, Olson, and Trimi (2012) referred that one of the cores of co-innovation is co-creation which emphasizes value co-creation with customers for shared value.

In this chapter, the researcher will discuss a variety of definitions of co-creation. Next, the researcher will present the different components of co-creation which will assist the main theme of the study. The researcher will also present how co-creation can be done and finally, it will conclude with the discussion of the co-creation for connected health care.

2.2.1   Defining Co-Creation

Ind and Coats (2013) mentioned in their article from Chesbrough (2006) who said that for the coincidence of various developments including the mainstream adoption of internet technologies, the orientation towards services and experiences, a more open approach to innovation and also the growth of social, collaboration and customization technologies, co-creation has appeared. Though these are the recent developments, the full formation of co-creation did not emerge after the announcement of Prahalad and Ramaswamy (2004). Ind and Coats (2013) also referred from Graham (1995) that the practice of co-creation has to be found in the context of Business-to-Business and in 1925, the management writer, Mary Parker Follett argued for the principles of co-creation back. So, it can be said that co-creation has rich and distinct roots could be stretch back into the 20th Century (Ind and Coats, 2013). Ranjan and Read (2016) stated

that it was driven by Vargo and Lusch's (2004) influential study of a co-creative service-dominant logic (SDL) in marketing, in recent years the research interest in value co-creation (VCC) has increased. The perception of co-creation in the light of Prahalad and Ramaswamy (2000) studies and service logic has progressed primarily after 2000 (the latest list of McColl-Kennedy et al.'s (2012) definitions of co-creation demonstrates that 22 of the 27 definitions are appropriate after 2000; the remaining definitions are both co-production specific which discussed and conceived in recent research.

The word "co-create" means to create (something) by working with one or others. It is a management initiative that brings different parties together to get a jointly-valued outcome. Value is closely related to the co-creation. According to Prahalad and Ramaswamy (2002), the industrial infrastructure and the entire business system have been shaped by a company-centric, efficiency-driven view of value creation for more than 100 years. The major themes for the organization are growth and value creation (Prahalad and Ramaswamy, 2004b). Prahalad and Ramaswamy (2002) stated that because of Information and communication technology, organizations are shifting their value-creation focus from firm-centric to personalized customer experiences. The core of value creation and value extraction is the interaction between the firm and the consumer and dialogue, access, risk benefits, and transparency are considered as the building blocks of value co-creation (Prahalad and Ramaswamy, 2004b).

McColl-Kennedy, Vargo, Dagger, Sweeney and van Kasteren (2012) stated that various researchers have found the customer's notion as an active rather than passive service recipient (Baron and Harris 2008; Payne, Storbacka and Frow 2008; Toffler 1980; Xie, Bagozzi and Troye 2008). Vargo and Lusch (2008, p. 35) contend that the customer is "endogenous to both its own value creation and that of the firm." Customers play an active role in providing service and realizing its benefit in varying degrees (value co-creation) (Prahalad and Ramaswamy 2000; Tax, Colgate, and Bowen 2006; Vargo and Lusch 2004). Some customers may be involved in activities which have been traditionally viewed as "firm" activities such as self-service (Bowen and Benjamin 1985; Mills and Morris 1986), or in giving ideas for service improvement (Bettencourt 1997), even in co-designing, and may therefore be considered as organization's "part-time employees".

Value co-creation has been defined in the literature in various ways. The researcher is demonstrating a table with 13 definitions from McColl-Kennedy et. al (2012) which provides a summary of some key conceptualizations of co-creation which is going back to Normann and Ramirez (1994). The conceptualizations can be broadly divided into those which are focused primarily on firms and those are focused on customers.

Table 7: Variety of definitions of Value Cocreation (McColl-Kennedy et. al, 2012: 372-374)

Author (s)	Conceptualization	Conceptual Domain
Normann and Ramirez (1994)	"Actors come together to co-produce value"	Coproduction: providing value to the customer
Gummesson (1996)	"Coproduction is the process of involving customers in joint production and thus joint value creation [with the firm]	Coproduction: creating joint value through dyadic interaction
Wikström (1996a)	"When the customer is conceived as a coproducer, the interaction between the parties should generate more value than a traditional transaction process"	Coproduction: value creation with the customer

Wikström (1996b)	Companies "design a system of activities within which customers can create their own value, thus the company complements the knowledge and resources already possessed by its customers	Value creation: [Firm activities] in order to develop an interactive way of working…it is, therefore, make it easier for consumer to gain greater value
Ramirez (1999)	"Coproduction is a framework for understanding value-creation processes that exist within interactions between producers and customers"	Coproduction: creating joint value through dyadic interaction
Prahalad and Ramaswamy (2000)	"Cocreate personalized experiences with customers-customers want to shape these experiences themselves, both individually or with experts or with other customers"	Value cocreation
Prahalad and Ramaswamy (2003)	"There are multiple points of exchange where the consumer and the company can co-create value"	Value cocreation
Prahalad and Ramaswamy (2004)	"The cocreation experience-not the	Value cocreation

	offering- becomes the basis of unique value creation"	
Grönroos (2000) and (2008)	"Value for the customer is created throughout the relationship by the customer, partly in interactions between the customer and the supplier or service provider"	Customer value creation: customer creates value
	"Adopting a service logic makes it possible for firms to get involved with their customers' value-generating processes, and the market offering is expanded to including firm-customer interactions"	Value cocreation
Vargo and Lusch (2004) and Lusch and Vargo (2006)	"Customers are active participants in relational exchanges and coproduction"	Customer coproduction
	"The S-D logic notion of value cocreation suggests that there is no value until an offering is used-experience and perception are essential to value determination"	Cocreation of value

Payne, Storbacka, and Frow (2008)	"The value cocreation process involves the supplier creating superior value propositions, with customers determining value when a good or service is consumed"	Value cocreation
Edvardsson, Tronvoll, and Gruber (2011)	"Value co-creation is shaped by social forces, is reproduced in social structures, and can be asymmetric for the actors involved"	Value co-creation: as a social phenomenon
McColl-Kennedy, Vargo, Dagger, Sweeney and van Kasteren (2012)	"We define customer value cocreation as 'benefit realized from the integration of resources through activities and interactions with collaborators in the customer's service network'. That is. A multiparty all-encompassing process including the focal firm and potentially other market-facing and public sources and private sources as well as customer activities (personal sources)	Customer value co-creation

It is clearly seen in the above table that how different authors have different conceptualizations about co-creation. Some authors see the customer primarily as an input into firm processes, such as Gummesson (1996, p.35) said, "customers are inputs into firm processes aligning them as temporary members of the firms". But, after Prahalad and Ramaswamy's (2003) article, it is acknowledged that value cocreation can extend beyond the firm's boundaries which were also prioritized by Vargo and Lusch (2004) and other authors. An important point of intellectual debate which derived from different conceptual roots is, "value-in-use" versus "value-inexchange" (Vargo and Lusch, 2011) which is shared by many authors including Lusch and Vargo (2006), Payne, Storbacka and Frow (2008), Xie, Bagozzi and Troye (2008), and Ng, Maull, and Smith (2010) who said that value-in-use is until service is consumed, value is not recognized. In other words, Vargo and Akaka (2009) stated that value is not produced until the recipient (i.e., usually the customer) combines resources from different sources. (McColl-Kennedy et. al, 2012)

Other authors like, Fridlington, McKay, Spencer, and Watson (2016) mentioned from Brown (2013) that for the organizations, co-creative activity is very important. An organization can be more innovative within itself and its outward-facing offer because co-creation can allow organizations to overstep boundaries and "align diverse interests, agendas, and priorities". The authors referred from (Nieters & Bollman, 2011; Gummesson & Mele, 2010; Blomqvist & Levy, 2006) that "Integral to the most successful co-creative activities, is collaboration across a wide-ranging internal and external stakeholder network". Co-creation is different from open innovation. Neumann (2014) differentiated co-creation with open innovation. He said, "Open innovation considers the collaborative sharing between organizations of intellectual property, whereas co-creation refers – to the relationship between an organization and a defined group of its stakeholders, usually its customers". (Fridlington et. al, 2016)

Fridlington et. al (2016) showed 'A Typology of Forms of Co-Creation' which is from Frow, Payne, and Storbacka (2013) that determines 12 different forms of co-creation which can be a benefit to an organization and lead innovative solutions.

The table is shown below.

Table 8: A Typology of forms of co-creation. (Adapted from Frow, Payne & Storbacka, 2011: 1-6 via Fridlington et. al, 2016)

Ten Distinct Forms of Co-Creation	Example
1. **Co-conception of ideas refers to two or more actors working on innovation in product concept.**	Complex technological solutions such as, in the development of Airbus 380
2. **Co-design refers to two or more actors who share their respective design perspectives.**	Customized design solutions such as, in Dell computers and sports shoe designs for Adidas.
3. **Co-production refers to the fact that two or more actors produce all or part of the offering of the focal actor (firm).**	IKEA self-assembly of merchandise.
4. **Co-promotion refers to two or more actors involved in promotional activities related to a particular product, brand or other entity.**	Brand communities, such as BMW.
5. **Co-pricing refers to collaborative pricing decisions involving two or more actors and reflecting their viewpoints on pricing.**	Radiohead 'pay what you want' downloads.
6. **Co-distribution refers to when two or more stakeholders collaborate in the distribution of goods and services, usually for final use.**	P & G/suppliers' shared consolidation.
7. **Co-consumption involves cooperation during use as actors use their resources (physical, social and/or cultural), individually or collectively, as co-consumers to determine and improve their own consumption experiences.**	Wet seal clothing online users.

8. **Co-maintenance refers to two or more actors who share a core product's maintenance services.**	Tesco's hotline where customers report damaged or discarded trolleys.
9. **Co-outsourcing refers to two or more actors working in outsourced solutions, including suppliers, customers, competitors or other actors.**	www. elance.com
10. **Co-disposal refers to the collaboration between two or more actors in disposal tasks.**	Columbia Sportswear's use of recycled boxes.
The other two aggregative and cumulative forms of co-creation are- 11. **Co-experience involves actors integrate their resources over time and in multiple meetings to create a shared experience with different results than those in more discrete individual interactions.** 12. **Co-meaning creation refers to interactions between actors that create new meanings and knowledge over time through multiple meetings.**	Tesco's suite of sub-brands: Baby Club, Toddler Club, etc. that provide opportunities to co-experience at specific life-stages. On-line gamers' shared meanings.

The different forms of co-creation which are mentioned in the above table will help companies to identify when and what form of co-creative activity will create more value for the companies.

Prahalad & Ramaswamy (2004) said, in every part of the business system, consumers look for their influence on exercise and they want to communicate with the firms so that they can "co-create" value which is armed with new tools and dissatisfied with available choices. They discussed that the locus of co-creation (and co-extraction) of value reevaluate the meaning of value and the process of value creation for the changing nature of the consumer-company interaction. If an individual does high-quality interactions that can co-create unique experiences with the company that is the

key for unlocking new sources of competitive advantage. The firm and the consumer will jointly create the value which is shown by the following table.

Table 9: Co-Creation Concept (Prahalad & Ramaswamy, 2004b: 8)

WHAT CO-CREATION IS NOT	WHAT CO-CREATION IS
Customer focus **Customer is king or** **Customer is always right**	Co-creation is about joint value creation by the company and the customer. It is not the company that wants to please the customer.
Providing good customer service or customer care with extensive customer service	Allowing the customer to co-build the service experience in accordance with its context.
Mass customization offers suitable for the supply chain of the industry	Defining Joint problem and solving the problem
Transfer of activities from the company as in self-service to the customer	Create an environment for experiences in which consumers can have active dialogue and co-build personalized experience. The product may be the same (e.g. Lego Mindstorms) but different experiences can be built by customers.
Product variation	Experience variation

Division of One	Experience of one
Substantial Market Research	Experience the business in real-time as consumers do
Experience staging	Co-building personalized experiences
Innovation on the demand side for new products and services	Innovating environments for new experiences in co-creation

The above table portrays the co-creation concept very specifically which gives the idea that co-creation means creating value jointly by the company and the customer and supports to create an environment where customers can share their experiences and co-build personalized experiences with the company. The same view is also shared by Vargo and Lusch (2004) who said that consumer-oriented means cooperating with and learning from customers and adjusting to their individual and dynamic needs. A value that is defined by and co-created with the consumer instead of integrated into output is called service-dominant logic.

Through the discussion of the co-creation concept, readers can easily understand what co-creation is. There are different elements or components which are very essential for value co-creation which is discussed in the next sub-chapter.

2.2.2   Components of Co-Creation

Ranjan and Read (2016) stated that consumers play an active role and create value along with the firm (Kohler et al. 2011; Prahalad and Ramaswamy 2004a) through direct and indirect collaboration over one or more stages of production and consumption (Hoyer et al. 2010; Payne et al. 2008; Payne et al. 2009; Roggeveen et

al. 2012; Tynan et al. 2010). The essential elements of joint value creation are engagement, interaction, self-service and experience (Bendapudi and Leone, 2003). Co-production and customization are such elements in which value cocreation is superordinate because it extends further the production chain to the consumption and value delivery chain (Kristensson et al. 2008; Lusch and Vargo 2006; Prahalad and Ramaswamy 2004a; Sharma and Sheth 2004).

Morris, Schindehutte, and Allen (2005) mentioned that the context of business models mostly includes the firm's offerings and the activities which are undertaken to produce them. The management needs to consider the firm's value proposition, select those activities which will undertake within the firm and decide the process how the firm fits into the value creation network. Based on Schumpeter's (1936) theory of economic development, "value is created from unique combinations of resources that produce innovations, while transaction cost economics identifies transaction efficiency and boundary decisions as a valued source. Positioning within the larger value network can be a critical factor in value creation". The firm needs to establish proper relationships with suppliers, partners, and customers for a part of its positioning.

According to Payne, Storbacka, and Frow (2008), for establishing co-creation, three components are necessary. They are- customer value-creating processes, supplier value-creating processes, and encounter processes. They said, "Customer value-creating processes—in a business-to-consumer relationship, the processes, resources, and practices which customers use to manage their activities. In a business-to-business relationship, the processes are ones that the customer organization uses to manage its business and its relationships with suppliers. & Supplier value-creating processes— the processes, resources and practices which the supplier uses to manage its business and its relationships with customer and other relevant stakeholders & Encounter processes—the processes and practices of interaction and exchange that take place within customer and supplier relationships and which need to be managed in order to develop successful co-creation opportunities".

Lee, Olson and Trimi (2012) stated that shared purpose is the main feature of collaboration for co-creation. The enterprise works with cooperation with all the stakeholder particularly with customers in the co-creating process of value creation.

Customers (end-users, e-customers, global customers, customer communities, and even non-customers) know their wants and how products/services can be changed to provide new values. The main principle of co-creation is "engaging people to create valuable experiences together" at the same time enhancing network economies (Ramaswamy and Gouillart, 2010). Ramaswamy and Gouillart (2010) referred four components for co-creation: experience mindset, context of interactions for collective intelligence, engagement platform, and network relationships.

Different authors suggested different components for value co-creation. But, the most important element or component in value co-creation is Customer. Without the customer, value co-creation does not work. In the next sub-chapter, I will discuss what is the purpose of value co-creation and what is the way to do that.

2.2.3   What is the point of Co-Creation and How it can be done

Prahalad and Ramaswamy (2004b) stated that firms take the decision about the products and services they will produce in the traditional system and there is little or no role of customers in value creation. But from the last two decades, some of the work is divided by the firm and pass it to the consumers from self-checkout (e.g. gas pumps, ATMs, supermarket checkout) to the involvement in product development by a subset of customers (e.g. industrial customer help to develop those products which they need as airlines do with Boeing) or a range of variants in between. And, consumers consider some of these as beneficial. They mentioned from Pine & Gilmore (1999) who stated an example of the two firms- Disney and Ritz Carlton which have found interesting ways to level experience for consumers including all variations of consumer involvement. Their focus is on customer experience though they are treated passively. Those companies are product-centric, service-centric and company-centric and they want to connect the customers to the company's offerings. This firm-centric view is refined by the new competitors and connected, informed, empowered and active consumers communities over the last 75 years. Prahalad and Ramaswamy (2004b) commented that there is an emerging disconnection between the opportunities for value creation and differentiation which is enabled by a networked, active, informed consumer (and consumer communities), their

expectations and capabilities and the constraining force of the traditional concept of a market.

According to Freire and Sangiorgi (2010), co-creation occurs when users are responsible not just only to the design of services but also for their production and continuous improvement. Prahalad and Ramaswamy (2004b) stated that building blocks are important for building a system for co-creation of value. They serve as a basis for the interaction between the consumer and the firm.

Building blocks are-

- Dialog
- Access
- Risk-benefits
- Transparency

The combination of the four building blocks is called DART.

Dialogue. Dialogue is considered as an important element in the co-creation. Prahalad and Ramaswamy (2004b) stated, "Dialogue means interactivity, engagement, and a propensity to act-on both sides". It refers more than listening to customers and also shared learning and communication between two equal problem solvers. A loyal community is created and maintained by it. Such as considering the competence of the customer base of Cisco Systems, it created Cisco Connections Online. This network provides a suite of interactive, networked services that can quickly access Cisco's information, resources and systems and allows its customers to engage each other in dialogue, helping to solve one another's technical problems and improving Cisco's experience for everyone. They referred from Levine, Locke, Searls, and Weinberger (2001) who said, "Markets can be viewed as a set of conversations between the customer and the firm". If there are two unequal partners, it is difficult to predict. So, the firm and the consumer must become equal and joint problem-solvers for doing an active dialogue and the development of a shared solution and it must serve as a center

point to the issues of both consumer and the firm. It also must have clearly detailed rules of engagement. Such as eBay allow buyers and sellers in a dialogue.

Access. It starts with information and tools. Such as one of the world's largest and more creative semiconductor firm Taiwan Semiconductor Manufacturing Company (TSMC) provided access to its customers to data on its manufacturing processes, design and fabrication libraries and quality processes. Small software firms can able to access the knowledge base of large manufacturing facilities like TSMC and can able to reduce the investment which is needed to participate effectively in the semiconductor business.
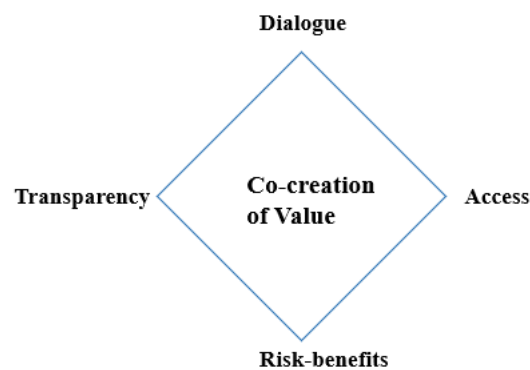
Figure 8: Building Blocks of Interactions for Co-creation of Value (Prahalad and Ramaswamy, 2004b:9)

Risk assessment. According to Prahalad and Ramaswamy (2004b), risk means "the probability of harm to the customer". They think that customers must participate in co-creation of value and businesses should inform them about risks by not only providing data but also appropriate methodologies for evaluating the personal and societal risks which are associated with products and services.

Transparency. Traditionally, companies have been benefitted between the consumer and the firm from information asymmetry which is very quickly disappearing. Because of this, firms cannot able to think about the opaqueness of prices, costs, and profit margins. Prahalad and Ramaswamy (2004b) suggested creating new levels of transparency because products, technologies and business systems information becomes more accessible.

When companies combine those four building blocks, they can able to engage customers as collaborators. Prahalad and Ramaswamy (2004b) said, "Transparency facilitates collaborative dialogue with consumers. Constant experimentation, coupled with access and risk assessment on both sides, can lead to new business models and functionalities designed to enable compelling co-creation experiences". For example, consumers helped Sony to co-develop PlayStation 2 and for this, Sony is now engaged with consumers in collaborative dialogues. In big companies from Intel to Microsoft to Nokia, consumers are taking part to shape new technology, ranging from web-enabled devices and networking software to cellular phones. Consumers make a contribution both technically and in terms of their expectations and views of value to the debate and thus, the future is being co-shaped by them. If we think of a doctor's visit today which is qualitatively different than 10 years ago. Patients want to engage in dialogue, understand the risk-benefits of alternate modalities of treatment, access to more information than before and expect transparency.

Above all, dialogue, access, and transparency can lead to a clear evaluation by the consumer of the risk-benefits of a course of action and decision. Firms that can embrace the concepts of personalized co-creation experience as the source of unique value, opportunities for value creation are increased significantly. Prahalad and Ramaswamy (2004b) said, "Personalizing the co-creation experience means fostering individualized interactions and experience outcomes. It involves more than a company's á la carte menu". A personalized co-creation experience portrays how the individual selects to communicate with the experience environment in which the firm facilitates.

Co-creation emphasizes on customer-company interaction as the core of locus of value creation. Prahalad and Ramaswamy (2004b) suggested a new framework which shows that all points of consumer-company interaction in the system are essential for creating value. "Since no one can predict the experience a consumer will have at any point in time, the task of the firm is one of innovating robust experience environments" (Prahalad & Ramaswamy, 2003). Traditional economics focuses mainly on the exchange of products and services between the company and the consumer and firm does the value extraction process and the consumer is the central point of interaction. On the other hand, all points of interaction between company and the consumer are

considered as opportunities for both value creation and extraction in the co-creation view. This view also challenges the market as a collection of consumers for what the firm can offer. In the new framework, Business managers have some part of control over the experience environment and the networks in which they build to expedite the co-creation experience though they do not have any control how individuals go about co-constructing their experiences.

Prahalad and Ramaswamy (2004b) suggested that the main concept in customer segmentation of this new framework is one-to-one marketing. That means the focus is mainly on consumer-company interaction- the roles of the company and the consumer converge. The new framework is shown below.

Firm- Consumer Interaction
(1) Interaction is the center of value co-creation and economic value extraction which is done by the consumer and the firm
(2) The base of value are Co-creation experiences

The Firm:
Collaborator for co-creating value and extracting economic value as competitor

The Market:
Unique Value Co-Creation Experiences at a particular moment in the situation of an individual

The Consumer:
Collaborator for co-creating value and extracting economic value as competitor

The Market is essential in the value creation process

Figure 9: The Emerging Concept of the Market (Prahalad & Ramaswamy, 2004b: 11)

In this framework, the market is attached to the value creation process and firm and the consumer are considered as both collaborators and competitors where collaborators co-create value and competitors extract the economic value. When there is direct interaction with consumers, it is easy to understand the consumer shifts because, without direct interaction, value co-creation is not possible (Grönroos, 2011). It will help the companies to co-shape consumer expectations and experiences along with their customers.

2.2.4   Co-Creation for Connected Health

eHealth or connected health means those health services and information which is delivered or enhanced by the Internet and related technologies. Whitehouse, Lam, Balka, McLellan, Deevska, Penn, Issenman and Paone (2013) said, "The "e"s in eHealth align with traditional medical practice in enhancing quality and evidence-based care, while providing the opportunity to achieve a number of other "e"s such as empowerment, efficiency, encouragement of new relationships between providers and patients, enabling information exchange, and extending the scope of health care". For the development of evidence to inform health care interventions, a single eHealth intervention can support it by improving the patient experience of the health care encounter, educate the patient, collect important clinical information, improve efficiency, and support aggregation of data.

According to Bonomi, Zardini, Rossignoli, and Dameri (2015), E-health refers to a continuous improvement process that can reorganize processes and improve quality services for developing the performance management system (Moullin et. al, 2011; Moggi et. al, 2013). It includes the interaction between doctors and patients and focuses on new challenges, opportunities, and threats to all the organizations. In e-health, many new technologies are implemented and also a lot of information technologies that emerge from them. Different types of resources, information technology solutions, and networks can be used in health and for this, health care can give different solutions for solving the problems of citizens with better services. Doctors and their team get instruments which come from information and communication technologies and also the flow of information from consumers which is more authentic. On the other hand, Frow, McColl-Kennedy, and Payne (2016) stated co-creation focuses on resource integration (Vargo & Lusch, 2004, 2008); the important role of practices (McColl-Kennedy, Cheung & Ferrier, 2015); and the linking of actors within an ecosystem (Maglio & Spohrer, 2008). They referred from Normann (2001) that the objective of these practices is to access resources, correcting resource deficiencies and improving resource density (Normann, 2001) along with the ideal outcome to realize valuable benefits of the service ecosystem's well-being and for the actors which represent co-creation activities and interactions in a particular context and thus, co-creation practices (McColl-Kennedy, Vargo, Dagger, Sweeney &

van Kasteren, 2012). According to Frow, McColl-Kennedy and Payne (2016), "Health care represents an important service setting in which to investigate how co-creation practices shape an ecosystem, as in this setting there is a widespread acknowledgment that collaborative activities between diverse actors are important for beneficial health outcomes" (Holman & Lorig, 2000). Furthermore, they stated from Gummesson (2009) that healthcare refers to a service ecosystem which reflects "that all parties (e.g. businesses, individual customers, households, etc.) engaged in economic exchange are similarly, resource-integrating, service-providing enterprises" with a common goal of co-creation.

Gallan, Jarvis, Brown, and Bitner (2013) stated the main focus in co-creation is customer-company interaction which is important for value creation. In the case of health care, customer participation is crucial for shaping the process and outcomes of a service encounter (Hausman, 2004). For co-creating a valuable customer experience, it is important to encourage the patient to share relevant information-including current status, desired outcomes and goals, and comfort with risk. When they share information, provide suggestions, and engage in shared decision making is called customer participation which reflects customer effort in co-producing a service (Chan et. al, 2010). According to Freire and Sangiorgi (2010) from Cottam and Leadbeater (2004) and Murray et. al (2006), co-creation occurs when users are main for designing the services as well as continuous development and production. "It is based on ordinary people generating the content of services and shaping their nature".

Gallan et. al (2013) stated from Cegala et. al (2007), patients are presented to co-create value during the service encounter in health care services by participating with health care providers through behaviors includes (1) discussing their current condition and symptoms, (2) cooperating with diagnostic efforts, (3) sharing knowledge about potential treatment options and (4) expressing their comfort level with, and desire to pursue, specific therapies and procedure. When patients participate by expressing their opinions, stating preferences, and exploring options, it is considered most effective in health care. In this way, a patient can able to co-create a satisfying experience by enhancing and managing service quality.

Hardyman, Daunt, and Kitchener (2015) stated that value creation and co-creation are considered as important concepts in marketing. They mentioned from Grönroos and Voima, (2013: 134) who discussed, 'value is perhaps the most ill-defined and elusive concept in service marketing and management'. They referred from Chandler and Vargo (2011) that it is an area of marketing where there is difference amongst scholars about how value is created. Direct interactions are considered as a 'platform' within the joint sphere for co-creating the value jointly (Grönroos and Voima, 2013: 141) and it is the only sphere within which value can be co-created. Corresponding to this view, by direct interaction, value co-creation can occur (Grönroos, 2011; Grönroos and Ravald, 2011). In case of healthcare, interactions occur within a 'joint sphere'. I found only a limited empirical studies which have empirically explored 'co-creation' in health by exploring value co-creation practice styles in cancer services, co-creation of services in community-based aged care and co-creation of learning in healthcare (McColl-Kennedy et al., 2012; Gill et al., 2012; Elg et al.,2012). Another study discussed by Hardyman et. al (2015) from Nordgren (2008) that patients by classifying as first consumers and then concern raises by customers creating value. Though the customer dialogue in service management is showed as his/her own agent with power and individual responsibility, 'it is doubtful if people view themselves as customers' (Nordgren, 2008: 510). Berry and Bendapudi (2007) said that healthcare consumers can be hesitant customers, for them the service may be 'needed' but not necessarily 'wanted'. Recent healthcare research believes that patients are willing to be part of their value-creating processes (Nordgren, 2008). "This has implications given that the responsibilities and tasks of healthcare professionals are regulated and institutionalized, which cannot necessarily be delegated to patients, as a matter of course" (Nordgren, 2008: 510). Though it is not clear how third parties are combined within the value co-creation process when they are acting on behalf of or as an advocate for the patient who is unable or unwilling to participate (Hardyman et. al, 2015).

Hardyman et. al (2015) mentioned from McColl-Kennedy and colleagues (2012: 375), who suggest in their study of value co-creation in two private oncology and haematology clinics that the customer is the 'primary resource integrator in the co-creation of their healthcare management' and that value co-creation includes private sources (i.e. family, friends, peers, etc.). They also stated that customer's self-

generated activities for example 'accessing their own personal knowledge and skillsets and through cerebral processes' are shown as potential sources that contribute to and become part of value co-creation. Hardyman et. al (2015) referred from McColl-Kennedy et. Al (2012) showed five groups of customer value co-creation practice styles such as, team management, insular controlling, partnering, pragmatic adopting and passive compliance, emphasizing with the first two styles which are associated with improved quality of life.

For co-creation, information and communication technologies provide instruments to doctors and their teams and the flow of information which comes from consumers that are considered more reliable. There are some examples that the researcher found from Bonomi et. al (2015). They gave examples of the combination of e-health and value co-creation from an Italian Academic Integrated Hospital. One of the instruments which can be defined as archive of patient's data in digital form, which is stored and exchanged securely, and it can be accessible by different levels of authorized users (Häyrinen et. al, 2008). It could enhance the quality of care and support in healthcare (Almutiry et. al, 2013). It is based on Electronic medical record (EMR) (Scott et. al, 2005; Chang et. al, 2012). The Electronic Medical Record (EMR) is considered as principal instrument which is introduced in the public health administration (Rossignoli et. al, 2014). It is defined as "an electronic medical data and reports about patients' conditions, images, physiological signals, checkup reports, medical treatment videos, and medical forms" (Chang et. al, 2012). It will include patients' all health and social data in digital form and allow significant savings both in terms of direct costs for production, conservation and re-production of their case history and also save time for entering information. Not only the relationship between patient and physicians can be stimulated and improved but also the relationship between the latter and the workers of the other hospitals for obtaining more efficiency, enhancing quality of care, evidence-based, empowerment of consumers and patients, encouragement of a new relationship between doctors and patients (Eysenbach et. al, 2006). These relationships allow to get more and better data and extract further information about the same patients and thus, improve the quality of the care. The introduction of EMR in a health context is the best example of value cocreation because it has a lot of aims that can be achieved through mutual service. Here, the health workers "have to exchange relationships, improving the adaptability and survivability of all service systems

engaged in exchange, by allowing integration of resources that are mutually beneficial" (Vargo et. al, 2008). In EMR, value is co-created by three key actors: physicians (all those that take care of the patient), hospital workers and patients themselves. These three actors have more cooperative relationships and bring different information to EMR by using it. It allows value creation process by becoming a resource for transferring information and sharing which improves the quality of care. Thus, patients get benefit from it and it improves the quality of work of health workers. Bonomi et. al (2015) said that citizens are the center point in the health systems by EMR. They can add news and increase information. That means they are not only the beneficiaries of the information, which is included in EMR but also, they are the co-creators of it. If information which is collected from every relation among patients and any other component of health information system can be integrated and structured, the health care will be improved and also it will co-create value.

2.3   Summary of Co-Creation of Business Models

Based on the discussion on Business Model and Co-creation, the researcher is conceptualizing some common and general themes which can be combined to answer the research question of the thesis that is - *How could the co-creation of business models help in developing connected health services?* and also to compare the co-creation of business models in two regions, Oulu (Finland) and Murcia (Spain). The researcher is portraying the themes with possible stakeholders by the following figure.
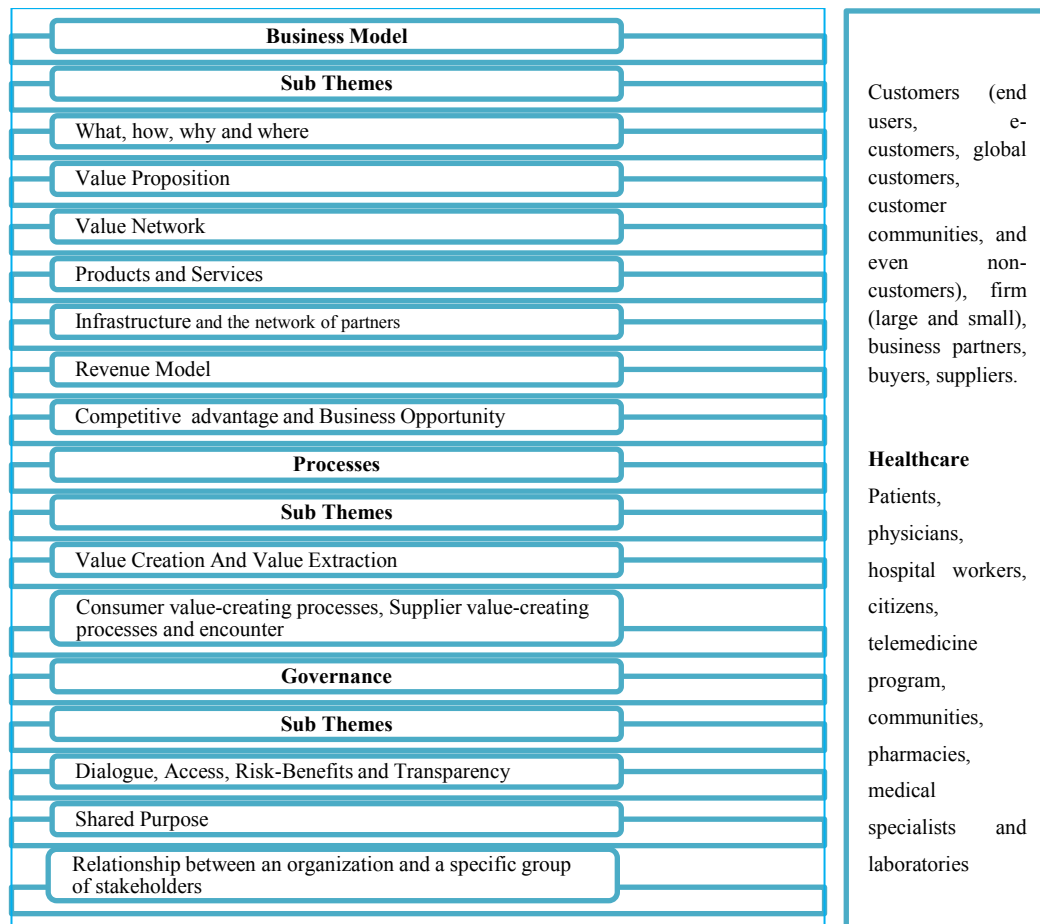
| Business Model |
| Sub Themes |
| What, how, why and where |
| Value Proposition |
| Value Network |
| Products and Services |
| Infrastructure and the network of partners |
| Revenue Model |
| Competitive advantage and Business Opportunity |
| Processes |
| Sub Themes |
| Value Creation And Value Extraction |
| Consumer value-creating processes, Supplier value-creating processes and encounter |
| Governance |
| Sub Themes |
| Dialogue, Access, Risk-Benefits and Transparency |
| Shared Purpose |
| Relationship between an organization and a specific group of stakeholders |

Customers (end users, e-customers, global customers, customer communities, and even non-customers), firm (large and small), business partners, buyers, suppliers.

Healthcare

Patients, physicians, hospital workers, citizens, telemedicine program, communities, pharmacies, medical specialists and laboratories

Figure 10: Themes of Business Model and Co-Creation (A Theoretical Framework)

In the framework, the researcher classifies the main themes into three themes and under these themes, there are some sub-themes. They are- Business Model (What, how, why and where, Value Proposition, Value Network, Products and Services, Infrastructure and the network of partners, Revenue model, Competitive advantage and Business Opportunity); Processes (Value Creation and Value Extraction, Consumer value-creating processes, Supplier value-creating processes and encounter processes); Governance (Dialogue, Access, Risk Benefits and Transparency, Shared Purpose, Relationship between an organization and a specific group of stakeholders).

The first theme is **Business Model.** By using this, an organization can create, provide value and change payments to profits (Teece, 2010). Companies can promote new technologies and ideas with the help of business model (Chesbrough, 2010). They can provide the offering to their customers regarding products/services and value proposition, how and where they are planning to do that in practice and why do they

think they can do it profitably because of business model. It covers three elements including, "what, comprising offering, value proposition, customer segments and differentiation; how, covering key operations, basis of advantage, mode of delivery, and selling and marketing; why, describing base of pricing, way of charging, cost elements, and cost drivers; and where are all these items located, internally or externally to the firm." Value Proposition is one of the important parts of business model which means a description of what value a customer or partner (e.g. a supplier) receives from the business. (Stähler 2001; 2002; Mahadevan, 2000). Value is considered as the basis for both business models and co-creation. A value proposition is one of the building blocks of business models for executing strategy (Richardson, 2008), one of the generic elements in business models (Voelpel et. al, 2004) and it is for business partners and buyers (Mahadevan, 2000). And, value network refers to (re) configuration for that value creation and leadership capabilities that ensure the satisfaction of relevant stakeholders (Voelpel et. al, 2004).

Value creation and extraction are not possible without products and services. Products and services are one of the main components in eBusiness Model Framework. The firm offers products and services which is a real value for a target customer (value proposition) and for which he is prepared to pay (Neonen and Storbacka, 2009), it is between the firm and the customer (Stähler 2001; 2002). For creating value and maintaining a good customer relationship, the infrastructure and the network of partners are necessary (Neonen and Storbacka, 2009). The business model decides the basis and sources of income of the firm (revenue model) and the value and sustainability of the business are decided by the revenue model (Stähler 2001; 2002).

Business models that have been linked to the fundamental challenges in the process of gaining competitive advantage and profits of a firm by creating and capturing value (Smith, Binns and Tushman, 2010; Zott, Amit and Massa, 2011). Ahokangas and Myllykoski (2014a) mentioned that exploit the business opportunity because it is built upon a business opportunity for gaining competitive advantage which is the overall objective of the firm's business model (Teece, 2010; Zott, Amit and Massa, 2011). On the other hand, interaction is most important between company and consumer in co-creation, high-quality interactions can co-create unique experiences with the company

which is the key to unlock new sources of competitive advantage (Prahalad & Ramaswamy, 2004).

The second theme is the **Processes**. Value creation and capture are the purposes of business model (Chesbrough, 2010) and interaction between company and the customer is considered as opportunities for both value creation and extraction (Prahalad and Ramaswamy, 2004b). For establishing co-creation, three components are necessary. They are- Customer value-creating processes, supplier value-creating processes and encounter processes which are the sub-theme of Processes. Payne et. al (2008) said, "Customer value-creating processes—in a business-to-consumer relationship, the processes, resources, and practices which customers use to manage their activities. In a business-to-business relationship, the processes are ones that the customer organization uses to manage its business and its relationships with suppliers. & Supplier value-creating processes—the processes, resources, and practices which the supplier uses to manage its business and its relationships with customers and other relevant stakeholders. & Encounter processes—the processes and practices of interaction and exchange that take place within customer and supplier relationships and which need to be managed in order to develop successful co-creation opportunities".

The third theme is **Governance**. It includes Dialogue, Access, Risk Benefits and Transparency which are the building blocks of value co-creation; shared purpose and relationship between an organization and a specific group of stakeholders. Dialogue, Access, Risk-Benefits, and Transparency are very important for building a system for value co-creation. They are considered as a basis for the interaction between the consumer and the firm (Prahalad & Ramaswamy, 2004). When there is direct interaction with consumers, it is easy to understand the consumer shifts because, without direct interaction, value co-creation is not possible (Grönroos, 2011).

Shared purpose is the main feature of collaboration for co-creation. In the value co-creation process, the enterprise works with cooperation with all the stakeholder particularly with customers (Lee, Olson and Trimi, 2012). And, co-creation occurs when users are responsible for both to design the services and for production and continuous improvement (Freire and Sangiorgi, 2010). The relationship between an

organization and a specific group of stakeholders refers to customer-company interaction which is the core for value co-creation. And Neumann (2014) said, "co-creation refers- to the relationship between an organization and a defined group of its stakeholders, usually its customers".

The researcher has also found some possible stakeholders who can contribute to the process of co-creation of business models which can help to develop the connected health services. Such as- Customers (end-users, e-customers, global customers, customer communities, and even non-customers), firm (large and small), business partners, buyers, suppliers and (**In Healthcare)** Patients, physicians, hospital workers, citizens, telemedicine program, communities, pharmacies, medical specialists and laboratories. According to Lee, Olson and Trimi (2012), customers know their wants and how products/services can be changed to provide new values. From the last two decades, some of the work is divided by the firm and pass it to the consumers from self-checkout (e.g. gas pumps, ATMs, supermarket checkout) to involvement of a subset of customers in product development (e.g. industrial customer help design the products they need as airlines do with Boeing) or a range of variants in between and, consumers consider some of these as beneficial. Thus, consumers are the central point of interaction (Prahalad and Ramaswamy, 2004b). Prahalad and Ramaswamy (2004b) suggested a new framework where market is attached in the value creation process and the firm and the consumer are considered as both collaborators and competitors where collaborators co-create value and competitors extract the economic value. It will help companies to co-shape consumer expectations and experiences along with their customers. In case of healthcare, customer participation is important for shaping the process and outcomes of a service encounter (Hausman, 2004). For co-creation, it is important to encourage the patient to share information and when they provide recommendations and participate in joint decision making while sharing information is called customer participation which indicated customer effort in co-producing a service (Chan et. al, 2010). Along with patients, doctors are also helping the co-creation process by using information and communication technologies tools such as EMR. Here, physicians, hospital workers, and patients have cooperative relationships and bring different information to EMR by using it. And, citizens who can add news and increase the information are the center point in the health systems by EMR (Bonomi et. al, 2015). Other stakeholders such as telemedicine programs,

communities, pharmacies, medical specialists and laboratories are also playing an important role in the value co-creation process.

So, by the above discussion, I argue that if the common and general themes of business model and co-creation are combined properly, it will not only help to create co-creation of business models but also to identify co-creation of business models in developing connected health services.

3   METHODOLOGY

It is necessary to collect and analyze empirical data for the research work and validate the theoretical compound which was discussed in the previous chapter. Methodology refers to how inquiries should be conducted by stating what problems are worth researching, how to shape a problem which can be explored, how to develop appropriate generation of data, and how to make logical connection between the problem, data produced, analysis and conclusions which equals inferences drawn (Jackson, Drummond and Camara, 2007). This chapter presents the explanation for the methodology which was applied in research work. At first, it starts with the basis and logic behind the decision-making process for collecting data and analysis. Then, the structure of the study shows by explaining the themes which are used during data collection (interview). Next, the data collection process is explained which includes coding and categorization from the interview data which follows the research design. Finally, a data analysis process and the limitations of the study are discussed.

3.1   Research Method

It is essential to select the research method to examine the aim and purpose of the research work. According to Campbell (2014), "A researcher that selects a qualitative research method collects open-ended, emerging data that is then used to develop themes. This method allows for a study of an exploratory nature. The exploration and discovery of data via a qualitative research method often indicate that there is not much written about the participants or the topic of study. Some of the characteristics of qualitative research include taking place in a natural setting, using multiple methods that are interactive and humanistic, emerging data rather than prefigured data, and being fundamentally interpretive". That is why, based on the nature of the research question, qualitative research method is selected here so that it is possible to review the available practices in the context and compare them with the theoretical compound.

The whole research starts by reviewing the existing literature about the business model and cocreation and then identify the main elements for analyzing "cocreated business model". Following this, research approach is selected by determining case companies, defining interview themes, data collection method and then collected data is analyzed

(Figure 11). The data analysis and findings are discussed in chapter 4. And in chapter 5, conclusion is discussed.
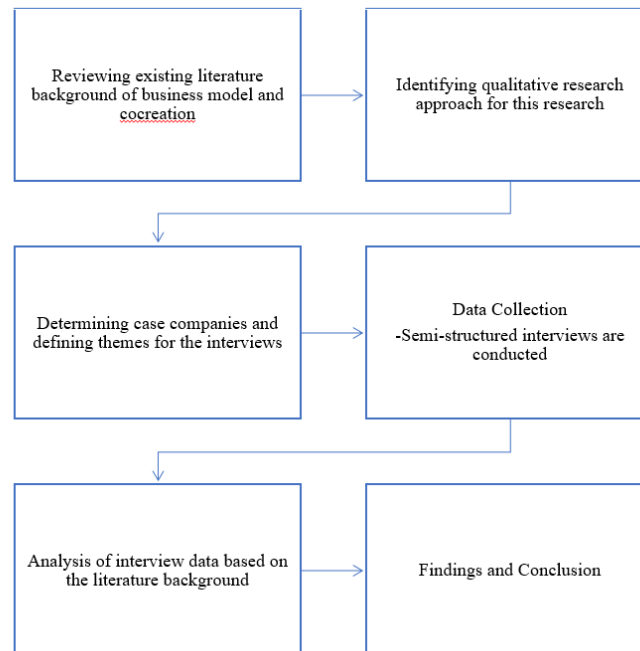

Figure 11: Empirical Study Roadmap

There are five strategies of qualitative research methods. They are- ethnographies, grounded theory, case studies, phenomenological research, and narrative research. Ethnographies let the researcher collect data by observing the members of a cultural group within their natural setting over a period of time. The grounded theory refers to develop a theory relating to a process, action or interaction which is grounded in participants' responses and reactions by allowing the researcher. Phenomenological research refers to research which focuses on humans' lived experiences. Narrative research is participant stories that are repeated by the researcher in a narrative way which includes list of life events. And, Case studies are performed by the researcher who examines in detail "a program, an event, an activity, a process of one or more individuals" (Campbell, 2014).

According to Baxter and Jack (2008), a qualitative case study is a research approach that promotes a phenomenon by exploring within its context by using a variety of data sources. Zainal (2007) referred a case study method chooses a small geographical area

or a very small number of individuals for the subjects of study. Yin (2003) said that a case study design should be taken into account when: "(a) the focus of the study is to answer 'how' and 'why' questions; (b) you cannot manipulate the behavior of those involved in the study; (c) you want to cover contextual conditions because you believe they are relevant to the phenomenon under study; or (d) the boundaries are not clear between the phenomenon and context". Here, qualitative case study approach is chosen for this research because the focus of this research is to answer "how" and "why" and also to explore the process of co-creation of business models which can help in developing connected health services and comparing the co-creation of business models of the three regions- Spain and Finland (Oulu) in the project of inDemand.

After determining the appropriate research method, it is necessary to decide the type of case study. Baxter and Jack (2008) said that the overall purpose of the study will guide to select a specific type of case study design. They referred from Yin (2003) and Stake (1995) who used different terms for describing a variety of case studies. Yin classifies case studies as explanatory, exploratory or descriptive. Stake recognizes case studies as intrinsic, instrumental or collective. Among those, an exploratory case study approach is selected for this research because "this type of case study is used to explore those situations in which the intervention being evaluated has no clear, single set of outcomes" (Yin, 2003). According to Dudovskiy (2019), exploratory research refers to explore the research questions and does not aim to provide final and conclusive solutions to the problems which are existing. It helps a researcher to understand a problem better and investigates the research topic with different degrees of depth. This approach allows the researcher to explore the research topic in detail.

According to Hyde (2000), for the acquisition of new knowledge, there are two general approaches for reasoning are used which are inductive reasoning and deductive reasoning. Inductive reasoning refers to a theory-building process that starts with the observation of particular instances and explores to establish generalizations of the phenomenon under examination. And, deductive reasoning is a process for theory testing which starts with an established theory or generalization and explore to determine whether the theory applies to particular instances. Thomas (2006, p. 238) said, "deductive analysis refers to data analysis that set out to test whether data are

consistent with prior assumptions, theories, or hypotheses identified or constructed by an investigator" (Thomas, 2006, p. 238). This approach aims and tests theory. In this research, deductive analysis is used because the researcher is going to answer the research question by using established theories (by different scientific articles) rather than create new theories and compare the theories with the collected interview data. For building the background concept, business model and its way of doing and co-creation and its way of doing within business ecosystem are chosen to describe and test in this study. The research design is described in the next sub-chapter.

3.2   Research Design

Qualitative research method depends on the data collection as a form of theme interviews, surveys, observations and the analysis of available recorded data. For conducting the qualitative research, interviews with a set of methods are used for producing data from individuals and groups by using structured, semi-structured or unstructured formats of questioning (Jackson, Drummand & Camara, 2007). Longhurst (2003) referred from Dunn (2005: 80) explains: "Structured interviews follow a predetermined and standardized list of questions. The questions are always asked in almost the same way and in the same order. At the other end of the continuum are unstructured forms of interviewing such as oral histories . . . The conversation in these interviews is actually directed by the informant rather than by the set questions. In the middle of this continuum are semi-structured interviews. This form of interviewing has some degree of predetermined order but still ensures flexibility in the way issues are addressed by the informant." Among the three types of questioning, semi-structured interview format is chosen for this study. The reason behind this because a semi-structured interview refers to a verbal interchange in which one person, the interviewer attempts to obtain information by asking questions from another person (Longhurst, 2003). And, Semi-structured interview includes open-ended questions which are related to the theme of study that allows the interviewer to lead the dialogue with the respondent. It does not restrict the depth and width of answers. Thus, it depends on the interviewer to put all the questions in particular order and based on the responses of interviewees, leave some questions out from the questionnaire.

Though semi-structured interview provides flexibility, it is essential to construct the interview structure before data collection. The researcher has selected the main themes extracted from theoretical compound which is covered in the second chapter of this research.

The themes are selected and stated in a way so that the particular interview can provide a logical and steady flow of information. As in semi-structured interviews provides flexibility to answer, the respondents were not bound in their way of giving answers. Even in some cases, some questions have come which are not part of the main interview questions but for the consistency of the responses of the respondents. In some cases, some predefined questions were left out because they did not have proper responses.

The purpose of this research to find out the process of the cocreated business model in connected health services for inDemand Project. The main key themes of this research are- Business Model and Co-creation. So, the researcher has divided the main key themes into three parts. They are-Business Model, Processes and Governance (Appendix 1). In first part, respondents have provided information about their way of doing business model activities which helps the co-creation process. In second part, respondents have provided the way of doing value creation, extraction, support activities and some specific considerations in co-created connected health. In third part, respondents have provided their perception about the components of co-creation in connected health services. Finally, they have shared their views on the main research question of this study.

3.3 Data Collection

The qualitative interview requires proper data collection. In this research, the data is collected from two sources. One is primary data and another one in secondary data. They are described below.

Primary Data

Primary data is data which is collected by a researcher by using techniques such as, surveys, interviews, or experiments from first-hand sources. It is gathered directly from primary sources by keeping the research project in mind (Stephanie, 2018). In this research, primary data is collected from those persons who are directly involved with inDemand Project. The main forms of data collection are face to face interviews and skype interviews. For collecting the interview, at first, Petri Ahokangas (supervisor of the researcher) contacted by email with the responsible persons from the inDemand Project. Next, after their agreement for the interview, the researcher sent them email for agreeing the time of the interview. Then, the researcher sent them the questionnaire for the interview by email so that they can able to know the main questions. Finally, the interview was taken, recorded and transcribed for the analysis. The interview was taken from two different countries: Oulu (Finland) and Spain. The respondents were addressed (X), (Y) and (Z) and their companies were as (A), (B) and (C). The detail of the interview is given below:

Table 10: Details of Interviews

Type of the Interview	Respondent Name	Position	Case Company	Date and Time of Interview	Origin of Data
Face to Face Interview	X	Senior Advisor, Business Development, inDemand, demand-driven eHealth co-creation	A	26 February 2019; 31:52 min	Oulu, Finland

	Y	Head of Testing, Northern Ostrobothnia Hospital District	B	5th April 2019; 26:32 min	
Skype	**Z**	Project Consultant	C	3rd May, 2019; 27:26 min	Spain

All the interviews were taken in the English language though all respondents were either Finnish or Spanish speakers. In Oulu (Finland) the interviews were carried out by face to face interview and from Spain, they were taken over the calls via Skype. The interviews were taken based on the agreed date and time of the researcher and respondents. Each interview took from 30 to 60 minutes based on the length and the depth of the answers of the respondents. All the responses were recorded and transcribed and documented in word for analysis.

Secondary Data

Secondary data is data collected from studies, surveys, or experiments which have been conducted by other people or for other research (Stephanie, 2018). In this research, secondary data is collected by different scientific articles related to the business model and co-creation. Google Scholar, a digital database of University of Oulu and different electronic sources are used for collecting data for building the theoretical framework. For the background information, data is collected from indemandhealth.eu website. The main keywords for searching information are business model, definition of business model, components of business model, process of business model, connected health for business model; cocreation, the definition of co-creation, components, way of doing cocreation and cocreation for connected health.

3.4   Data Analysis of the Study

Data analysis is the most complex part of the research. Thorne (2000) referred data analysis is "The theoretical lens from which the researcher approaches the phenomenon, the strategies that the researcher uses to collect or construct data, and the

understandings that the researcher has about what might count as relevant or important data in answering the research question are all analytic processes that influence the data". Pope, Ziebland and Mays (2000) stated that large amounts of data can be produced by qualitative research which may include verbatim notes or transcribed recordings of interviews or focus groups, jotted notes and more detailed observational research on "fieldnotes", a diary or chronological account, and the researcher's reflective notes which made during the research. They also referred that these data are on a large scale and it takes several hours to transcribe a typical single interview. Maxwell and Miller (2008) suggested "there are a number of analytic options available to the researcher. We see these as falling into three main groups: memos, categorizing strategies (such as coding and thematic analysis) and connecting strategies (typically involved in narratives, case studies, and ethnographic microanalysis)". Here, the researcher has used the categorizing strategy (coding and thematic analysis) for the analysis. The reason behind choosing is, thematic analysis is an independent qualitative descriptive approach which is primarily defined from (Braun and Clarke, 2006:79) by Vaismoradi, Turunen, and Bondas (2013) as "a method for identifying, analyzing and reporting patterns (themes) within data". Alhojailan (2012) said thematic analysis is considered most suitable for any study which intends to discover by using interpretations. According to Braun, Clarke, Hayfield and Terry (2019:58), " It offers a way into qualitative research that teaches the mechanics of coding and analyzing qualitative data systematically, which can then be linked to broader theoretical or conceptual issues". Both inductive and deductive methodologies can be used for its flexibility which is referred by Alhojailan (2012) (Frith and Gleeson 2004; Hayes 1997). Braun et.al (2019:58) explained that both inductive and deductive approach is data coding and the first one is bottom-up approach that means "codes and themes derive from the content of the data themselves" and second one is top-down approach that means " the codes and themes derive more from concepts and ideas the researcher brings to the data".

In this research, the researcher has used the deductive methodology in thematic analysis because the researcher has already constructed themes based on the research context which is described in chapter 2.

The researcher has conducted data analysis in different phases. They are-

Phase 1: Researcher recorded data by interviewing people from Finland and Spain

Phase 2: The researcher transcribed the recorded interview and documented it into word.

Phase 3: Next, the researcher printed the transcript of the interview and underlined and categorized those lines which belonged to the themes (Business Model, Processes and Governance) of the questionnaire of the interview and took some notes.

Phase 5: Finally, the researcher wrote the analysis by comparing data based on Finland and Spain context and also with the theoretical context. Some direct quotations from interviews are used in the analysis chapter.

The data analysis is displayed by a following figure.

Phase 1
Data Collected and recorded from interviews

Phase 2
Transcribed and documented into word

Phase 3
Printed the transcript and underlined and categorized
the sentences according to the pre-defined themes
(Business Model, Processes and Governance)

Phase 4
Wrote analysis by comparing data based on the
themes and the theoretical context of Finland and
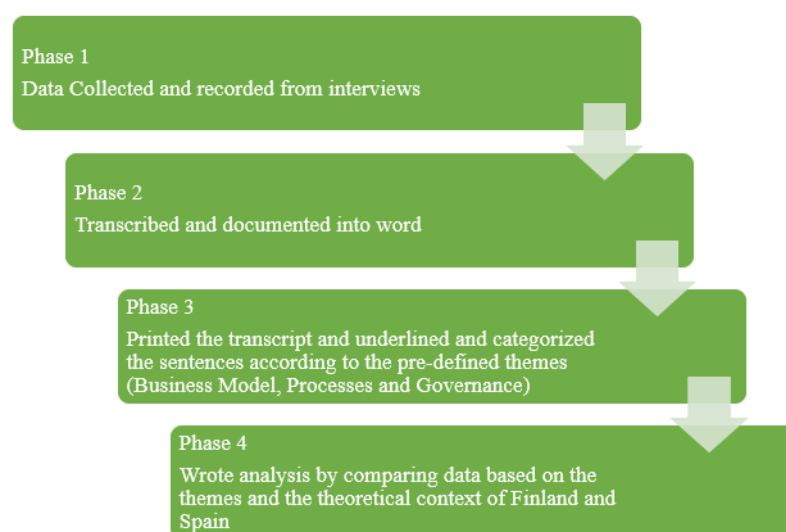Spain

Figure 12: Data Analysis Process

4   DATA ANALYSIS AND FINDINGS

The main purpose of the study enhances the understanding and creates a link between the business model and co-creation. In this chapter, the researcher is going to analyze the collected data for answering the research question "*How could the co-creation of business models help in developing connected health services?*". This chapter starts with short introduction of case companies, followed by the perspective of business model, processes and governance themes based on the interviews in the connected healthcare context.

4.1   Summary of the case companies

The main theme of this study to find out link how cocreated business models help in connected health services. For finding out the link, the empirical study is formulated based on the three case companies (who are a part of inDemand project) which researcher addressed as (A), (B) and (C) for collecting research data, and analyze those data as follows:

The case company (A) is an economic development organization of the city of Oulu and they coordinate the Oulu health ecosystem and its product portfolio. They offer business services to companies in Oulu in old stages in the lifecycle and most of their services are free of charge. Their services include business modeling, public and private instruments. They act as supporter in inDemand project. Their role starts in the third phase of the inDemand project (Ec.Europa.eu, 2018). They help the internationalization activities of the companies and promote them that mentioned by Ms. X, who is the senior advisor of company (A).

> "*For example, access to markets like internationalization activities to the companies and nowadays companies are well aware of our activities and we have to promote regularly with the local events and international events and so on*". *(X)*

The case company (B) is a public entity that acts as challenger in the inDemand. They are not involved with the business model creation process or development with the

companies. Even they are not engaged with the activities of finding out customers and segmentation. Their main challenges come from healthcare. The challenges are real. They gather various challenges and pick out those which are suitable for inDemand. Identifying the challenges is the first step of the inDemand project (Ec.Europa.eu, 2018). It was mentioned by Mr. Y, who is a manager of testing and innovation company (B) and also a project manager of inDemand project,

> *"(...) our challenges come from healthcare. They are real challenges in the daily health care work of this organization. We have collected several challenges and then selected those that could suit in inDemand scope". (Y)*

The case company (C) is a business association that promotes collaborative projects in digital health. They act as a supporter in inDemand like company (A). They assist open-innovation agreements between different eHealth stakeholders. They link unmet needs with market solutions. They assist a big international digital health network. Ms. Z, who is a project consultant of company (C) mentioned that their main concentration are startups, SMEs and scale-ups and they are proficient especially in business model optimization, commercialization, access to finance and legal and regulatory guidance.

> *"We are mainly focused on startups, SMEs and scale-ups. We are experts in business model optimization, commercialization, access to finance and legal and regulatory guidance". (Z)*

They are the link for healthcare, organizations, and pharma. They support business organizations by encouraging them to contact the hospitals in inDemand. Ms. Z from company (C) mentioned,

> *"We are the bridge to potential clients – Healthcare organizations, corporates, pharma, etc. We boost their business and connect them to eHealth opportunities." (Z)*

4.2 Analysis from Business Model Perspective

Before asking the main questions, the interviewer has given a brief idea about the business model to the respondents.

"Business model is a tool for creating and capturing value which
can help in co-creating connected health services"

It is mentioned earlier that business model can able to answer those questions including who the customer is, what the customer value does, how do companies make money in the business, what is the underlying economic logic which explains to deliver value to customers at an appropriate cost. Those questions show the components of a business model which are also the sub-themes of the interview questionnaire. The sub-themes are also taken from business model wheel and business model canvas. So, empirical data analysis is given below.

4.2.1 Customers and Segmentation

Customers are the core of any business. Without deciding who are the customer and which market should be targeted, the business model cannot be developed. Customers and segmentation are important components under strategic choice of a business model. For carefully designing UVP, problem needs to be identified and then customer segment should be targeted. The three interviewees have provided different viewpoints regarding customers and segmentation.

Ms. X from the company (A) supports and helps hospitals and companies for co-creating with each other. She mentioned that segmentation is developed in different ways in cocreation project based on the accumulated knowledge. She also told the interviewer that when the company co-creates with the field professionals and the business development specialists, segmentation develops based on business model. On the other hand, company (B) are the challengers in inDemand project. Mr. Y mentioned that target customers and segmentation are not relevant in their case. They are responsible for collecting challenges from healthcare.

"So, it can be done in different ways and segmentation develops during the co-creation project and it develops based on the accumulated knowledge when the company is co-creating with the field professionals, for example, healthcare professionals and the business development specialists." (X)

"And if we think target customers and segmentation, that is not so relevant. Since our challenges come from healthcare". (Y)

Both company (A) and company (B) are not involved with finding customers and do segmentation. Company (A) is more involved to help hospitals to identify the original need in a clear language which can be formed as an initial business opportunity for the companies by which companies can understand the importance of the problem, whether it is scalable and international or not. It will help them to be aligned with the company strategy and do segmentation properly. On the other hand, according to Mr. Y, they collect real challenges from daily health care, and they select those challenges which fit in inDemand project. He mentioned about two times for publishing the challenges. The call is open for private companies and Company (B) expects good solution proposals from them.

"So, I ask questions from the healthcare professionals to specify the problem so that it can be formed as in initial business opportunity for companies like who is surrounded by that need, who would be the main users of the solution and if the solution would be used in public health care or private health care or both. For example, so this is really important for the companies to understand how big the problem is and is it scalable would that need to be international in nature". (X)

"There are two iterations in inDemand and the first iteration we published and created cocreations solutions for four of those. And now the next four are open. So its in the way that you have opened

a call for solutions and we are waiting eagerly to get really good

solution proposals from private companies". (Y)

Like company (A), company (C) has the role of supporter in inDemand. They also do not find customers and do segmentation like the company (A) and company (B), rather they support the companies to co-create directly with their target customers so that they can identify other customers with similar characteristics. Moreover, according to Ms. Z, this support helps the companies to do customer segmentation by encouraging them to contact hospitals, execute validation interviews for collecting information about target customers and also to check whether they are interested or not.

"In my opinion, this cocreation provides companies with valuable

information to helping customer segmentation because otherwise,

they would not be able to access the information that this hospital is

providing them and it's our way to like filtering which is the type of

customers that can match with their profile or not". (Z)

4.2.2 Selling, Marketing, and Distribution Channel Activities

After identifying target customers and doing customer segmentation, it is necessary to decide for the companies to identify how and where they deliver the products or services to the customers. Selling and marketing are some of the elements under 'how' of a business model wheel. The interviewees have shared their opinions on this in the interviews.

Ms. X mentioned that they share a lean canvas to the companies to fill it in and then share with her to get feedback on it. The feedback is important so that companies can update the canvas and the selling, marketing and distribution channel related activities for the co-creation project. In contrast, according to Mr. Y, there is hardly any involvement in the selling, marketing, and distribution channel related activities. The major importance for company (B) is to accept real challenges and co-create solutions to meet those challenges. Mr. Y believed that is also major value for them and for other European healthcare providers.

> *"(…) I have for example shared the lean canvas for companies to fill it in and based on the input, the canvas is then shared with me for example and in one co-creation project, the company presented the canvas to different stakeholders in the hospital environment and got feedback." (X)*

> *"(…) so, the company might have really good at least a marketing point of view and they say this has been co-created with university hospitals. And, that's one key selling point of inDemand". (Y)*

Company (A) also is doing mentoring and coaching for helping the companies to execute the commercialization strategy plan. The main focus for them to promote and market the solutions of the companies which are co-created by using social media, relevant events locally and nationally. However, company (B) does not promote solutions in social media or local events like company (A). They share their experiences with inDemand partners. They use regions that are the primary channel where they share the findings of their current work and encourage them to conduct them in their regions. Mr. Y mentioned community is the main conduct point as they have very nice community inside inDemand. Then, medical companies use those experiences with university hospitals for their further operations.

> *"(…) we use different tools like social media, relevant events locally and nationally, for example, last month one of the companies that we had in the co-creation project they joined Arab health in Dubai and this activity was done with Oulu health ecosystem and the business Finland. And, the company got a chance to showcase their solutions and the company in their Dubai hospital". (X)*

> *"We have collected its about 10 to 12 regions throughout Europe and those are the primary channel whom we share the findings from our current ongoing development work and also we are trying to encourage them to execute similar cases in their regions. So, that community is the main conduct point at this stage". (Y)*

Ms. Z had a totally different viewpoint than Ms. X and Mr. Y. She mentioned that she has seen that healthcare professionals including doctors, nurses and all the staff who work with the companies know how healthcare works and how their peers work. Healthcare professionals, for example, doctors have big contacts by which they can suggest the companies which channel to use. Ms. Z mentioned how cocreation helps the companies activities by the following example.

> *"(….) for instance, if you have a solution for children obesity as in worst the case, in Murcia, the doctors can recommend the company which are the main medical progresses where they can present their solution to as a channel reach those doctors and also they can even for instant present their solution themselves with other doctors which is their solution of the product". (Z)*

4.2.3   Value Proposition

A value proposition is one of the most important components in business model. It refers to a description of the value which customer or partner (e.g. a supplier) gets from the company. The main theme of it is how the company generates value for its customers.

Ms. X told that they create value by providing business support to the companies so that they can look at the markets and the opportunities from a new angle. They also help the companies to identify relevant stakeholders and new relevant networks. Their main aim of business support is to ensure that companies do not overlook business support and business development in the co-creation. On the contrary, company (B) creates value by co-creating with companies in inDemand. Mr. Y mentioned, they publish real needs and they hope to get a quite good fit for those needs as they co-create the solutions with the companies. They are involved with the companies by providing point of views, comments, and guidance in various phases of product development. Mr. Y also said that the final results are expected to fit with the need which is the real valuable thing in healthcare so that people can be able to use it.

"(…) another company said that for them the business support is beneficial because I helped them to identify the relevant stakeholders that they need to have for their business model and one company said that the at the beginning of the co-creation project, they focus on the technical solution development and the purpose of the business support is to make sure that business support and the business development is not forgotten in the co-creation. So, that is why, they sort of like it and ya, helping to get new relevant networks is really important". (X)

"Sometimes, there are products that are technically really good but not usable so then they tend to that people may be not willing to use those because it is somehow challenging or difficult. And, in this kind of co-creation, we are trying to not fall into those holes". (Y)

Like company (A) and company (B), company (C) also creates value. They create it by helping the companies to focus on the longterm system ability of their company by creating a repeatable and scalable business model. Ms. Z mentioned they also encourage the company to contact other customers different from those who are participated in co-creation. In this way, companies can build competitive strategies and can able to create product for other customers.

"So, this is to help them to build a competitive strategy and finding among creating a solution target with co-creation partners while they still create a minimum product for other potential customers". (Z)

4.2.4   Value Network and Competition

A value network is one of the most important elements of a business model. It refers to a configuration that makes sure that the relevant stakeholders are satisfied with that value creation and leadership capabilities. In co-creation, both value network and competition are considered. Companies are required to create value for being competitive in the market along with linking to other stakeholders.

Ms. X has a role to facilitate the hospital innovation activities and development and project management in the form of co-creation and business support management. She also leads the work for creating such as regional approaches for the regional cocreation for ensuring that all partners can achieve the overall project management requirements including schedules. She mentioned that the company perspective is very important for them as for the companies, co-creation is not charity work and they take a business risk for entering such a project. Company (A) has also a funder who provides regional development fund money and closely experience and monitor how the fund is allotted for development purposes.

Ms. X mentioned three perspectives if competition is considered in cocreation or not. In company perspective, they always need to examine and describe the existing landscape when they apply in international co-creation projects.

> *"(...) for example, to international co-creation projects, and they position themselves against the competition and they need to define how they will create competitive edge in the healthcare market once the cocreated solution has been launched". (X)*

From a healthcare organization perspective, the innovative hospitals are competing against each other and also provide best patient care and the service delivery to the end customers based on the most advanced digital tools which also motivate the staff to give their best. She mentioned that when hospital entrepreneur team defines the problem, they must consider testing existing product and services if it matches with the need which they want to provide for the co-creation project.

> *"And, if you consider competition from more tactical level, for example when a hospital entrepreneur team is defining the need or problem, I like to see that entrepreneur teams would be given enough time to examine the existing product and service offering related to the need they are describing and want to offer for the co-creation project". (X)*

From the support organization perspective, Ms. X checks the competition for the new needs.

> *"(…), I have also been in checking the competition for the new needs in the company selection phase for the co-creation projects". (X)*

On the other hand, Mr. Y did not mention different perspective in case of existing value network and competition like Ms. X. He told that company B publishes challenges to companies which are called open calls. He mentioned that they utilize existing networks in a way that they share the open calls especially for them by using advertisements. They do so for getting high-value solution proposals.

> *"(…) we have now this call open. Maybe, it would be time to react and then we are expecting to get high number of high-value proposals, solution proposals". (Y)*

He told the interviewer that he does not have enough information to answer about the competition. He mentioned if they get various competing solution proposals, they select the best fit for the need based on the evaluation of an experienced panel.

> *"The competition would be a good thing and if we get several competing solution proposals so that would, of course, be a good thing and we have a really experienced panel who evaluates the solution proposals and we select the best fit for the need". (Y)*

But Ms. Z provided a completely different view than Ms. X and Mr. Y. According to Ms. Z, existing value network and competition should be considered for finding out all the potential customers. It is necessary to evaluate the current competition by differentiating the value.

> *"(…) because at the end of the day, the co-creation will end, and you will need to find all the potential customers. So, for this, you have to differentiate under for you need to assess current*

competition while in cocreation and the existing value network of course". (Z)

4.2.5   Co-created Products/Services

A company cannot generate and capture value without products and services. Thus, products and services are one of the important elements in Business model.   The company provides a target customer products and services that represent a significant value (value proposition) and for which he is prepared to pay. For doing the cocreation in connected health, it is necessary to have products/services and also to exploit the business opportunity for gaining competitive advantage which is mentioned in the research context chapter.

Ms. X told that if the hospitals have enough resources in the hospital innovation activities, field related healthcare professionals can able to find the most important needs based on that. The needs are solved together with the companies based on a demand-driven approach which will provide a good platform for co-created products. She also mentioned that innovation allows hospitals to put more concentration on building and developing testing services which are very interesting for the companies and the results (based on knowledge and knowledge management) will show what would happen if hospital would invest money for the solution co-creation. As they have public funding, they can able to see stronger commitment from hospital innovation strategy which is necessary for gaining competitive advantage.

Ms. X understood those general hospitals are satisfied with the solution and companies can able to achieve a competitive advantage with the solution. She thought that if hospital could put more focus on making the solution, they will adopt the solution when it is ready.

> *"I have an understanding that in general hospitals are satisfied with the cocreated solutions and I think companies can gain competitive advantage with the cocreated solutions because they have been developed based on the knowledge in value creation and it would be nice to see that the hospitals could put more focus in making sure*

that the new co-created solutions they will be adopted in the hospital

once the solution is ready". (X)

She suggested that after the end of the cocreation project, it is good to learn what kind of results are achieved by the companies with the hospitals in the test trial phase and it is important to notice, the products need to be further developed for the market in the business development site. According to Ms. X, follow the company is important for getting new opportunities.

"(…) it is good to follow the companies after the co-creation project,
how would they talk about it the project results in the media for
example and do they actively see for new cocreation projects if there
are opportunities available". (X)

On the contrary, Mr. Y told the interviewer that because of the long-time period, for producing something new in medical technology field, they decided to go for eHealth as the Oulu region has great potential in it. They chose those solutions which could be available protofunctional prototype so that they could understand the level where to start. He mentioned for eHealth solutions, it is the right time to think about competitive advantage. He also mentioned that in Oulu region, people are eager to use new things, new technologies and even they ask them to offer something new in healthcare. He provided the following example about breastfeeding pass.

"(…) good example of this first round, there was the breastfeeding
pass which is a paper version of the pass that was existing already,
so we wanted to put that into digital form and then when we did it in
inDemand, we actually got really good feedback from the user group
they were really saying that yes, we want to use this electronic
format and that was encouraging feedback and so I think, we are on
the right path". (Y)

Ms. Z did not mention cocreated products and services like Ms. X and Mr. Y. She told that there are a lot of telehealth and telemonitoring solutions for offering in connected health. She emphasized not to focus on future and technology as it is a part of the

solution rather companies should focus on the people. It is necessary to concentrate on the end-users when they make them engaged or monitored or how much easy for them to use or do, they have to use uncomplicated devices. She gave an example based on this.

> *"For instance, also is the process design going to their needs often uses not only patients but also healthcare professionals because you build a fantastic technology, but the end-users do not use the solution, it is a waste of time and money at the end". (Z)*

4.2.6   Pricing and Revenue Model

After the production of products or services, it is necessary to determine the value for those. That is called pricing. And, the business model needs a plan which generates revenue that is a revenue model. Both are important components of business model which play an important role in business performance and also in co-creation.

Ms. X agreed that pricing and revenue model is important for private companies if they want to build economically viable businesses. She told that the co-creation project between hospitals and companies is intensive because the center point is technical solution development. Ms. X's organization provides business support to the companies by assuring to make the first assumption about pricing and revenue model in cocreation project so that the companies cannot able to forget the business development. She thought that pricing and revenue model is needed to research for knowing the situation of the companies if they develop their pricing and revenue models after cocreation projects, how it is tested, and do they find any change that needs to fix.

"(....) for example six or twelve months after the co-creation project has ended, how did the company develop further their pricing and revenue models, how they were able to test it and has it perhaps changed and so far with the experience I have, companies did not yet see so much changes to the pricing and revenue model compare to the other business segments and once they have finished with the hospital, they will continue and start testing with the certain business models and fix and change if needed". (X)

Ms. X concluded that hospitals are also interested in pricing and revenue model and also in cocreated solutions.

"(....) for example, in one case, the hospitals are going to allocate sixty thousand euros for a new co-creation project, and the public funder will put another sixty thousand. So, the company will have over one hundred thousand to get the solution development ongoing and many questions arise from this". (X)

On the contrary, Mr. Y was not able to provide any full answer regarding pricing and revenue model. He told the interviewer that he can able to answer this after the inDemand project. For his organization, public procurement is a challenge. Their main focus point is to discuss when they co-create the solution and get certain license for using the cocreated product for example in inDemand case, it is telmart. He also told that pricing is still in planning stage. He emphasized that public procurement process is a great challenge for them.

"(...) but this public procurement is a challenge in the way that even if the solution would be really good and fit for the need, so if there is slight chance that when we make the public procurement, someone else still wins the case. It is always like that when we have to do the public procurement process". (Y)

Mr. Y also was not able to answer about revenue model. He told the interviewer that there are some discussions about the revenue model in cocreation project but still there are no applications.

Ms. Z has given a quite same opinion as Ms. X. She thought it is necessary to think about pricing and revenue when co-creating the solution. She told that revenue stream is important for commercialization as soon as the work is developed or as soon as to find NVP and minimum viable product. She believed that for getting a scalable business model, it is required for the companies to think about this so that they can able to test pricing strategies and revenue models and consider different actors who are related to pricing and revenue model.

> *"This way you are doing the better even more if they are in the healthcare sector which as you know is mainly public in Europe under for slow work than transnational business. And, besides you also need to take into account this issue pricing and revenue model as there are different actors versus public hospitals and also when you are planning to sales to insurance companies that are potential customers as these days. So, which are the priority this of their healthcare service providers". (Z)*

She emphasized companies can benefit from the knowledge of their findings in the healthcare sector.

> *"So, if you are doing cocreation, you can benefit from also from the knowledge that your findings in the healthcare sector half and I mean that test them how much they are willing to pay and whether they would recommend the solution to their peers and so on". (Z)*

4.3   Analysis from Processes Perspective

In every business model, there are a series of activities that are followed for capturing and extracting value. That is called process. The process is important if companies want to cocreate with customers, suppliers or other stakeholders. Besides, pricing, cost structure, and revenue model also need a specific process in cocreated connected health services.

4.3.1   Value Creation and Extraction

Value creation is a process by which a company can able to create value for its customers. As the value proposition, it is also one of the major elements of business model. Both value creation and extraction are important for business models and co-creation. When company interacts with the customer, that is considered as opportunities for value creation and extraction. The three interviewees shared different opinions about value creation and extraction process in the interview.

Ms. X said that company (A) and Oulu health support ecosystem development, smooth the way of the cocreation management with hospitals and aid them for the innovation activities. They also cooperate with the hospitals by promoting their hospital innovation activities on a regular basis and their value creation process. Moreover, they support every sector's co-creation opportunities. On the other hand, Mr. Y emphasized challenges which are collected from healthcare. He said it is one of the major ways for improving their current operation with the business solution. They can also improve those solutions which are evaluated when they choose challenges though it depends on case. He concluded with two examples by showing the different solutions based on the variation of cases. One was improvement of treatment rooms by increasing the occupancy rate which helped the productivity of the hospitals and another one was adding value by providing latest guidance and information to the final user so that they can get highest value in this service. He also told the interviewer that value creation and extraction must be evaluated in the challenge selection phase.

"In cocreation, we currently facilitate the co-creation management itself with the hospitals and support hospitals in developing the innovation activities and we also promote the hospital innovation activities regularly in collaboration with them and in value creation process." (X)

"Like, we had one challenge, where we wanted to improve the like the use of rooms like the treatment rooms, so we wanted to get a better occupancy rate for those. And, that would then enhance the total productivity of the hospitals as a building and as an operation like a factory and then on the other hand, in this breastfeeding guidance pass, it would the value add would be in the way, that we can share the latest guidance and share the latest information in more convenient way so there may be the highest value would be created at the end-users and then it varies case by case." (Y)

In contrast, Ms. Z explained the process for value creation and extraction in detail than Ms. X and Mr. Y. According to Ms. Z, at first, needs are identified by the healthcare professionals and then, they select the companies with whom company (C) can work for preparing proposals of solution. After that, companies have one or more meetings with healthcare professionals to get a qualified data requirement of the solution in detail. This helps them to understand the healthcare professional program. Companies create the first prototype and present it to the users for comparison. After getting feedback, they make necessary adjustments and present it to company (C). Then, the stable working solution is piloted in the hospital system or to the final users get training how to use the solution. Company (C) supports each step of the co-creation between hospitals and companies. They also assist periodic meetings between companies and healthcare professionals for following up the co-creation process. Company (C) also organize periodic meeting with the solver for answering about business modeling. In the meeting, they explain them about lean startup methodology and customer development approaches so that they can able to complete initial lean canvas. They also help the companies to create their initial hypothesis and test them against the markets for finding out the potential customers or to understand whether they need customers in the co-creation process.

"(….) initial hypothesis and now you have to go and test them against the markets so find potential customers or is it easy to participate in co-creation and ask them about your initial hypothesis and once they have done this we have public classroom, a new meeting for presenting what they have modeled approach where they present the result of such interviews whether they were right in their initial hypothesis or whether they need people regarding the business model". (Z)

4.3.2   Co-created Processes, Resources and Practices

Processes, resources, and practices are significant in both the business model and co-creation. When companies want to create value with customers and other stakeholders, they need processes, resources, and practices by which they can manage their business, maintain relationships with customers and other relevant stakeholders and also can develop opportunities for successful co-creation.

According to Ms. X, co-creation processes, resources, and practices help to get relevant parties and they can be used in both practical and concrete ways for industrial and territorial development. She believed that when everyone brings their own expertise in the table while doing co-creation, new ideas, good practices, and learned lessons are further grown and can be able to execute quickly. In this way, knowledge-based value creation can be created that helps to get new solutions when hospitals and companies want to co-create. She told that the solution can be tailor-made which can fulfill the need and sometimes go beyond their needs. It aids the way for companies to get business opportunities that are interesting in nature. Thus, they provide their best in the projects. She also told that as their main purpose is to assist the innovation which allows economic growth, this cocreation can help value capturing in territorial development and also bring competitive edges that can benefit everyone. On the other hand, Mr. Y emphasized company's significant contribution to the co-creation process with hospitals. When company gets the need from healthcare and customer, they efficiently use their narrow R&D resources for meeting the need and thus, they create the solution for company (B) and also for the final users so that they will get better treatment. He believed every stakeholder win in the co-creation.

"And, when hospitals and companies co-create, they can get new solutions in the use that are tailor-made to fulfill and perhaps, even exceed their needs and at the same time, companies get new interesting business opportunities that really inspired them to give their best to the projects because they really appreciate that they can work with the field specialists." (X)

"(…) they will create a solution that is valuable for us as a healthcare provider since we can get this technology solution for the recognized need. And in the end, the value is created for the patient just they will get better treatment. So, there are those my favorite this win-win situation. Everybody wins in this co-creation." (Y)

Mr. Y said that based on the need, they also involve patients in the co-creation process. If the need does not relate to customers or patients, they will not involve them.

"Like in the breastfeeding guidance pass, we had the new mothers who used, they were the test user group of the solution. It depends. Then, when we were discussing those treatment rooms that are not relevant to customers. It is more relevant for our own professionals." (Y)

Ms. Z agreed with the point of Mr. Y that as hospitals get the latest technology by which they can able to address their specific needs along with the customers. She mentioned that the technology is specific innovation and hospitals should use the standardized product as they are part of the solution development process.

" (…) it is the latest technology adapted to what they need which have several advantages apart from your views which is innovation but it also if it is the adaption of certain innovation, the healthcare professionals are motivated to use the product since they have become part of the development process." (Z)

4.3.3 Pricing, Cost Structure, and Revenue Model

Pricing, cost structure, and revenue model are some of the most important components in business model. When organization wants to co-create with health sector, it must be concern about those so that an organization can able to fix the right expectations, increase customer commitment, minimize costs and start to produce revenue.

According to Ms. X, after the production of the solution, companies want to keep the pricing of the solutions low so that the adoption into the use of hospitals is increased. They take the risk by postponing potential revenues. Companies do not want to apply 'free trial period' but startup companies follow free of charge roads because of the dependency on hospital. Their main customers are hospitals and rest are final users or patients. Ms. X suggested using pricing model e.g. SaaS model for some solutions. Based on this companies can able to explore, gather feedback and fix the pricing model if needed.

> *"A SaaS model could be considered in some solutions from the company perspective. Hospitals must then track the initial fee plus monthly fee. What is the benefit of taking this solution into use vs the SaaS model fees? Are there fewer patient visits? Fewer healthcare professionals needed, etc." (X)*

Ms. X considered the cost structure and revenue model as important as pricing in co-creation. The cost structure is significant for hospitals as they put a lot of effort into identifying the most important needs and also in their co-creation process with the companies. It is also important after the co-creation project has ended and the entrepreneur team and the company want to continue collaboration for further research technical development. Hospitals can able to know who is participating in the project and should consider rewarding the entrepreneur team for participating in cocreation and older organization cost structure.

> *"And, there has been some discussion if the entrepreneur teams should be economically rewarded for their work because they do it beside the daily patient care. So, my opinion is that it should be*

really considered if the economical reward would be appropriate."
(X)

On the other hand, Mr. Y and Ms. Z did not separate the opinion about pricing, cost structure and revenue model like Ms. X. They provided an overall opinion about those. Mr. Y suggested establishing a model like Ms. X for utilizing it for the purpose to publish call for solutions. He told the interviewer that after the ending of the project and when the solution is available and can meet the needs that they defined earlier; they could think to purchase it for their use. He also told that the result is uncertain so, they are not sure whether they will purchase it or not. Ms. Z explained there is some public component in European Public Health Care, so organization must consider instruments for collaborating with European Public organizations. They should consider the time for selling the solution to the public and private organizations which is necessary for their revenue model and cost structure. Companies also must take advantage of healthcare professionals in cocreation as they know the working process of the industry. Moreover, Ms. X told that revenue models and the parties who will receive revenue are determined during the process of value capturing in co-creation.

> *"(…) as the start of public procurement process. So, that would enable in the best case when the cocreation has ended and the cocreated solution is available so, if we are satisfied with it we could purchase it for the use."* (Y)

> *"(…) also, you need to take into account the times, it takes more time to sell the solution to public organizations and the private one so this is not complete somehow in their revenue model and cost structure. And, also healthcare professionals under organization are a source of knowledge regarding these issues in cocreation because they know how the sector works. So, companies must take advantage when they have time during co-creation."* (Z)

> *"Each organization puts efforts in the value creation process. However, revenue model is actualized in value capturing process. Who will receive the revenues, only the private company or some other organizations too?"* (X)

4.4   Analysis from Governance Perspective

For cocreating the business model in connected health services, governance is compulsory. For good governance, all the components of the business model and cocreation should combine together so that companies can cocreate properly with all stakeholders. The three interviewees shared their opinions about governance from their perspectives.

4.4.1   Dialogue, Access, Risk Benefits and Transparency

It is mentioned earlier that cocreation is possible when all the parties are responsible for both designing the services and for production and ongoing improvement. It is attainable when an organization uses four building blocks of co-creation while interacting with customers and other stakeholders. The building blocks are important for communication between customer and the company.

Ms. X thought governance is important in co-creation. She explained that the initiator could be hospital in case of role of dialogue e.g. if hospitals want to create the business model with companies, if they are interested in certain solutions and if they want a share of some business. She suggested it should be done in the beginning phase when companies are applying to specific projects and companies should ask healthcare professionals about these topics, pricing, and stakeholders. She believed access should be given to the business model among agreed parties based IPR strategy. She told that for developing the business, risk-benefit is the natural part of it and transparency should be clear and written from the beginning of the co-creation. Mr. Y agreed with Ms. X by explaining that those building blocks are important and rich dialogue between healthcare and company occurs when hospitals share their needs carefully and also, they want to know about company's thinking and it's way to go forward. He told open access is not acceptable in hospitals as doctors treat people there. But, company (B) is working as one-stop one-point conduct as interface between hospitals and companies to create proper dialogue and access so that each party can reach other parties. He also told risk is very low in inDemand as they get funding from EU. Companies get funds from the company (B). According to Mr. Y, if the funding is not available after the project, risk assessment is compulsory before using their own

resources. Proper consideration is needed in cocreation when companies want to create the solution and end the process and also when company (B) investigate and add value to the companies. He said the benefits are enormous, so the risk is worth to take in inDemand. Mr. Y agreed with the point of Ms. X in transparency that communication should be open from the beginning to know the situation of the company that will create solution in co-creation.

> *"(...) building a business is always a risk. So, it is the natural part of the business development. And, transparency is very important and must be clear right from the beginning, for example, when the most important aspects are agreed and followed in a written format then it is a nice starting point for transparency." (X)*

> *"In inDemand, since we have the funding from the EU so the risk is quite low for the healthcare organization since they cover all participation cost and also the lower the risk of the company participation since we are funding to the companies up to 40,000 euro per case. So that, they can cover part of their personal cost from the EU money and then when this kind of element does not exist after the project time, so there is always need for risk evaluation before we try our resources." (Y)*

Ms. Z agreed with Ms. X and Mr. Y on the topic of Dialogue. She said that as healthcare professionals and companies are not used to work together, good communication between them will smooth the process. She believed access should be given both to companies and patients so that companies can able to access patients' data and patients also can participate in co-creation. The access should be open based on resources and processes. She thought in inDemand, risk benefits are managed well as all the parties have clear rules though the only risk is to depend on companies.

> *"And I think, they manage quite well in Murcia, these days they have clear the rules so themselves are collaborators and the SMEs are the business owners of their further position are riskier so they were*

the main pushers of the cocreation because they were the one risking

their money because they are company." (Z)

In the case of transparency, she believed trust is necessary among each party. If companies do not inform all the processes, the doctors will not able to trust them. She concluded that in inDemand, transparency is present among every partner.

"(…) it is essential to trust among each partner because if companies are not transparent, the doctors won't trust them because they see them as external for the hospitals and external for they are not their peers, so they need to demonstrate that they are transparent and inform doctors about all of the processes, whole development is going until and I think, in inDemand, it worked well." (Z)

4.4.2   Shared Purpose

It is mentioned earlier that the company now works with all the stakeholders including customers for the purpose co-creating value. In this way, companies can able to know the demand of a customer and customers also can able to see how products/services have changed for providing new values based on their demand. It is called shared purpose which is the main characteristic of the cooperation of co-creation.

According to Ms. X, shared purpose can be achieved when all the partners have proper space for sharing their ideas and views while exploiting the business opportunity. On the other hand, Mr. Y, they are neither interested in own intellectual property nor on the part of the company and goes into the productization phase of the company. Company B wants license of the solution in a discounted price and equitable share for their investment. But Ms. Z said that shared purpose can be achieved if the roles in the co-creation are predefined. As the main owner of the solution is company, based on the reputation and excellence in innovation, companies can include doctors and healthcare professionals as future collaborators and provide compensation for their work.

"By enabling room for neutral discussion, making sure its parties are able to exchange and share their own ideas and views so facilitating the discussions." (X)

"(…) the shared purpose could come from when the solution is ready, so we could get this device or solutions to our use for some discounted price for example, for a certain time period. So, this kind of arrangement is something of our interest. Like a license for the solution of something, not owning the company but gaining fair share of in return of our investment in that way." (Y)

"(…) reputation or excellent in innovation so the company can include them for instance as future collaborators or an advisory board and obviously compensate them accordingly economically or any other form so if these roles are defined for instance as like in this example, I think, they will collaborate better and achieved this shared purpose that we are talking about." (Z)

4.4.3   Pricing, Cost Structure, and Revenue Model

Pricing, cost structure, and revenue model should be plan carefully when any organization wants to create business model for its business. It is also essential when companies go for co-creation.

According to Ms. X, open access in pricing, cost structure and revenue model which are shared by partners who are related, can be beneficial to control. On the other hand, Mr. Y shared his answer from testing operation perspective and told that they have a specific pricing structure as they know their costs, the price of every healthcare professional's participation, how much they have to charge from the companies so that they can meet the costs. They do not have aim to make profit and also do not want to support product development of the company by providing public money. He also said that if there is any cost occurs in cocreation which needs to charge from the companies, company B can able to know the actual cost. They are facilitating the companies so that they can create better solutions to meet the market demand. Ms. Z shared her opinion from company perspective. She believed that control is just as it is the

company's responsibility. Companies can ask for advice from their cocreation partners if needed. She told that in inDemand, companies can invite other partners who are cooperating by setting milestones so that they can control and smoothing the process.

> *"(..) the control can be achieved with open access to these topics, shared by the relevant stakeholders." (X)*

> *"If there would be a case, that there would be cost for cocreation need to be charge from companies so we would actually know how much it costs. And, also that we are not at the moment, we are not willing to do real revenues from this service. We are more like willing to enable companies to create better solutions for the market." (Y)*

> *"In inDemand, how we control the product flow I mean, that cocreation is actually they can invite under the actors are collaborating its by setting milestones, prototype 1, prototype 2, pilot, this step we control that everything is going smoothly."(Z)*

4.4.4   Cocreate Business Model

When one organization wants to co-create with other organizations, it is necessary to combine all the above components. The three interviews shared different opinions about this topic.

According to Ms. X, it is essential to know the specific vision, aims, value proposition, target customer segments, product and service, and budget. In contrast, Mr. Y said cocreation is possible by sharing the needs and getting good proposal for solution that can be finalized with the company jointly. He suggested that revenue sharing, or shared purpose can be good idea for co-creation. The reason behind this, for the funding that comes from a completed project which can be invested in the next project. On the other hand, Ms. Z shared a similar view as Ms. X but with a clear explanation. She told that company C provides business support to the parties by explaining lean startup and customer development methodologies. They show the lean canvas to them which is similar to business model. They give time to them to complete it and then they share

their lean canvas to other parties. Company C provides coaching for performing validation interviews so that they can start hypothesis with their target customers. After collecting hypothesis, the parties share their results and company C provides advice what they need to consider which are overlooked and then, it asks them to do validation interviews again. After going through it, they take step to start real business model for co-creation.

> *"(…) clear vision, aims and value proposition and target customer segments as well as product and service offering and to start with and what is the budget for the activity and so on." (X)*

> *"(….) this cocreation, that we could share the needs and then gain a good solution proposal which we can then finalize together with the company." (Y)*

> *"(…) then, we give them a bit of coaching on how to perform validation interviews because I said before we asked them to go out of the building and start hypothesis with potential customers. Then, we have our new meeting where they share their results and we give them some kind of advice they were, or they need to focus our consents may be things that they have not considered and ask them to perform the validation interviews again. After they have gone through that, they take lean canvas and they start actual business model." (Z)*

5 CONCLUSION

The final chapter of this thesis provides empirical findings along with the answer to the main research question. Based on the results and existing literature, theoretical contributions, managerial implications, and evaluation of research will be discussed. In the end, limitations and recommendations of the research will be outlined.

5.1 Discussion

The main objective of this thesis was to identify the co-created business models by developing a framework in connected health services. There were two parts to the study. In theoretical part, existing theories about business model and co-creation along with their impact on connected health were summarized. A new framework was developed based on the existing literature (Figure 10). In empirical part, data were collected and analyzed based on the new theoretical framework. In this section, the main research question is going to be answered along with the results of this study.

The main research question was-

How could the co-creation of business models help in developing connected health services?

An organization needs a business model for successfully operating its business and creating value for the customers along with generating revenues and profits. Value creation and capture are the center point for business model. For getting jointly-valued outcomes, it is necessary for an organization to work with different parties which is value co-creation. For both business model and co-creation, value is the core point. As companies have been trying to switch from company-centric perspective to customized experiences for customers (Prahalad and Ramaswamy, 2002), it is crucial for the companies to combine the components of business model and co-creation in such a way so that it can able to provide the customers personalized experiences and can achieve a competitive advantage. It is only possible if companies can join with other stakeholders for gaining a joint value result. That is also the main theme of inDemand project which applies the demand-driven and co-creation approaches

together by solving the needs which are identified by the customer-the healthcare organizations and creating opportunities for the private companies. (indemandhealth.eu, 2019)

The following results have made based on the empirical data analysis from chapter 4 which will assist to answer the research question. They are discussed based on three perspectives:

Business Model Perspective

A business model can be developed after deciding the target customers and target market. There are supporter and challenger organizations in inDemand who help hospitals and companies to co-create with each other. For successfully doing the co-creation, needs should be identified at first by the healthcare organizations or hospitals and then companies will do segmentation by aligning with their strategy. Accumulated knowledge and the business model aid the process of segmentation. Companies do validation interviews for collecting information about customers so that they can check if the customers are interested or not.

For executing the selling, marketing, and distribution activities, companies can use business model tool. In this case study, supporter organization helps companies to use a business model tool named 'Lean Canvas' so that they can get a full roadmap for their operations. For the co-creation, supporter organization also promotes company's solutions along with social media, local and international local events. Challenger organizations promote their findings by the regions and communities. Doctors also have impact on co-creating selling and marketing activities. They promote the solution to other doctors and suggest the companies by which channel they can promote their solution.

Co-creation is not possible without a joint value outcome. So, value is most important for both business model and co-creation. In inDemand case, every stakeholder creates value for making this co-creation successful. Supporter organizations create value by providing support to the companies for looking at the markets and opportunities from a new point of view, identifying appropriate partners and new networks, not avoiding

business support and business development, concentrating on the longterm system ability of the companies by building a business model which is repeatable and scalable and communicating with those customers who have not participated in the co-creation. Based on the support, companies can able to develop competitive strategy that helps them to create product for other customers. Whereas, challenger organizations create value by providing the companies with real health care needs so that it will be good fit while co-creating the solutions with the companies. They also provide their views, comments, and guidance in different stages of product development.

Value networks and competition are also important elements for both business model and co-creation. Existing value networks and competition are crucial for discovering new customers. Supporter organization aids the hospital innovation activities, development and project management, creates regional approaches so that all stakeholders can attain project management requirements and provides a fund from funder for the regional development and check how the fund is allocated for the development purposes while challengers advertise open call for obtaining high-value solution proposals by using existing networks. On the other hand, by attaining a unique value proposition, competition can be evaluated. It can be considered from three perspectives. One, when companies enter into international co-creation projects, they should check and define how will they able to create competitive edge after launching the co-created solutions in the healthcare market. Two, hospitals compete against each other for providing best health care along with their staff by using advanced digital tools. Three, for getting new needs, support organization checks the competition.

Co-created products or services can be achieved when hospitals put more effort into making the solution along with field related healthcare professionals and companies. Hospitals can use their resources to find out the important needs and solve the needs by using demand-driven approach with companies. They also involve customers whether they can able to use new solution or not. And innovation helps hospitals to put more focus on building and developing testing services. After making the solution, they will approve it for use and competitive advantage will be achieved by the companies with the solution. It is important to follow the companies for exploring new co-creation projects after the co-creation projects.

Pricing, cost structure, and revenue model should be considered when companies and hospitals go for co-creation. Pricing and revenue model can help companies to plan for business development, know the condition of the companies whether they develop those after the co-creation, test and find any change to fix or not. And, for finding NVP and minimum viable product, it is crucial to commercializing revenue model. The companies need to test pricing strategies and revenue models and identify related actors of pricing and revenue model. And, it should be done in the value capturing process. Companies can also get benefit from the healthcare sector findings by examining them how much they are ready to pay and if they refer the co-created solution to other hospitals.

Processes Perspective

Value Creation and Extraction have a great impact on co-creation. If every stakeholder supports and helps in the co-creation process, value creation process will be easy for obtaining the ultimate result. In the case of inDemand, supporter organizations aid hospitals with co-creation management and promote the innovation activities of the hospital and the value creation process. They also help the companies for making the proposal of the solution and arranging periodic meetings between companies and hospitals. With the support of them, companies can able to create their initial hypothesis for testing against the market and take decisions if they need customers in the co-creation process. Whereas challenger organizations can choose those challenges which are real and depending on the case, the solutions are evaluated and improved.

In the co-creation process, co-created processes, resources, and practices aid the way to involve all the parties that can be used for industrial and territorial development. They involve their own ideas and expertise by which knowledge-based value creation is created that is beneficial for both hospitals and companies. By this, they can create a new solution together for hospitals and customers or patients and new business opportunities will be opened for the companies. Thus, everyone is a gainer in co-creation.

As the main consumers of the solution are hospitals and end-users or patients, companies should keep their prices low so that they can get more customers. Startup

companies can apply free of charge road as they are dependent on hospitals. Companies can use SaaS pricing model for exploring, collecting feedback and fix the model if necessary. The cost structure is crucial for hospitals in the co-creation process and also after the ending of the co-creation project when the entrepreneur team collaborates with the companies for further research on technical development. Hospitals can also able to know the participating actors in the project and should recognize if they are suitable for any economic reward. It is necessary for the hospitals to purchase the solutions if that meets the defined needs. When selling the solution to the public and private companies, company must consider the time as it is important for its revenue model and cost structure. They also get advantage from healthcare professionals because they know the process of working in the industry while in co-creation. As different parties are involved in the co-creation process, it is important to actualize the revenue model and determine the receiving parties who will get revenues in the value capturing process.

Governance Perspective

Dialogue, access, risk benefits, and transparency affect when co-creating in connected health services. Dialogue should be rich between hospitals and companies so that they can able to understand what actually they want from each other. Based on IPR strategy, the agreed parties whether they are companies or patients, they should have access in business model as well as patients data. As the risk is very low in case of inDemand (get fund from EU), the risk can be easily taken by all the parties of it to get huge benefits. Trust is important among all the parties. Everyone should inform other stakeholders about their operations.

If every partner shares their ideas and viewpoints, it is possible to add new values in the final products or services which will help everyone to get a shared purpose in co-creation. Besides, roles of every partner should be predefined so that companies can able to include doctors and healthcare professionals as future collaborators. Thus, they can able to better cooperate with each other, get compensation for their work and can able to achieve shared purpose in the co-creation process.

It is good to control when related parties have open access to pricing, cost structure, and revenue model. Healthcare organizations should know every cost that will occur in the co-creation. Companies can take help from other co-creation stakeholders for controlling the whole process.

Thus, co-create business model in developing connected health services is possible when all the components including customers, target customer segments, selling, marketing and distribution channel activities, value proposition, value creation and extraction, value network and competition, products/services, pricing, cost structure and revenue model, processes, resources and practices, dialogue, access, risk benefits and transparency and shared purpose are perfectly blended. Besides, it is important to know the vision, aims, to share the needs, and to get a good proposal for solution while doing co-creation. It is also crucial to use advanced technology for identifying needs and preparing solution and use business model tool. Moreover, the participation of every stakeholder with each other including, supporter organizations, challenger organizations, funder, companies, hospitals, healthcare professionals (doctors, nurses and all the staff), business development specialists and patients is significant for the successful co-creation.

5.2 Theoretical Contributions

Theoretical contributions of the study present a novel way for a cocreated business model in developing connected health services and it provides the existing literature contribution in different aspects. A well-grounded literature review was used for testing the empirical data and for further analysis. The results of the empirical analysis have proved with the literature context in the same way and also has added new information. Those are portrayed in the following based on business model, co-creation and combined business model and co-creation contribution.

Business Model Contribution

The empirical results confirm that customer needs must be meet by business model (Teece, 2010) and business model aids the process of value creation (Chesbrough and Rosenbloom, 2002; Osterwalder, Pigneur, and Tucci, 2005; Shafer, Smith and Linder,

2005; Voelpel, Leibold, Tekie and Von Krogh, 2005 and Zott and Amit 2007). It was also shown in the literature review that finding out the components and relationships which describe the business of a company is the main quest for business model.

The results show that for the co-creation of business model, there should be some components. The mentioned definitions of different authors in chapter 2 showed most of the components which agree with the empirical results. They are- customer value creation or value proposition or create value, revenue model under earnings logic, value network which showing the relationships with partners, resources and capabilities (resource or processes, activities), target market or target customer (Neonen and Storbacka, 2010). Other components like the mission, competitors, cost/pricing, partners/actors/suppliers, customer relationships were also mentioned by several authors (Onetti et.al, 2012). Based on those components, the researcher made a list of fifteen business model components which was the base for building the theoretical framework.

The researcher gave the concepts of those components in the literature review which almost matches the empirical results. The reason behind this is, the researcher conceptualized some common and general themes from business model and co-creation by a theoretical framework and based on these, the questionnaire was developed for conducting the interview. After that, the data was analyzed based on the themes. The results have provided new information about the way of using those components.

It was also stated in the literature review to use business modeling tools for creating business model as business model tools present a structural framework. Among them, lean canvas is a business model validation tool that uses customer-centric approach with nine components. Startup founders can get a roadmap to reach the target customers (Ash Maurya, 2012) which justifies the empirical results. Besides, the result confirms that inDemand model is quite similar to **horizontal business model** which has a purpose for serving, collecting customers and reaching different customer segments to obtain more value from the customers to be competitive in the market (Messerschmitti and Szyperski, 2003 via Ahokangas, 2015).

Co-Creation Contribution

Co-creation, which is one of the center part of co-innovation, gives priority to value co-creation with customers for obtaining shared value (Lee, Olson and Trimi, 2012) confirms with the empirical results that co-creation occurs when there is a relationship between an organization and a specified group of its stakeholders, generally its customers (Fridlington et. al, 2016). Even the switch of the companies from firm centric to customer-centric (Prahalad and Ramaswamy, 2002) matches with the mentioned demand-driven approach in the empirical result. When the interaction between company and customer is high, it will unlock new sources of competitive advantage and the most important building blocks of co-creation are dialogue, access, risk benefits and transparency (Prahalad and Ramaswamy, 2004) which were quite identical with the empirical result. Besides, shared purpose which is one of the characteristics of co-operation of co-creation (Lee, Olson and Trimi, 2012) also justifies with the empirical results that if the company cocreate by working with all the partners including customers, they can able to know the customers want and based on that, new value adds into the products/services.

Summary of Business Model and Co-Creation Contribution

There are several examples of the importance of business model and co-creation that were mentioned in the literature context. Those showed that patients want to be part of the value creation process (Nordgren, 2008) while how to include third parties in the value co-creation process is unclear (Hardyman et.al, 2015). Here, the empirical results have shown in a big picture of how the other stakeholders can be included besides customers. Moreover, the components which were mentioned in the empirical result justify the components in chapter 2 that proves for a successful co-creation, those components should be mixed properly so that every partner can be a gainer in the co-creation.

In addition, the contribution of every stakeholder including participation of customers (Chan et. al, 2010), assistance of doctors, cooperative relationships among patients, hospital workers and physicians (Bonomi et. al, 2015) are valuable in co-creation process which fits the empirical results.

5.3   Managerial Implications

The results of this thesis were based on three case companies who have a very active role in co-creation of the inDemand project which is based on Finnish and foreign healthcare systems. Results portrayed to the companies and the healthcare organizations that how can a company involve in a co-creation with different organizations, what will be the main components that it should consider and how they will carry on the whole project by influencing all the partners.

From the managerial point of view, the results of the study can be a starting point for the companies or entrepreneurs or healthcare organizations for thinking about co-creation and combine with the business model. The study illustrates that what is actually the business model is, what are the components a company should consider while creating a business model, what are the tools that assist the business model building process and also how it is connected with e-health or connected health. The study tells the importance of co-creation, what are the elements should be considered for co-creation and how can a business able to combine business model and co-creation. In addition, the empirical results have justified how the co-creation of business model has occurred in real field, how the actors are chosen, how the funds are assured, how to maintain relationships among stakeholders while sometimes motivating them with reward, how to target customers and do segmentation, how value is added, how to use pricing, cost structure and revenue model, how to control different activities by maintaining proper dialogue, access, risk benefits and transparency and so forth.

The whole study including theoretical and empirical parts provide a broader framework for the companies and healthcare organizations that it is necessary to have both business model and co-creation for having a joint benefit and competitive advantage. Companies can able to get new opportunities and hospitals can get new solutions for their problems in connected health. Companies can also able to understand the importance of business support and business development. Both healthcare organizations and companies should involve customers more in their co-creation process. Lastly, for reducing the risk in co-creation, organization should be

more aware while choosing other organizations and should define everyone's role from the beginning of the co-creation.

5.4   Reliability and Validity of the study

For evaluating the quality of the research, it is necessary to test the reliability, validity, and generalizability of the study. The study is based on identifying the process for co-creation of business model of developing connected health services. To reach the goal of this study, qualitative case study approach has taken, and face-to-face interviews and Skype interviews are conducted. The findings have shown that there is some limitation in the results based on the features of the research. Study results can not be generalizable in this research. The concept 'Generalizability' refers to the extent by which the results of the research found from the study sample can be generalized to the total population (Polit and Hungler, 1991:645 via Ali and Yusof, 2011). Here, the sample size is small. The sample is collected from three case companies of Finland and Spain for the purpose of meeting the objective of the thesis. According to Leung (2015), most of the qualitative studies concentrate on a specific phenomenon in a certain population in a particular environment, as a result, the generalizability of findings in qualitative research is unexpected feature. As the thesis is limited to a specific sample, it can be said that the results of the study cannot be generalized the whole population.

In a qualitative study, validity assesses the appropriateness of data, processes, and tools which are used in the study (Leung, 2015). In this study, the research question is developed based on a specific phenomenon. Though there are no sub-questions, the research question has met the answer of the research through a planned way, so it can be said that the research question is valid. For answering the research question, concepts of business model and co-creation have been discussed in the theoretical context. The study follows qualitative case study approach which is categorized as an exploratory case study. From this angle, the qualitative case study is appropriate for answering the research question in this study. Thus, the research method is valid here. In addition, deductive analysis is used to conform to the chosen methodology.

Data is collected by conducting face to face and Skype interviews which are semi-structured and thematic in nature. The researcher has directly observed, collected and analyzed the interview data based on themes. So, it proves that the research design, sampling, and data analysis are valid for this study. Finally, the empirical results are being compared with the theoretical context and the researcher has got the research answer by concluding the study confirms that the results and the conclusions are valid for this research.

Reliability can be achieved if another researcher researches the same event based on the same sample and gets same findings (Spencer et al., 2003:65 via Ali and Yusuf, 2011). In this research, the findings are based on two developed countries-Finland and Spain while the results will be different if the same issue is investigated in developing countries. Stenbacka, 2001 via Ali and Yusuf, 2011 argues that as the issue of reliability relates to measurements, it is not relevant in qualitative research. Though there are data collection techniques (semi-structured face to face and Skype interviews) and thematic analysis are used in the study which is reliable in nature, there are no measurements like quantitative research. Golafshani, 2003:61 via Ali and Yusuf, 2011 agrees with Stenbacka, 2001 that in qualitative research, there is no relevance of the concept of reliability. As this research illustrates qualitative research, so, there is no presence of reliability in this study. Though there are limitations on the reliability, the study can be expected almost at a satisfactory level.

5.5 Limitations

This study has some limitations. As qualitative research is based on the researcher's understanding and perception of a particular phenomenon, its objectivity can be contented based on the person who is conducting the study. This research is closely linked to a particular context and cannot able to present generalized results. But it portrays different insights into this particular context. In some of the cases, responses were vague which was difficult for the researcher to analysis.

At first, data planned to collect from Finland, Spain, and France. Due to the time limitation, the researcher gathered data only from Finland and Spain. Because of the flexible nature of the semi-structured interview, in some cases, the respondents shared their personal views and opinions which should not be viewed under strict rules and guidelines. Moreover, the sample size is limited between Finland and Spain and the researcher's interpretation of collected data is constrained based on the perception of the respondents of the topic though the interview responses were recorded and transcribed word by word. Data which was derived from Finland and Spain were almost same in nature. If data could be collected from France, it would assist the researcher to find more differences to compare in their co-creation process.

5.6   Suggestions for further research

Based on the conclusion and the above limitations, the main contribution of this thesis in scientific research is to find out the process of co-creation of business models to help in developing connected health services. This research has found the process, actors and technology in co-creation based on two countries. This is a wide scope of the researchers to study this issue over a big sample and identify whether the collected data and findings match with their sample and findings or not. Also, they can research the same issue in the case of developing countries. They can even investigate the impact of pricing, cost structure and revenue model in this type of co-creation.

Moreover, the interviewees suggested using lean canvas for getting a roadmap of what to do in co-creation. Here, the future researchers can search whether other business modeling tools are applicable in the co-created business model process and also can compare if there is any benefit to using other business modeling tools.

REFERENCES

Ahokangas, P. & Myllykoski, J. (2014a). The practice of creating and transforming a business model. *Journal of Business Models*, *2*(1), 6. doi: 10.5278/ojs.jbm.v2i1.719

Ahokangas, P., Juntunen, M., & Myllykoski, J. (2014b). Cloud computing and transformation of international e-business models. In *A Focused Issue on Building New Competences in Dynamic Environments* (pp. 3-28). Emerald Group Publishing Limited. doi:10.1108/S1744-211720140000007001

Al-Debei, M. M., & Avison, D. (2010). Developing a unified framework of the business model concept. *European Journal of Information Systems*, *19*(3), 359-376. doi:10.1057/ejis.2010.21

Alhojailan, M. I. (2012). Thematic analysis: A critical review of its process and evaluation. *West East Journal of Social Sciences*, *1*(1), 39-47.

Ali, A. M., & Yusof, H. (2011). Quality in qualitative studies: The case of validity, reliability and generalizability. *Issues in Social and Environmental Accounting*, *5*(1/2), 25-64.

Amit, R., & Zott, C. (2001). Value creation in e-business. *Strategic management journal*, *22*(6-7), 493-520. doi:10.1002/smj.187

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The qualitative report*, *13*(4), 544-559.

Bertolazzi, P., Krusich, C., Missikoff, M. (2001) An Approach to the Definition of a Core Enterprise Ontology: CEO, OES-SEO 2001, *International Workshop on Open Enterprise Solutions: Systems, Experiences, and Organizations*, Rome, September 14-15.

Bonomi, S., Zardini, A., Rossignoli, C., & Dameri, P. R. (2015, February). E-health and value co-creation: the case of electronic medical record in an Italian academic integrated hospital. In *International Conference on Exploring Services Science* (pp. 166-175). Springer, Cham. doi:10.1007/978-3-319-14980-6_13

Braun, V., Clarke, V., Hayfield, N., & Terry, G. (2019). Thematic analysis. *Handbook of Research Methods in Health Social Sciences*, 843-860.

Campbell, S. (2014). What is qualitative research?. *Clinical Laboratory Science*, *27*(1), 3.

Caulfield, B. M., & Donnelly, S. C. (2013). What is connected health and why will it change your practice?. *QJM: An International Journal of Medicine*, *106*(8), 703-707.

Chesbrough, H. (2010). Business model innovation: opportunities and barriers. *Long range planning*, *43*(2-3), 354-363. doi:10.1016/j.lrp.2009.07.010

Dubosson-Torbay, M., Osterwalder, A., & Pigneur, Y. (2002). E-business model design, classification, and measurements. *Thunderbird International Business Review*, *44*(1), 5-23. doi:10.1002/tie.1036

Freire, K., & Sangiorgi, D. (2010). Service design and healthcare innovation: From consumption to co-production to co-creation. In *Service Design and Service Innovation conference* (pp. 39-50). Linköping Electronic Conference Proceedings.

Fridlington, L., Mckay, L., Spencer, N., & Watson, B. (2016). The Co-creation design framework. *Academic design management conference.* Retrieved from http://nrl.northumbria.ac.uk/27851/1/The%2520Co-Creation%2520Design%2520Framework.pdf

Frow, P., McColl-Kennedy, J. R., & Payne, A. (2016). Co-creation practices: Their role in shaping a health care ecosystem. *Industrial Marketing Management*, *56*, 24-39. doi:10.1016/j.indmarman.2016.03.007

Gallan, A. S., Jarvis, C. B., Brown, S. W., & Bitner, M. J. (2013). Customer positivity and participation in services: an empirical test in a health care context. *Journal of the Academy of Marketing Science*, *41*(3), 338-356. doi:10.1007/s11747-012-0307-4

Gomes, J. F., Ahokangas, P., & Pikkarainen, M. (2017). Factors impacting the orchestrator business model in connected health business ecosystems, 18–19.

Grönroos, C. (2011). Value co-creation in service logic: A critical analysis. *Marketing theory*, *11*(3), 279-301. doi:10.1177/1470593111408177

Hamel, G. (2000). Leading the revolution: An interview with Gary Hamel. *Strategy & Leadership*, *22*(12), 4-10.

Hedman, J. and Kalling, T. (2003). The business model concept: theoretical underpinnings and empirical illustrations. European journal of information systems, 12(1), pp.49-59.

Hyde, K. F. (2000). Recognising deductive processes in qualitative research. *Qualitative market research: An international journal*, *3*(2), 82-90.

Iivari, M. M., Ahokangas, P., Komi, M., Tihinen, M., & Valtanen, K. (2016). Toward ecosystemic business models in the context of industrial internet. *Journal of Business Models*, *4*(2).

Ind, N., & Coates, N. (2013). The meanings of co-creation. *European Business Review*, *25*(1), 86-95. doi:10.1108/09555341311287754

Jackson, R. L., Drummond, D. K., & Camara, S. (2007). What is qualitative research?. *Qualitative research reports in communication*, *8*(1), 21-28.

Jansson, N., Ahokangas, P., Iivari, M., Perälä-Heape, M. and Salo, S. (2014). The Competitive Advantage of an Ecosystemic Business Model: The Case of OuluHealth. Interdisciplinary Studies Journal, 3(4), p.282.

Kimble, C. (2015). Business Models for E-Health: Evidence From Ten Case Studies. *Global Business and Organizational Excellence*, *34*(4), 18-30. doi:10.1002/joe.21611

Lee, S. M., Olson, D. L., & Trimi, S. (2012). Co-innovation: convergenomics, collaboration, and co-creation for organizational values. *Management decision*, *50*(5), 817-831. doi:10.1108/00251741211227528

Leung, L. (2015). Validity, reliability, and generalizability in qualitative research. *Journal of family medicine and primary care*, *4*(3), 324.

Liu, L., & Jia, W. (2010). Business model for drug supply chain based on the internet of things. *2010 2nd IEEE International Conference on Network Infrastructure and Digital Content*, 982-986.

Longhurst, R. (2003). Semi-structured interviews and focus groups. *Key methods in geography*, *3*, 143-156.

Magretta, J. (2002). Why business models matter. Harvard Business Review 80(5), 86–92.

Maurya, A. (2012). *Running lean: Iterate from plan A to a plan that works*. " O'Reilly Media, Inc.".

Maxwell, J. A., & Miller, B. A. (2008). Categorizing and connecting strategies in qualitative data analysis. *Handbook of emergent methods*, 461-477.

McColl-Kennedy, J. R., Vargo, S. L., Dagger, T. S., Sweeney, J. C., & Kasteren, Y. V. (2012). Health care customer value cocreation practice styles. *Journal of Service Research*, *15*(4), 370-389. doi:10.1177/1094670512442806

Messerschmitt, D. G., & Szyperski, C. (2003). Software ecosystem: Understanding an Indispensable Technology and Industry. *Massachusetts Institute of Technology, Cambridge, MA*.

Morris, M., Schindehutte, M., & Allen, J. (2005). The entrepreneur's business model: toward a unified perspective. *Journal of business research*, *58*(6), 726-735. doi:10.1016/j.jbusres.2003.11.001

Nenonen, S., & Storbacka, K. (2010). Business model design: conceptualizing networked value co-creation. *International Journal of Quality and Service Sciences*, *2*(1), 43-59. doi:10.1108/17566691011026595

Onetti, A., Zucchella, A., Jones, M. V., & McDougall-Covin, P. P. (2012). Internationalization, innovation and entrepreneurship: business models for new technology-based firms. *Journal of Management & Governance*, *16*(3), 337-368. doi:10.1007/s10997-010-9154-1

Osterwalder, A. (2004). *The business model ontology a proposition in a design science approach* (Doctoral dissertation, Université de Lausanne, Faculté des hautes études commerciales).

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

Osterwalder, A., Pigneur, Y., & Tucci, C. L. (2005). Clarifying business models: Origins, present, and future of the concept. *Communications of the association for Information Systems*, *16*(1), 1.

Payne, A. F., Storbacka, K., & Frow, P. (2008). Managing the co-creation of value. *Journal of the academy of marketing science*, *36*(1), 83-96. doi:10.1007/s11747-007-0070-0

Pope, C., Ziebland, S., & Mays, N. (2000). Qualitative research in health care: analysing qualitative data. *BMJ: British Medical Journal*, *320*(7227), 114.

Prahalad, C. K., & Ramaswamy, V. (2002). The co-creation connection. *Strategy and Business*, 50-61.

Prahalad, C. K., & Ramaswamy, V. (2004a). Co-creating unique value with customers. *Strategy & leadership*, *32*(3), 4-9. doi:10.1108/10878570410699249

Prahalad, C. K., & Ramaswamy, V. (2004b). Co-creation experiences: The next practice in value creation. *Journal of interactive marketing*, *18*(3), 5-14. doi:10.1002/dir.20015

Pyzdek, T. (2003). The six sigma handbook. New York7 McGraw-Hill.

Ranjan, K. R., & Read, S. (2016). Value co-creation: concept and measurement. *Journal of the Academy of Marketing Science*, *44*(3), 290-315. doi:10.1007/s11747-014-0397-2

Shafer, S. M., Smith, H. J., & Linder, J. C. (2005). The power of business models. *Business horizons*, *48*(3), 199-207. doi:10.1016/j.bushor.2004.10.014

Teece, D. J. (2010). Business models, business strategy and innovation. *Long range planning*, *43*(2-3), 172-194. doi:10.1016/j.lrp.2009.07.003

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

Thorne, S. (2000). Data analysis in qualitative research. *Evidence-based nursing*, *3*(3), 68-70.

Timmers, P. (1998). Business models for electronic markets. *Electronic markets*, *8*(2), 3-8. doi:10.1080/10196789800000016

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & health sciences*, *15*(3), 398-405.

Vargo, S. L., & Lusch, R. F. (2004). Evolving to a new dominant logic for marketing. *Journal of Marketing, 68*(1), 1-17. doi:10.1509/jmkg.68.1.1.24036

Voelpel, S. C., Leibold, M., & Tekie, E. B. (2004). The wheel of business model reinvention: how to reshape your business model to leapfrog competitors. *Journal of change management*, *4*(3), 259-276. doi:10.1080/1469701042000212669

von Hippel, E. A., Ogawa, S., & PJ de Jong, J. (2011). The age of the consumer-innovator. *MIT Sloan Management Review, 53*(1), 27-35.

Whitehouse, S. R., Lam, P. Y., Balka, E., McLellan, S., Deevska, M., Penn, D., ... & Paone, M. (2013). Co-creation with TickiT: designing and evaluating a clinical eHealth platform for youth. *JMIR research protocols*, *2*(2).

Wirtz, B. W. (2011). *Business model management: Design Process Instruments* (1st ed). Wiesbaden, Gabler Verlag.

Wirtz, B. W., Pistoia, A., Ullrich, S., & Göttel, V. (2016). Business models: Origin, development and future research perspectives. *Long range planning*, *49*(1), 36-54.

Wirtz, B. W., Schilke, O., & Ullrich, S. (2010). Strategic development of business models: implications of the Web 2.0 for creating value on the internet. *Long range planning*, *43*(2-3), 272-290. doi:10.1016/j.lrp.2015.04.001

Yin, R. K. (2003). Case study research: Design and methods (3rd ed.). Thousand Oaks, CA: Sage.

Zainal, Z. (2007). Case study as a research method. *Jurnal Kemanusiaan*, *5*(1).

Zott, C., & Amit, R. (2007). Business model design and the performance of entrepreneurial firms. *Organization science*, *18*(2), 181-199. doi:10.1287/orsc.1060.0232

Zott, C., Amit, R., & Massa, L. (2011). The business model: recent developments and future research. *Journal of management*, *37*(4), 1019-1042. doi:10.1177/0149206311406265

Electronic Sources:

Ahokangas, P. (2015). Vertical, horizontal and oblique business models. Available at: < http://techbusstratintfutures.blogspot.fi/> Cited 12.12.2018

Allied Consultants (2016). [Infographic] What are the 4 Basic Layers of an IoT Service Oriented Architecture? Available at: <http://www.alliedc.com/infographic-what-are-the-4-basic-layers-of-an-iot-service-oriented-architecture/> cited 15.02.2019

Business Finland (2019). Digital Health-Strong in Digital Health. Available at: < https://www.businessfinland.fi/en/do-business-with-finland/explore-finland/health--wellbeing/Digitalhealth/> citied 16.10.2019

Business Insider (2016). Internet of Things in Healthcare: Information Technology in Health. Available at: <https://nordic.businessinsider.com/internet-of-things-in-healthcare-2016-8> citied 17.02.2019

Deloitte.com (2019). Accelerating the adoption of connected health. Available at: < https://www2.deloitte.com/us/en/pages/life-sciences-and-health-care/articles/accelerating-the-adoption-of-connected-health.html#> citied 16.10.2019

Dudovskiy, J. (2019). Exploratory Research. Available at: <https://research-methodology.net/research-methodology/research-design/exploratory-research/> citied 17.04.2019

Ec. Europa.eu (2018). D1.1 Interim Report to European Commission [Online] Available at: < https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds= 080166e5c317245b&appId=PPGMS> cited 27.11.2019

Ec.europa.eu (2017). inDemand: a new Horizon 2020 project for co-creating eHealth solutions [Online] Available at: <https://ec.europa.eu/programmes/horizon2020/en/news/indemand-new-horizon-2020-project-co-creating-ehealth-solutions> cited 16.10.2019

Ec.europa.eu (2019). The Digital Economy and Society Index (DESI). Available at: < https://ec.europa.eu/digital-single-market/en/desi> cited 16.10.2019

Erhard, A., Ortolani, G., Wintermantel, T., Anscombe, J. & De Bres-Riemslag, E. (2013). Building Value-Based Healthcare Business Models. Available at: <http://www.middle-east.atkearney.com/documents/10192/2719243/Building+Value-Based+Healthcare+Business+Models.pdf/6b3065e1-a1e3-4e82-8477-0903bcdc68af >cited 18.02.2019

Indemandhealth.eu (2019). inDemand Available at: < https://www.indemandhealth.eu/> citied at 23.10.2019

Indemandhealth.eu (2019). InDemand Community: European regions committed to digital transformation in healthcare. Available at: <https://www.indemandhealth.eu/the-indemand-community-members/> citied at 16.10.2019

Investopedia (2019). Which Business Model is Best? Depends on the Industry. Available at: <https://www.investopedia.com/ask/answers/042715/what-are-some-examples-different-types-business-models-major-industries.asp> Citied 19.03.2019

Koch, C. (2005). A New BluePrint For The Enterprise. CIO Magazine. Available at: <https://www.cio.com.au/article/30960/new_blueprint_enterprise/> cited 18.02.2019

Microsoft Azure (2018). Azure for health. Available at: <https://azure.microsoft.com/en-us/industries/healthcare/> cited 13.12.2018

N4s. Dimecc. Com (2019). Era of Internet of Things Needs New Oblique Business Models. Available at: <http://n4s.dimecc.com/2016magazine/article19/>cited 19.02.2019

Slade (2018). The Rise of Connected Healthcare with IoT. Available at: <https://cloudblogs.microsoft.com/industry-blog/health/2018/06/14/the-rise-of-connected-healthcare-with-iot/> citied 15.12.2018

Starak, Y. (2014). Horizontal or Vertical Business Models: Which Is Right For You? Available at: <http://www.entrepreneurs-journey.com/2446/horizontal-vertical-business-models/>Cited 15.12.2018

Stephanie (2018). Primary Data & Secondary Data: Definition & Example. Available at: <https://www.statisticshowto.datasciencecentral.com/primary-data-secondary/> Citied 18.04.2019

APPENDIX 1

Interview Framework

For getting some idea about the business model, I am showing a business model canvas and business model wheel.

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
	Key Resources		Channels	
Cost Structure		Revenue Streams		

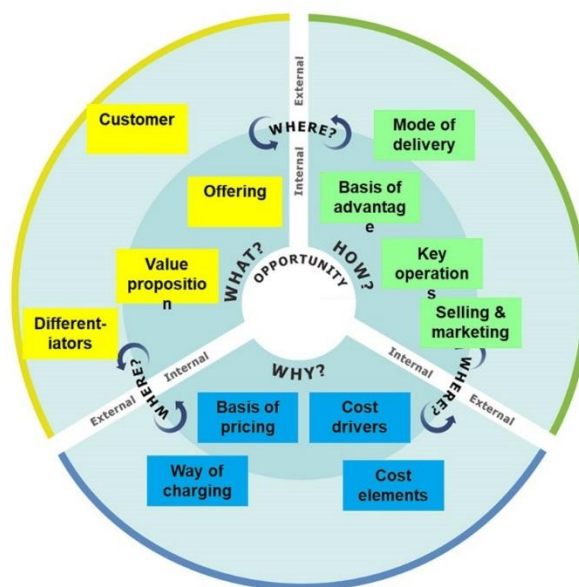*Figure: Business Model Canvas (Osterwalder & Pigneur, 2010:44)*

Figure: Business Model Wheel(Ahokangas, Juntunen and Myllykoski, 2014b)

I am researching co-created business models of connected health services. I have three themes. They are- Business Model, Processes and Governance. There are few questions and we have about one hour to discuss those questions.

Business Model refers to a tool for creating and capturing value which can help in co-creating connected health services.

1) How do you find your target customers and do segmentation in co-creation? How would you co-create selling, marketing and distribution channel related activities?
2) What kind of value does your company/organization create for customers and partners in co-creation? Do the existing value network and competition need to be considered in co-creation? If yes, how?
3) What kind of co-created products/services are appropriate to offer in connected health for gaining competitive advantage and opportunities?
4) What role pricing and revenue model play for business performance in co-creation?

Processes are series of activities for capturing and extracting value in connected health services.

1) What kind of process you have for value creation and extraction within co-created services?
2) How and why co-created processes, resources and practices can help customers' or collaborating organizations' or suppliers' activities?
3) Why and how does pricing, cost structure and revenue model need specific considerations in co-created connected health?

Governance is needed for co-creating the business model in connected health services.

1) What do you think about the role of dialogue, access, risk-benefits or assessment and transparency when co-creating in connected health services?
2) How do you think you could reach the shared purpose between customer and company when exploiting the business opportunity?
3) When we plan about pricing, cost structure, revenue model, what kind of need there is for control? If you do, then how do you control these activities?

If you are asked to co-create business model for helping in developing connected health services, how would you do it?