Title: The importance and challenges of sustainability in the healthcare services (A case study of Germany)

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Major: Public Health
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Year: 2025

DECLARATION

I do hereby declare that I am the sole author of this dissertation and that its contents are only the result of the readings and research I have done. This thesis reflects a commitment to sustainability, innovation, public health, academic integrity, and awareness.

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I confirm that the candidate carried out the work reported in this thesis under my supervision.

Supervisor Name: **Professor Salvatore Fava**

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I have developed various skills and achieved various improvements through collaboration and continuous learning by collaborating and learning about different cultures. Therefore, I have managed to understand how to deal with and benefit from a diverse culture during my PHD studies. I hereby confirm that this project is my work and no part of it has been previously published elsewhere.

Thank you all for your contributions and support

Abstract

The healthcare industry is vast and is transforming public health administration through digital healthcare services and sustainable innovation. This research aims to explore the importance and challenges of sustainability in healthcare services to ensure customer service efficiency and effective public management. Similarly, the research study aims to answer the main research question on the importance of sustainability in healthcare services in Germany. As well as providing details that will answer the sub-research questions, in particular, the opportunities and ways used during the collaboration between the two parties, and the challenges faced. The sampling technique used by the researcher during the research process was random in the geographical location of Germany. A systematic review of the existing literature, data visualization, and analysis was conducted to generate evidence regarding the importance and challenges of sustainability in healthcare services. The findings are intended to highlight the importance of sustainable innovation in healthcare services.

The researcher used the primary and secondary methods to collect data for analysis through a qualitative research design. The data was obtained from literature review, social media, observation, interview method, and questionnaire data collection method through a survey to obtain data from the sample. Specifically, the researcher collected data from healthcare workers and users in Germany. Above all, the research is relevant to the current situation since the government is empowering sustainability actions in the healthcare sector through sustainable innovation. During the research, the identification of the gap in the research topic was made, as many sources explain the integration of sustainability in the healthcare sector without specifically touching on customer efficiency and sustainable healthcare services. For this reason, the researcher believes that the findings from the analysis of the primary sources will be of benefit for further studies. The future research should address the limitations of sustainable healthcare services by improving the data and developing sustainable innovations.

Key words

Sustainable healthcare services, Innovation, public management, customer service efficiency

Table of contents

Contents

List of Tables

List of Figures

List of Acronyms and Abbreviations

ACFTA: African Continental Free Trade Area

EU: European Union

SWOT: Strengths, weaknesses, opportunities, and threats

PESTEL: Political, economic, technological, legal, and environmental factors

UN: United Nations

Chapter 1.0 Introduction

Sustainability is the situation where the individual or organization ensures the proper utilization of resources while thinking long-term about the future generation through environmental conservation and adequate planning (Boons et al., 2013). The advantages of Sustainability are cost reduction and proper ecological conservation. Moreover, it tends to increase productivity and ensure efficiency in healthcare service management. It increases the sales revenue of organizations such as healthcare insurance because the customers and employees appreciate companies that observe sustainability, and this leads to a competitive advantage. However, the disadvantage of sustainability is that it is costly to the business during the adaptation and implementation of sustainability. Also, it demands time and attention to implement and adapt various models and technologies to complete the intended goal and target strategies. Healthcare management is an activity that involves proper management of the resources and activities that provide healthcare services to the public with equity and efficiency. Healthcare management is facing various challenges in ensuring cost reduction and keeping up with the new sustainable innovations in medical devices and data record-using technology (Nomani & Hussain, 2020). The advantages of healthcare management are to mitigate risks in the healthcare sector, like financial risks associated with penalties for ensuring environmental waste. Also, it enables the reduction of costs during the healthcare provision by ensuring proper utilization of the resources available. Moreover, it enables proper quality control to ensure efficiency and proper planning. Furthermore, it enables the improvement in communication and decision-making in healthcare operations. However, the disadvantages of healthcare management are an increase in costs during operational activities and uncertainty that might occur while adapting the sustainability process in the supply chain. Furthermore, the importance of sustainability in healthcare is to ensure proper use of the resources and increase profits in the organization. Therefore, the company faces an increase in costs and challenges during the implementation of sustainability (Buffoli et al., 2013). Also, it enables efficiency and proper planning in the healthcare services management to ensure just-in-time delivery and inventory management. It assists in ensuring an increase in productivity through employee motivation and proper policies that ensure cost reductions. Therefore, the benefits listed of sustainability to the

healthcare management became a driving motive towards the adoption of a conscious plan to promote awareness.

Through globalization and creativity, the healthcare technologies are continuously emerging, leading to changes in service provision in the market. The technology in healthcare services has enabled improvement in customer services by allowing customers to use digital services and get access to healthcare services on time with less bureaucracy. Moreover, public health management plays a big role in enabling several improvements, such as proper decision-making through the integration of data from different departments in an organization by ensuring proper quality management and risk control. Therefore, public health management tends to strengthen customer service efficiency and proper planning to enable proper utilization of resources. Next, the concept tends to facilitate proper environmental conservation through sustainability implementation that allows the proper allocation of resources as sustainability is taking over in the economy and society. In addition, public health management tends to reduce costs at the operational level and enable public satisfaction.

The research topic is regarding the importance and challenges of sustainability in healthcare services. Then the research topic was identified by the researcher from the recognition of the gap left by former research. Afterward, the researcher formulated the research questions, hypothesis, and objectives that assisted the researcher while conducting the research study for data collection. The hypothesis statement states that `` it is hypothesized that sustainability in the healthcare services has facilitated the increment in customer service efficiency by waste reduction and going digital, leading to a reduction in costs''. The reason for the formulation of the hypothesis is to direct the researcher on what to collect, the findings, and the conclusions. During the collection of data, the researcher used interview and questionnaire methods of data collection while implementing the survey strategy. The data collection methods used have enabled the researcher to get data and analyze it in order to draw a conclusion for the hypothesis statement. Moreover, the data collected facilitated the researcher to answer the main question and sub-questions of the research study, and was specifically done based on random sampling techniques from the German population. Therefore, the use of sampling techniques has facilitated time-saving and cost reduction. In this report, the discussion on the research process of the importance and challenges of sustainability in healthcare services will be made.

1.1 Background of the Study

This section provides an overview of the research topic and expounds on the importance and challenges of sustainability in healthcare services in Germany from the experienced view of a consultant and practitioner in the field. Sustainability is growing and leading to development in economic, social, and environmental activities. European countries are investing heavily in sustainability activities in various sectors, such as the healthcare sector. Germany is among the leading pioneers in affordable and high-quality healthcare services. Sustainability actions in healthcare services formulate sustainable healthcare for the public to support the proper management of resources, public management, operational initiatives, healthcare management, and environmental conservation that address societal needs. These initiatives include reducing waste, recycling of wastes, and reuse of wastes, and social services such as healthcare resources management, and sustainability awareness to the health sector and the public. Sustainability is the solution to address proper healthcare service management while ensuring proper optimization of the resources and innovations that lead to effectiveness and efficiency while using public health. Sustainability ensures development and proper risk management, and the objectives of public healthcare are met through government aid and funds for various complex projects (Anuar et al., 2018). Sustainability facilities optimizations, developments, and inventions of new technology in the healthcare sector enable improvements in healthcare services for public health.

Sustainability has become an increasingly popular tool for government in health to enable waste management, promote awareness, and integrate developments to enable operational solutions. The goal of sustainability in healthcare services is to maximize gains, reduce waste, and ensure proper use of resources by recycling and planning for public benefits. In recent years, sustainability has been adopted, practiced, and implemented in various activities such as healthcare, supply chain management, quality management, tourism management, and overall economic management to provide effective management assistance (Lăzăroiu et al., 2020). While sustainability has become increasingly popular, much is still to be learned about its effectiveness and impact on healthcare services management. This research examines the influence of sustainability in healthcare service innovations from a practitioner's perspective. The European Union sustainability reports analysis highlights the value of sustainability in the healthcare services for sustainable healthcare development. This paper proposes that sustainability influences the healthcare service in various ways to tackle tough healthcare issues and implement innovative solutions. The government provides the healthcare sector with access to funding to integrate and practice sustainable development that enables project management, efficiency, and innovations (Kostetckaia & Hametner, 2022). Because of these advantages,

sustainable healthcare may be designed to be more productive and beneficial to public health. Moreover, the paper argues that sustainability in healthcare services faces various challenges and limitations that require remedy, proper planning, and solutions to enable sustainable development. When communities ensure sustainable practices, the activities will facilitate an increase in returns, proper sustainable environmental management, and public health to achieve benefits.

The European Union sustainability reports propose that all institutions should practice sustainable actions during operations, and they should make several reports showing the risks associated and opportunities that may affect the public and the environment. Therefore, this activity will provide awareness to the investors and shareholders and provide sustainable performance evaluations and screening of the overall projects conducted (Kostetckaia & Hametner, 2022). This can be advantageous to enable sustainable development and achieve progress in the sustainability practice of a country. The European Union sustainability reports outline the potential benefits of sustainability, and benefits in healthcare services, including improved access to financing, improved project management, greater efficiency, and greater innovation in healthcare services. These benefits can help the government to develop more efficient and effective healthcare service projects that deliver greater value to citizens. Furthermore, sustainability can also help public healthcare to get access to new technologies and improve its innovation ability. A study by Nomani and Hussain (2020) found that sustainability provides various benefits and influences in healthcare services technology development, such as medical devices. Also, it enables healthcare to develop more innovative solutions through proper records and solutions to achieve various gains.

The demand for improved service and goods delivery to the public has sparked an increase in collaborations between sustainability and healthcare services organizations with a common goal of meeting the public demands of achieving quality healthcare (Buffoli et al., 2013). Governments prefer that public healthcare be integrated with sustainability due to its effectiveness in ensuring proper waste management and quality improvement. The procedure enables the government to have a well-structured policy, sustainable development innovations, and public care management. Therefore, the sustainability concept is essential in healthcare services management because it has a wide range of influence on resources and skills to implement innovations in healthcare services.

This research explores the multifaceted interactions between healthcare services and sustainability innovations and developments from the perspective of healthcare practitioners, experts, and consultants. The research study shows a conceptual framework in relation to the

interactions between sustainability, innovations, and healthcare services to provide insights into the degree of influence of sustainability on healthcare services from a consultant's perspective. The study provides insights and a better understanding of the influence of sustainability on the performance and success of healthcare service projects and the challenges facing this collaboration in Germany.

1.2 Problem statement

The introduction of the case study is about the importance and challenges of sustainability in the healthcare services in Germany. The case study shows the importance of the growing awareness among the customers and the public about sustainability, leading the healthcare services institutes to be interested in developing sustainable healthcare (Shen, 2014). Also, the public health sector in the country aims to reduce waste to zero pollution to protect the environment, ensure proper resource management, and promote human rights. Furthermore, the case elaborates on the challenges that occur in the healthcare services institutions and facilities while adapting and operating using sustainability integration in the healthcare process. The background of the study focused on the geographical area of Germany, which is among the most successful countries with the best healthcare services in Europe, and provides affordable and well-structured healthcare services. The healthcare service is well distributed throughout the country in different geographical locations to enable accessibility and proper public health management. Moreover, it provides employment opportunities worldwide and contributes to economic development and government strength. The healthcare institutes also provide innumerable contributions to society through healthcare foundations such as Stiftung Gesundheit Public Health Foundation, and the public healthcare institutes participate in various social community relations and charity activities. Furthermore, Germany's healthcare system has made efforts to move sustainably to ensure the proper utilization of the resources available. In addition, the country considers sustainability adaptation to ensure proper use of resources by adopting sustainable development goals in general. In addition, in Germany, health insurance is affordable and compulsory for each individual to have against any unforeseen issues, such as accidents. The healthcare insurance management continuously undertakes sustainability actions to facilitate improvements.

The SWOT analysis of healthcare services in Germany shows effective strategy as one among the strengths of the organizations by using a fast healthcare service rendering model and effective quality management to ensure public satisfaction with a variety of products and

affordable prices. However, the weaknesses are challenges in ensuring proper waste management and reducing costs because the production of the medical devices is mostly done abroad, like in Asia, leading to over-dependence on outsourcing (Youell, 2013). Also, the healthcare institutes in Germany ensure quality and time management, leading to an increase in costs for administration. The opportunities of the healthcare services institutes include a diversity of services through the use of e-commerce to enable increasing customer public satisfaction through self-service. In addition, healthcare service institutes are facing various threats like competition and economic problems that lead to growth in operational costs. Despite an increase in the application of sustainability in healthcare management, there is a limited understanding of the importance and challenges of sustainability in healthcare services. This research addresses this gap by providing knowledge on the role of sustainability in healthcare services management, innovations, advantages, and challenges. The study identifies best practices for successful collaboration between sustainability and healthcare services in ensuring sustainable healthcare developments, to existing research on the influence of sustainable development on healthcare services innovation. Sustainability could be constructive in implementing sustainable healthcare services development, which will allow leverage and proper utilization of the resources.

The project can therefore access a wider range of specialists, resources, and expertise and complete projects. Furthermore, the research identifies how sustainability could benefit long-term healthcare services management. However, the exploration highlights the difficulties that often occur in aligning profit interests, competition, and sustainability in operations. The problem situation is the high consumption of healthcare services such as medical care, medical materials, medications, and analysis laboratories, which leads to environmental and social impacts on public healthcare. The problem situation faced by healthcare services in Germany is the growing awareness of sustainability among customers and society, leading to a demand for sustainability implementation (Shen, 2014). Therefore, the healthcare service facilities and institutes in Germany faced tough competition from other sustainable healthcare service institutes in the healthcare sector, which have adopted sustainable healthcare services. Moreover, the healthcare facilities intend to achieve a competitive advantage by adopting sustainability actions

similar to competitors in the market. The case explains further the lessons learned from healthcare institutes and facilities in Germany during sustainability implementation in the supply chain, such as the challenges in costs and the recycling process.

Most of the research and data available on the importance and challenges of sustainability in the healthcare service have come from an academic perspective. The purpose of this research is to provide practical insight into the importance and challenges of sustainability in healthcare services from a practitioner's viewpoint. The examination aims to construct a conceptual model that will instruct interpreters on proper planning and management of such connections to ensure sustainable healthcare.

1.3 Statement of the causes

The analysis of the root cause of the healthcare services institutes and facilities in Germany, such as insurance, pharmacies, and hospitals problem is the growing awareness among customers about sustainability and the high consumption that leads to environmental and social impact on public health. Therefore, healthcare services face a need for proper waste management to ensure environmental conservation (Carnero, 2015). Moreover, customer demands keep changing, and the customers are continuously aware of the importance and benefits of public health to observe and operate while considering sustainability actions. Sustainability actions are essential to public health and society in ensuring proper environmental conservation.

Awareness is essential in ensuring the improvement of care, public management, communication, and relations between society and the organization. Moreover, Sustainability awareness has enabled healthcare services to ensure environmental care through reduction, reuse, recycling, and recovery (Martin et al., 2021). Healthcare services institutes and facilities, such as insurance, are building brand awareness through sustainable actions in public health management to attract and retain customers. Moreover, the customers are becoming aware each day of the importance of sustainability in the healthcare, leading the health services to keep up with the new innovations that practice sustainability and improve customer satisfaction. The healthcare institutes and facilities in Germany have incurred various costs like quality costs, financial costs, and time costs during the adaptation and implementation of sustainability in the healthcare services process, and this is a root cause problem. The process is costly and demanding to ensure customer satisfaction, especially the recycling process and the utilization of the resources.

1.4 Research objectives

The objectives and aims of the research study involve the importance and challenges of sustainability in healthcare services in Germany. Specifically speaking, there are six objectives of this study:

- First, to identify the importance of sustainability in the healthcare services management and operations.
- Second, to assess the influence of sustainability on the success and performance of the healthcare services.
- Third, to identify the best practices for successful collaboration between sustainability and healthcare services.
- Fourth, to explore varied interconnections between sustainability and healthcare services innovations and developments from the view of public health practitioners and experts.
- Fifth, to evaluate the limitations of sustainability in the healthcare services in ensuring public health satisfaction.
- Sixth, to identify the improvements that need to be made during the sustainability actions in the healthcare services administration and operations to enable an increase in public health satisfaction.

1.5 Research questions

According to Saunders et al. (2009), the research question is among the core aspects in the conduct of the research. It assists the researcher in focusing on the research study in order to obtain data for data analysis and conclusion-making. The researcher used descriptive type of research questions in order to gather information in depth and draw conclusions from the data obtained. The current study will focus on the following aspects
The main research questions are

- What is the importance of sustainability in the healthcare services in Germany?
- What are the challenges of sustainability in the healthcare services in Germany?

Sub-research questions are

- What are the ways used to enable sustainability in healthcare services for the benefit of public health?

- What are the opportunities offered in healthcare services to enable sustainability growth?
- What does the literature review sources holds regarding the influence of the sustainability in the healthcare services?
- What are the ways used by healthcare facilities while considering sustainability to create public health service efficiency?
- What are the limitations faced by the healthcare services institutes and facilities while ensuring sustainability?
- What improvements need to be done in ensuring public health service efficiency by the healthcare services institutes while undertaking sustainability measures?

1.6 Rationale statement

This study examines the influence of sustainability in the healthcare services administration and operations, in general, to ensure that public healthcare is provided while considering future generations by reducing and recycling waste. Sustainability is an essential focus for addressing the issues of economic, social growth, sustainable development, and public management in Germany. Due to the complex and costly nature of implementing sustainability in public health care projects, sustainability provides an avenue for solutions regarding environmental conservation through proper waste management, proper resource management, and risk management. The study aims to bridge the gap in limited knowledge on the importance and challenges of sustainability in healthcare services by providing a practitioner's view on the topic. Sustainability could be an effective tool for developing healthcare services; furthermore, involving the public and providing sustainability awareness to enable proper planning are key factors for success. However, the absence of sustainability actions in the healthcare services management and public management can lead to misuse of resources, improper waste management, and other challenges. The findings of this study have essential implications for the future of sustainability in healthcare management and development and highlight the need for governments, private entities, and other stakeholders to collaborate openly and transparently to ensure that sustainability is successful in public health services. It also reinforces the advantages of involving sustainability awareness to the public and management in ensuring a proper planning process and providing incentives to ensure proper healthcare management. Going forward, governments, healthcare facilities, and the public must work together to create an environment that encourages the development of sustainable healthcare service solutions.

1.7 Purpose of the Research

The purpose of the study is to explain and prove the link between healthcare service facilities and institutes, such as hospitals and health insurance companies, in terms of sustainability in ensuring public health customer service efficiency in Germany. Similarly, the researcher aims to understand more about the influence and limitations of sustainability in healthcare services in order to evaluate and collect data for future studies. Likewise, the conduction of the research will provide practical knowledge to the researchers since the concepts of sustainability and healthcare services are among the academic topics taught in educational institutes. Next to that, the undertaking of the research will assist further studies with data for research purposes. Above all, the research aims to come out with a conclusion and recommendation regarding the collaboration between sustainability actions and healthcare services operations to enable waste management and proper use of the resources to ensure public health and customer service efficiency in Germany.

1.8 Significance of the study

The research demonstrates the importance and challenges of sustainability in healthcare services based in Germany. The report also emphasized that some of the difficulties faced in medical healthcare are the lack of sufficient financial funds and resources to adopt proper sustainability procedures due to high costs, improper planning, and growing awareness of sustainability among customers and society, leading to a demand for sustainability implementation. These issues may constrain the success of sustainability in the healthcare services.

This research study will clarify the concept of sustainability in healthcare services and the benefits it holds within Germany's economy. Therefore, data obtained from the research study will provide a reference to other researchers during their future studies and enable further improvements in the healthcare sector by understanding sustainability needs and preferences. Accordingly, the research study will be useful to the country of Germany in matching the public health needs, as innovation is taking place drastically due to globalization and sustainability awareness. As a result, the research will enable a positive change in perception regarding the influence of sustainability on public health and healthcare service facilities, rather than competition in the healthcare sector.

Furthermore, this research also seeks to provide a specialist's perspective on the role of sustainability in healthcare service ideas. The research aims to fill the knowledge gap on the effects of sustainability on the development of healthcare services by offering a comprehensive understanding of the implications, difficulties, and possibilities of creating effective healthcare services. The research findings shed light on sustainability contributions to and challenges of sustainability in the healthcare services and highlight key elements that are necessary to enable sustainability to succeed in the healthcare services process. The study demonstrates that successful healthcare services need strong sustainability awareness, well-defined roles, duties, and adaptation. The research also demonstrates how sustainability might improve healthcare services, open innovation doors in the public health sector, and improve public satisfaction.

1.9 Justification of the research

The current literature research relating to the importance and challenges of sustainability in healthcare services in Germany has no prior research regarding the topic in the specific area as clearly outlined. Moreover, in this research, sustainability in healthcare services has not been fully discussed but has been partially explored in previous academic studies. Sustainability awareness is growing and vital for public health management with the aim of ensuring customer satisfaction and proper resource management for future generations. The researcher aims to explore the importance and challenges of sustainability in healthcare services. So, this research aims to end this neglect in the healthcare sector, as well as the healthcare services, government, the public, and institutes collaborate in ensuring proper waste management through awareness programs and sustainability implementations. In Germany, the healthcare sector is aware of the importance of sustainability in ensuring efficiency and proper waste management. Therefore, driving forces such as the government, innovation adaptation, competition, environmental preservation measures, and the public have facilitated the collaboration between sustainability and healthcare services in ensuring proper public care and environmental conservation to enable proper waste management.

1.10 Methodology

During this study, the researcher made systematic planning with a theoretical investigation of techniques used during the research through a selection of qualitative and quantitative methods. Consequently, the finding of deep knowledge from secondary data available regarding the

research topic was used before obtaining the primary data. The researcher identified the problem statement of the research during the conduction of the literature review in order to collect data and recognize what gaps other researchers left. Therefore, the research topic was formulated from the gap noticed, and it was mainly about the importance and challenges of sustainability in the healthcare services in Germany. Consequently, the researcher had to understand the challenges facing the collaboration between the healthcare services and sustainability in ensuring customer service efficiency. Afterward, the improvements had to be identified in order to make further customer service efficiency, and sufficient through the connection between the healthcare services and sustainability. Moreover, in the process of gathering the primary data, the researcher used the interview method and questionnaire method in order to make an assessment of the collaboration between the healthcare services and sustainability in ensuring public health service efficiency. In addition, the researcher used the research onion in the formulation and conduction of the research by following the elements of the research onion, such as data collection and data analysis (Saunders et al., 2019).

Research onion paragraph

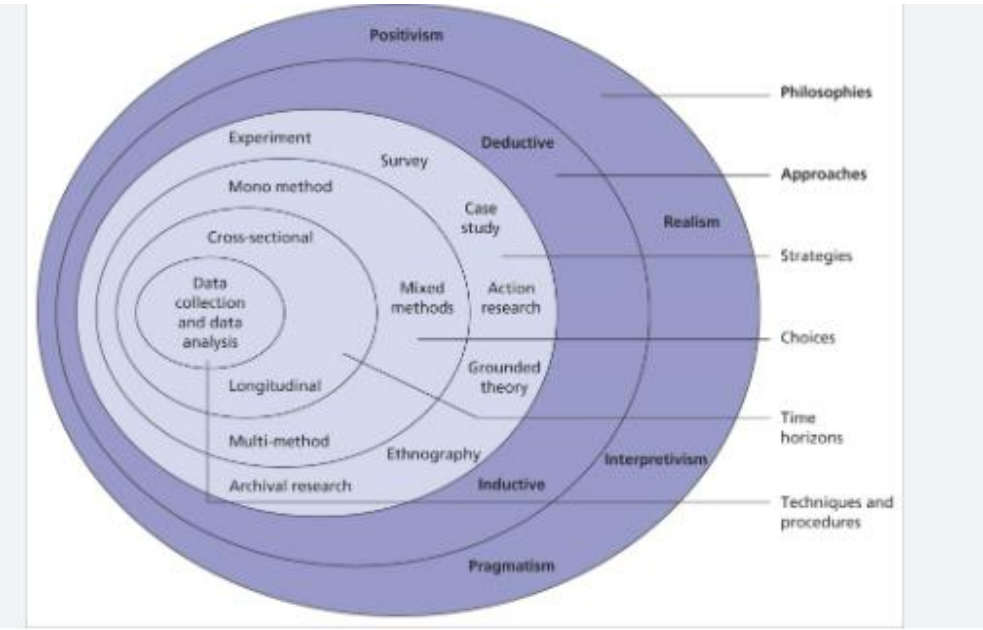

Figure 1: Research onion (Saunders et al., 2017)

The illustration of Figure 1 is the research onion, which is a model for designing research methodology. It includes a system of beliefs and philosophical assumptions that enable a critical understanding of the research questions to the choice of research methods. The research onion has six main layers that enable the research study completion, such as research philosophy, approaches to future studies, approaches to theory development, research strategy, methodological choice, time horizon, techniques, and procedures.

Due to the absence of prior academic investigation of the topic, this research regarding the importance and challenges of sustainability in healthcare services in Germany will choose to be exploratory in nature with a qualitative research method and research techniques, observation, questionnaire, and interviews in use. The author discusses the research methods by going into detail and pointing out the significance of research techniques, data collection, data analysis, and data reporting (McNeill, 2006). In investigating the research problem, well-experienced individuals who had participated in healthcare services activities were interviewed in order to obtain relevant information regarding the research study about the importance and challenges of sustainability in the healthcare services in Germany. Chapter 3 first reviewed and analyzed the qualitative, quantitative, and mixed methods of research methodologies in-depth, and a justification is provided as to why the qualitative research paradigm was the most suitable for this research. It was the conclusion of Chapter 3 that enabled the participants to fully express their perspectives and opinions, and provide technical, process, and interpretative knowledge; the most suitable qualitative research method was a problem-centered expert interview. The researcher also urges that the problem-centered expert interview method take into account the implicit dimensions of the knowledge learned from the interviewed experienced practitioner and expert with deep knowledge regarding healthcare management and improvement.

1.11 Structure of the Research Study

The frame structure of the research and the organization of the research study are shown in Figure 2. The entire dissertation can be divided into five parts:

The first part (Chapter 1) is the introduction to the research. This section provides background information on the research, the rationale statement, the problems the research aims to solve,

the research objectives, and the significance of the study in providing insights into the importance and challenges of sustainability in healthcare services.

The second part (Chapter 2) is the literature review. This section covers various aspects of sustainability, healthcare services, and existing research on the influence, importance, and challenges of sustainability in healthcare services.

The third part (Chapter 3) is the Methodology. This chapter is organized into research design, research strategy, data analysis methods, ethical considerations, and limitations and delimitations of the study.

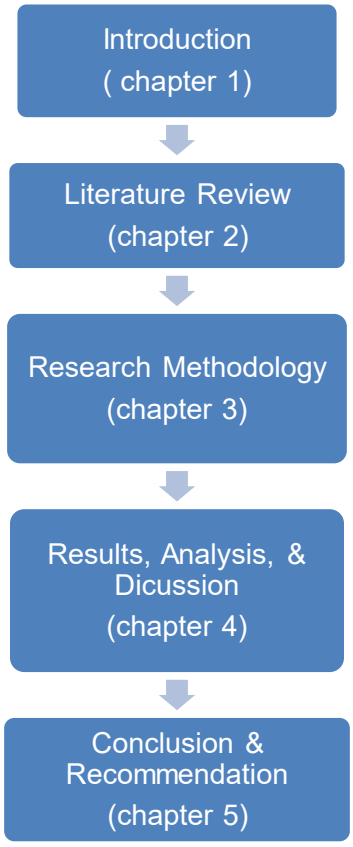

Figure 2: Frame structure of the research

The fourth part (Chapter 4) is the core research results, analysis, and discussion. This chapter is organized and focused on illustrating the results, analysis, and discussion regarding the importance and challenges of sustainability in the healthcare services based in Germany. Moreover, this section covers data presentation, presents research findings, and comparison of the findings with existing literature findings. The fifth part (Chapter 5) is Conclusions and Recommendations. This chapter summarizes the findings of the study regarding the importance

and challenges of sustainability in healthcare services. Furthermore, it provides valuable insights for researchers, practitioners, and policy-makers, as well as makes recommendations for future research on the topic.

Chapter 2.0. Literature review

2.1 Introduction

This section reviews sustainability, healthcare services, opportunities, and challenges in public health by reviewing past studies on this research topic, methodologies, and their findings. It starts with an overview of sustainability, followed by a review of the healthcare services in general, their involvement in sustainability, and the influence of these collaborations on healthcare innovations from an academic expert perspective. Moreover, in this chapter, the researcher will consider several publications written by other writers that relate to and assist the research topic in validation. Thus, conducting the literature review will help the researcher avoid duplication by recognizing other research made by previous researchers relating to the research topic about the importance and challenges of sustainability in healthcare services. Similarly, the researcher aims to recognize the gap left by other researchers while conducting the research. The reason for that is the formulation of the research topic that will facilitate further research through data collection methods such as interviews, questionnaires, and observation methods in obtaining primary data. Then the data analysis takes place after data collection, allowing the researcher to draw a conclusion and make further recommendations. Furthermore, the skimming of the literature review facilitated the researcher in formulating the problem statement that often introduces the research study and displays the researcher's vision, such as problems and solutions towards the research study. The researcher will diminish the general data obtained from the literature review about the research study. Finally, the literature review will assist the researcher in analyzing and drawing a conclusion that will provide the means for theory formulation.

2.2 Sustainability

Sustainability in the organization is crucial for the company to increase profits and efficiency. Organizations are still learning about sustainable development, innovations, and influences in business operations (Assoratgoon & Kantabutra, 2023). The organization is trying to integrate sustainability and organizational operations activities due to the growing demand for awareness regarding sustainability's influence on customer satisfaction and loyalty. Environmental conservation is an activity that involves proper preservation and management of nature and natural resources through reduction, sustainable choices, and allocation of resources. The

advantages of environmental conservation are to ensure recycling and reusing to enable the proper use of the resources available. For example, the plastic bottles recycling and reusing the government tends to encourage customers to recycle the bottles by offering a coupon back for returning the bottles. Moreover, it enables the public to keep up with climate change through sustainability, which leads to severe effects. However, the disadvantages of environmental conservation are a rise in costs due to the implementation of sustainability procedures that tend to oppose the development and growth in profits of the organizations. Sustainability aims at waste reduction and management to ensure proper use of the resources for future generations, aiming at improving the environment and public health through digitalization (Charfeddine & Umlai, 2023). The integration of digitalization, such as the Internet and mobile phones, has led to an increase in sustainability and environmental conservation awareness.

Awareness is essential to the organization's success because it improves communication and relations between society and the organization (Dach & Allmendinger, 2014). Most healthcare companies, such as insurance companies, pharmacies, and hospitals, are building brand awareness through sustainable business operations in supply chain management and customer service efficiency to attract and retain customers. Moreover, the customers' awareness of the importance of sustainability pushes the organization to keep up with the customers' demands and attain a competitive advantage in the medical care industry. Furthermore, the case study about the sustainable healthcare supply and the lessons from the case regarding environmental sustainability awareness in healthcare (Badanta et al., 2025). The author discusses the involvement of health professionals in environmental sustainability and the benefits associated with sustainable development implementations, like proper waste management. In addition, it shows the path healthcare services companies undertake as a challenge to develop a sustainable supply chain to achieve a competitive advantage and increase customer recognition of the brand.

Sustainability reporting is a procedure that deals with and ensures proper data collection regarding environmental, social, economic, and government issues to enable proper communication and decision-making. The procedure involves identifying various sustainability issues, defining the organization's sustainability goals, followed by data gathering and analyzing data, reporting framework, engaging the stakeholders, and the sustainability report formulation. The activity enables risk management, transparency, and improvements in business performance. The stakeholders’ interest in sustainability is emerging to higher levels, leading to demand for sustainability reports to foresee the business performance and measures to make for future developments (Almashhadani & Almashhadani, 2023). Sustainability activities tend to

improve the organization's performance, leading to an increase in profits and customer satisfaction. Therefore, sustainable business operations are essential for innovation developments that will maximize efficiency in the organization's performance.

Sustainability quality management is an activity that facilitates performance improvements and innovations in the organization that focus on long-term goals and the proper use of resources. It is essential for improvements by ensuring an increase in productivity, an increase in profits, and cost reductions that enable sustainable developments (Zhao et al., 2023). Therefore, quality management is essential in ensuring the organization has proper leadership, human resource management, and process management that enable proper, sustainable innovation improvements and implementation. The case study details the importance of sustainability in production, marketing, logistics, and operations (Arrigo, 2018). It shows the importance of building customer relationships and satisfaction by ensuring improvements in business operations while ensuring sustainability. By ensuring proper sustainable supply chain management, organizations gain access to sustainable development by ensuring adequate use of the resources and creating more efficient and cost-effective initiatives (Siva et al., 2016). For instance, sustainability may guarantee that the organizations benefit from sustainable innovation and development to ensure inventory management and access to improved services that facilitate proper time management and cost reductions. This may ensure that sustainable projects in the supply chain are completed based on the schedule and budget while decreasing the likelihood of failure. After everything is said and done, Arrigo (2018) argues that sustainability may facilitate the proper use of resources by facilitating the recycling and reuse of materials due to high consumption by the market. The interlinkage between sustainability activities and corporate activities will formulate proper planning and decision-making that will lead to the creation of essential approaches in problem-solving that will enable sustainable development and improvement in the quality of goods and services while stimulating lower associated costs. Therefore, the organization will earn numerous benefits and trust from the customers because of the sustainability actions implemented in the organization.

Sustainability innovation enables the organization to have access to technology that enables continuous advancements of products, procedures, and operations for a moving forward sustainable future. Therefore, it is essential for proper planning and decision-making for long-term purposes. Sustainability innovations tend to depend on proper sustainable initiative plans that enable long-term success through various contributions to the efficient and responsible use of the available resources that enable performance improvement (Phonthanukitithaworn et al., 2023). Sustainability operates with three major cores: conservation, community, and circular

economy, which are driven through sustainable innovation that improves the services and products.

Sustainability's three pillars include environmental, economic sustainability, and social sustainability, which are essential in analysis and solution formulation for various global problems. Therefore, the three pillars of sustainability enable sustainable development that benefits society and organizations with long-term growth. Sustainability awareness is increasing and leading to disruptive innovations that benefit the future and current generations (Ranjbari et al., 2021). Scholars and practitioners are attracted to sustainability concepts and finding gaps to fill that will enable sustainable development. Sustainability opportunities created tend to benefit the government, organizations, and the public in the long run as a result of sustainable innovation and sustainable reporting. Therefore, corporate responsibility for sustainability is essential to ensure long-term gains and access to new technology that will improve the services.

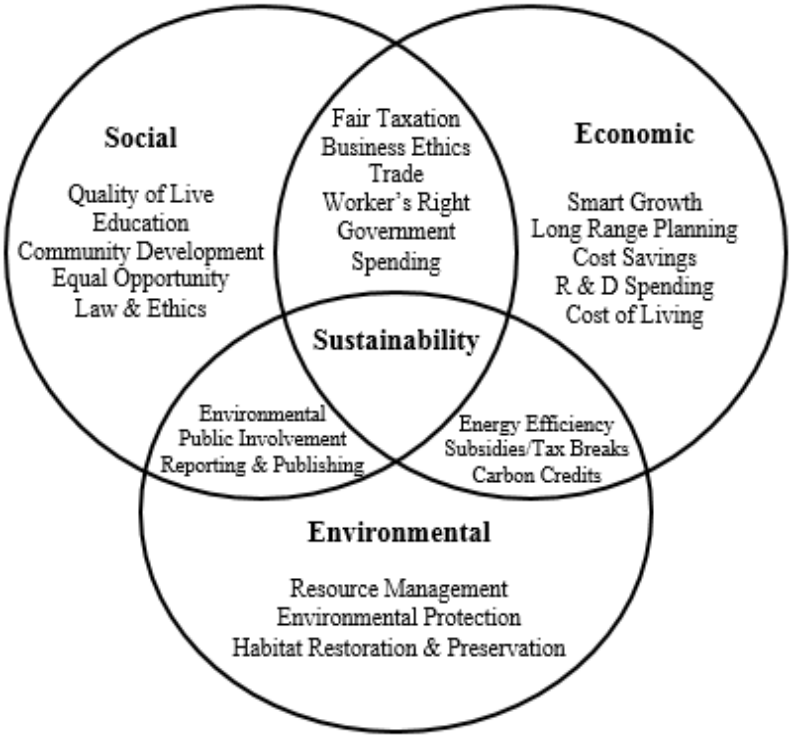

Figure 3 (Concrete Technology and Sustainable Development from Past to Future, 2019)

The illustration of Figure 3 is about the three sustainability pillars that represent social, economic, and environmental. The three pillars are the major channels towards sustainable development that benefit the public in the long run. The social aspect tends to consider the quality of life, education, community development, equal opportunities, laws, and ethics to ensure sustainable development actions and implementations. Moreover, the economic aspect tends to consider smart growth, long-range planning, cost savings, research and development spending, cost of living, trade, fair taxation, workers' rights, and government spending to ensure sustainable development actions and implementations. Lastly, the environmental aspect tends to consider resource management, environmental protection, habitat restoration and preservation, energy efficiency, subsidies, carbon credits, public involvement, and reporting to ensure sustainable development actions and implementations. Overall, sustainable development enables improvements in social, economic, and environmental aspects to benefit the public's current and future needs.

Furthermore, the triple bottom line is a sustainability framework around People, planet, and profit. The activity enables the organization to attain numerous benefits that positively impact the world while boosting the financial performance of the business. Sustainability's triple bottom line is essential in ensuring waste reduction by reducing, reusing, and recycling waste and resources. The advantages of sustainability triple bottom line are an increase in productivity while ensuring expenditure reduction in energy consumption by using technology to enable clean energy use that produces limited emissions. Also, through a sustainable triple bottom line, there is a high increase in transparency and accountability in the organization through data analysis and sustainable reporting. Sustainability triple bottom line is essential for business success and environmental conservation throughout the years, leading to improved productivity and good relations (Loviscek, 2020). Therefore, society and organizations need to ensure proper use of resources for present and future generations. The challenges of sustainability triple bottom line are numerous, despite its influence on sustainable living, and the limitations include the absence of metrics for the three factors of people, planet, and profit to ensure proper performance and sustainable living.

Figure 4 (Triple Bottom Line Sustainability, 2023)

The illustration of Figure 4 is about the sustainability triple bottom line, portraying people, the planet, and profit as the main aspects. The sustainability triple bottom line is essential for the business and institutional success in achieving sustainable development improvements and benefits. The people aspect tends to ensure social equity and awareness regarding sustainability to achieve sustainable development. Moreover, the planet aspect tends to ensure environmental stewardship, proper waste management, proper energy consumption, and awareness regarding sustainability to achieve sustainable development. Lastly, the profit aspect tends to ensure economic prosperity through implementing sustainability actions and practices, and awareness to achieve sustainable development. The sustainability triple bottom line framework shows the main aim of achieving sustainable development through proper planning, critical decision-making, and sustainable utilization of resources available.

Sustainability development aims to meet the needs of the present without compromising the continuity of use and availability for future needs through economic growth, and connection to environmental protection. The concept is applicable in social, economic, and environmental issues to ensure public health and proper management. Moreover, sustainable development has five pillars: people, planet, prosperity, peace, and partnerships. Sustainability development enables organizations to implement various development aspects in strategy formulation and operations, such as environmental aspects (Rashed & Shah, 2021). The author elaborates further on the recommendations for improving various organizational successes by measuring the progress through the inclusion of sustainable development goals.

The 2030 Agenda of Sustainability aims to solve socio-economic and environmental problems to reduce poverty, promote gender equality, and proper use of resources. Moreover, the Sustainability plan for 2030 is to ensure human rights and good health among the people. The Sustainable Development Goals are global goals that were established in 2015 as part of the United Nations 2030 Agenda on sustainable development, where countries agreed to ensure human rights, protect the planet, and work on poverty eradication (Belmonte-Ureña et al., 2021). However, the sustainability development goals face challenges such as improper waste management and deforestation, and eradicating these challenges demands efforts and implementation of effective policies. Sustainability development goals can be achieved through the reduction of paper use, the elimination of pesticides, and the recycling of paper, plastic, metals, and glass (Walker, 2021). The United Nations aims to ensure environmental conservation through sustainability implementation across all nations in the world by agreeing on common interests and formulating improvement strategies.

Furthermore, the European Union's sustainability is guided by the precautionary principle, the prevention principle, and the polluter pays principle to promote environmental protection (Bianchi et al., 2022). The European Union's sustainability aims to achieve the Sustainable Development Goals for 2030 despite the challenges. Moreover, the EU environmental targets for 2030 intend to eliminate emissions and achieve climate neutrality by understanding the challenges faced by society, income inequality, and resource scarcity. The challenge of the sustainability plan for the 2030 launch is the measurement of the efficiency and progress of the agenda to ensure success and improvements (Tsalis et al., 2020). The EU healthcare services aim to improve healthcare by protecting it and ensuring equal access to efficient and modern healthcare for all Europeans. It aims at coordinating European countries' healthcare to be able to solve various health threats and diseases, for example, Covid 19 outbreak was managed throughout Europe to ensure proper public health (Alowais et al., 2023). Moreover, the EU healthcare services ensure access to medical treatment by establishing a European healthcare insurance card.

All in all, sustainability is essential in various organizational activities such as supply chain management, quality management, risk management, public management, resource management, and waste management to ensure proper environmental care by promoting corporate social responsibility.

2.3 Health care services

Health is one of the fundamental rights of human beings and the total well-being of the individual, including physical, mental, and social care. Therefore, the government and each individual have to ensure proper healthcare to maintain good health. Healthcare is a process that involves proper maintenance and improvements of human health, and it involves nursing, physical therapy, dentistry, nursing, psychology, physical, midwifery, medicine, and occupational therapy. It includes caring and empathy by building interactions between the healthcare providers and the patients. Furthermore, healthcare tends to consider ethical practices by considering values, human rights, and justifiable actions during healthcare provision by health professionals, researchers, and policymakers that may impact public health. When the government and the individual ensure proper healthcare, there will be positive outcomes, such as improvement in productivity among individuals and good mental health. However, the healthcare sector tends to face challenges such as a shortage of healthcare workers, financial crises, and regulatory changes. Healthcare faces various challenges in allocating resources due to an increase in complexity and diversification (Suphanchaimat et al., 2015). The care managers need to ensure professional ethics during the process of providing care to the public, despite background. Therefore, healthcare should ensure good health and safety for the public by providing awareness.

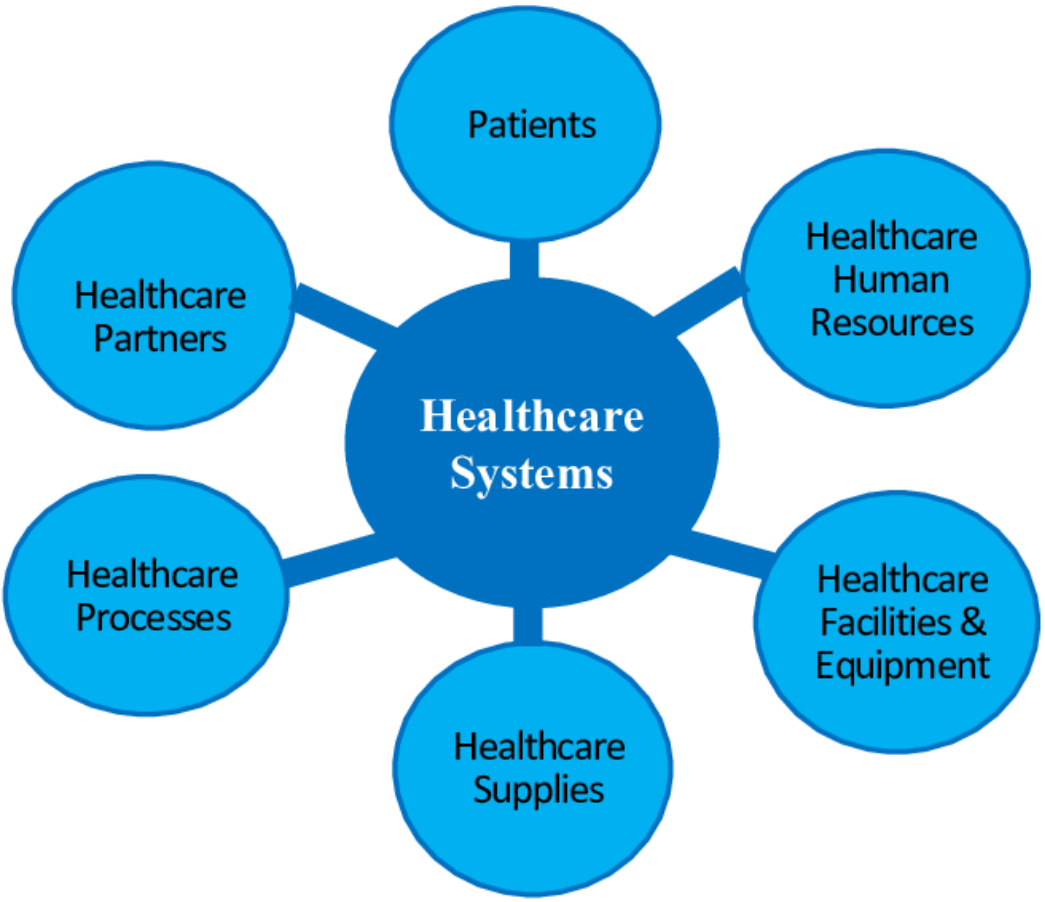

Figure 5 (Leveraging Digital Twins for Healthcare Systems Engineering, 2023)

The Illustration in Figure 5 is about the digital twin's healthcare systems and operations; the healthcare systems are complex, with the need for efficiency and effective management to enable quality healthcare services. The diagram shows that the healthcare system involves patients, healthcare partners, and healthcare human resources during operations and service rendering. Moreover, it includes healthcare processes, healthcare supplies, and healthcare facilities and equipment to ensure efficiency, effective decision-making, increased performance, and productivity in healthcare.

Digitalization in healthcare includes tools and services that use technology to improve processes in healthcare and enable proper management of public health. Digital healthcare services include electronic health records using tools such as My Health. Moreover, digital healthcare services include the use of medical devices, the use of artificial intelligence, and information technology systems. The advantages of digital healthcare are time-saving, the decline in administrative burden through the use of information technology, and proper insight

into individual health. However, the challenges of digital healthcare include big data being accompanied by duplicates, errors, inaccuracy, and misleading decision-making due to incorrect data. Therefore, the biggest big data issue is data security and failures due to difficulties in adapting to new technology and artificial intelligence. Also, cybersecurity issues such as malware and attacks are the biggest problems related to digital healthcare. The healthcare systems evolved and adjusted to the pandemic disease that required distance and safety through online digital use and technology improvements (Naik et al, 2022). Therefore, the healthcare system enables big data handling, proper analysis, and record-making of the cases of ill patients, like the new COVID patients registered and the ones who recovered. This procedure enabled the public health to be critical of its health.

However, digitalization in the healthcare systems faced challenges such as reluctance to change, therefore leading to problems in keeping up with technology innovations that simplify the healthcare processes and proper data management. For instance, digital health and wellness that are delivered through an app, like digital therapy, nutrition, and physical activities like workouts, to promote proper public health.

Healthcare services and facilities tend to be associated with risks such as operational risks, credit risks, and market risks (Boot, A.W., 2017). Credit risks are all the risks associated with money from transfers, payment errors that occur while using the digital payment method after receiving the healthcare services, and theft that might occur while using financial technologies. Similarly, credit risks can result from default and errors during procedures. Moreover, market risks are risks that tend to occur as a result of market changes due to fluctuations in demand and supply (Bevere & Faccilongo, 2024). Next to that, sustainability in the healthcare sector has led to new inventions, innovations, and disruptive technology through the use of digital technology that leads to changes in operations and service rendering, such as digital procedures during healthcare services like ordering medicines and medical devices. However, sustainability through sustainability innovation aims to eliminate intermediaries and limitations in the healthcare services rendered to reduce cost and bureaucratic procedures. Moreover, the government has analysed and recognized the future of healthcare sector technology as beneficial in improving operations in the healthcare sector.

Healthcare services are transformed and improved by sustainability through policies and public demands. The reason for sustainability in healthcare is to accelerate the improvements in services offered to customers and patients in healthcare through the use of technology. Moreover, the healthcare sector is regulated by the government to identify the barriers while using digital healthcare services to ensure the customer is secured and safeguarded from risk

exposure. According to Vishwakarma (2025), artificial intelligence in healthcare has led to continuous improvement in quality, reach, access, and affordability. However, the introduction of artificial intelligence is associated with various threats and challenges, such as cyberattacks. Moreover, the author emphasizes that sustainability in healthcare services has led to gains in technology and competitive advantage. However, it is associated with cost due to new technology and the use of expensive operational materials and procedures. The emergence and development of digital healthcare services tend to be positive and effective in ensuring public satisfaction.

According to Ikhsan (2025), integrating sustainable artificial intelligence in healthcare has led to numerous improvements, such as quality, that led to customer service efficiency. Moreover, sustainability plays a big role in ensuring customer service efficiency in the healthcare sector through advancing healthcare services provided via technology that enables data management and reduction in bureaucratic operational activities that tend to minimize costs. The emergence of sustainability in healthcare has led healthcare organizations to move digital and form connections to satisfy customer demands. Moreover, sustainable innovation is transforming the healthcare sector and is predicted to make the public users new services through the improvement and introduction of new services due to easy accessibility. The use of healthcare mobile apps has facilitated the use of digital health technologies. Since customers use the Internet and see the capabilities of improving services, the Internet. Therefore, sustainability innovations take over in healthcare to fill the gap in service provision and aid in the simplification of tasks using technology. Similarly, it enables the restructuring of the health care operations to satisfy public health.

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development of digital healthcare services tend to be positive and effective in ensuring public satisfaction.

Sustainable innovations tend to create instabilities in the healthcare sector as healthcare services face competition like quality, technology, and prices. Therefore, the healthcare sector tends to face risks due to uncertainties and competition from other traditional competitors in the health sector, such as quality and price competition. However, the healthcare industry needs to adapt and use new technologies to sustain its competitive advantage in the market. The satisfaction of customers and the public is among the essential things to consider in the healthcare sector service offering to attain a competitive advantage and survive in the market. Therefore, the failure to satisfy and consider the customer's needs by the healthcare services companies tends to end in failure, together with a risk association. Despite the risks that face the healthcare sector due to the emergence of sustainable innovations and new technologies, the healthcare sector and the government aim to regulate these risks, such as credit risks, market risks, and operational risks. The regulations of the healthcare sector tend to be facilitated through the enforcement of the laws. Similarly, the identification of the barriers, such as the absence of awareness in using sustainable technology properly, that are experienced while using the technology in healthcare, will be made to take measures for improvement of the schemes that encourage innovations.

Medical Biotechnology is a branch of medicine that helps to treat and prevent diseases, and it uses living cells and cell materials to make further studies that enable the production of pharmaceutical and diagnostic products. It has numerous advantages, like the production of vaccines and antibiotics that enable the healing and cure of diseases. This enables the improvement of the well-being of the individuals. In addition, pharmaceutical biotechnology aims to design and produce drugs that provide therapeutic effects, and it enables medicines creation from a chemical basis by the biotech industry. The biotechnology products include insulin, gene therapies, vaccines, and growth hormones. However, biotechnology in healthcare tends to face various challenges, like ensuring ethical conduct during the procedure, proper waste management, and the discovery of the unknown in biotechnology due to the uncertainty surrounding it. Biotechnology in healthcare services tends to ensure sustainability through the recycling of materials used in sequencing services and the reduction of the use of paper through digital technology. Moreover, biotechnology is the biggest strength of sustainable development and environmental preservation through the use of technology and the use of cleaner processes (Lokko, 2018). However, the biotechnology industry is faced with various challenges in ensuring

the proper use of resources, such as recycling procedures, materials, and the reduction of waste to the environment.

Social work in healthcare involves taking care of each other in society through interactions, empathy, and treating others with dignity and equity to prevent physical and mental negative collapse leading to public health harm. The benefits of social care include healthcare opportunities for advancement in social healthcare through sustainable development and the use of technology. However, health and social care tend to face various challenges, like preventive measures to ensure positive outcomes in healthcare. Also, a proper structure to ensure social care integrates with environmental conservation to enable social healthcare services improvements and advanced technology has been a challenge in public health management throughout due to continuous improvements demanding enough funds and skilled labor to cope with the changes. Therefore, society, together with the healthcare facilities, needs to collaborate through proper planning and development, decision-making, to make the world a better place. Social work in mental health has been a significant help in ensuring problem-solving and support to families who have almost lost hope in dealing with loved ones who suffer from mental illness (Bland et al., 2021). Social workers are professionals who are experts in the mental health field, and they are employed to support mental health victims with loving care and hope that enable individuals to keep moving and fight back to positive health.

Pharmaceutical activities are among the healthcare services that involve medical discovery, production, and distribution to the market of pharmaceuticals for use as drugs for patients and curing various diseases. The advantages of the pharmaceutical industry are that it works in different sectors, such as research and development, marketing, and sales. Moreover, it assists in quality control for drugs and aids in safety regulations to protect public health. Furthermore, the pharmacists assist in implementing sustainable practices in the pharmacy by reducing waste, using environmentally friendly products, and minimizing energy consumption. However, there are challenges to pharmaceutical sustainability, such as ensuring proper environmental conservation by reducing waste, pollution, and minimizing energy consumption. Therefore, sustainability in the pharmaceutical industry is essential, and it involves adopting environmentally responsible practices from drug development to disposal with the target of ensuring the medicines are affordable, accessible, and sustainable to public health. The pharmaceutical industry is aware of the growing interest in sustainability, leading to ensuring quality, innovation, and corporate social responsibility through sustainability human resource management (Milanesi et al., 2020). Dental care provides healthcare services by ensuring the maintenance of healthy teeth. The dental practice can be sustainable through proper planning of

the layouts in the healthcare facilities and minimal energy use, installation of amalgam separators, the use of public transport by employees, and the use of environmentally friendly medical procedures and devices (Duane et al, 2020). The sustainability practice will reduce energy consumption and pollution. Furthermore, the author emphasizes the importance of waste management, such as proper disposal of plasters by the pharmaceutical industry, to ensure environmental preservation and proper utilization of resources for future use availability. Furthermore, hospitals are essential in public health management for treatment and medical support. However, they are faced with challenges regarding waste management processes, such as carbon emissions reduction from toxic chemicals and surgical waste (Sherman et al, 2020). Therefore, hospitals need to promote sustainability through the proper use of resources and training programs.

Healthcare insurance is essential to public health through coverage and discounts related to healthcare. In Germany, health care insurance is similar to Allianz care, providing various healthcare services. Healthcare insurance is beneficial to public health and enables each individual to have access to healthcare despite his or her social status. Healthcare insurance enables proper mental healthcare and safety preventive services to society, with financial management to avoid high treatment costs. However, healthcare insurance is faced with various challenges, such as increased costs and high expectations from customers that require high flexibility to market changes and technology. Sustainability in healthcare insurance is a growing interest for competitive advantage and an increase in customer satisfaction. Therefore, the healthcare system's insurance practices are sustainable, which leads to a review of pricing and enables affordable services for public health satisfaction (Godman et al., 2021). Therefore, the healthcare systems together with healthcare systems change to adapt to sustainability for future improvements and developments. Therefore, healthcare services are essential in ensuring proper health, public health distribution, and improvement to meet the needs of the patients and the public in general, such as maternity care, mental care, and surgical care.

2.4 Health care management

Healthcare management is the procedure that directs hospitals and other care institutions to provide leadership, management, and proper organizational direction and structure that provide healthcare services with equity, effectiveness, and efficiency. It enables community improvement, growth, and opportunities in the health sector and public management. However, healthcare management tends to face various challenges, such as cost reduction, quality

control, and technology adaptation due to new inventions. Healthcare systems and services are becoming increasingly complex, and proper decision-making needs to be made to ensure increased productivity and efficiency (Guo, 2020). Therefore, healthcare managers need to understand the problem, find solutions, and make proper plans to facilitate excellent decisions that will make positive impacts. In addition, healthcare management requires proper decision-making skills and managerial skills that will broaden the insight into certain situations occurring and provide proper solutions to such situations. Furthermore, healthcare management tends to ensure proper decision-making and coordinating care, reaching out to patients and supporting their needs, recognizing costs and the public, and implementing cost-effective health solutions. Therefore, the healthcare plan ensures proper assessment, planning, analysis, implementation, and evaluation to ensure proper maintenance and improvement of the healthcare sector. Healthcare management can be critical and urgently needed for life-threatening injuries and illnesses in patients.

Healthcare management tends to ensure environmental healthcare management that demands accountability and responsibility. Studies the link between the environment and health that enables the care facilities to prevent and reduce wastes that lead to environmental pollution and endanger public health (Richie, 2022). Therefore, the care facilities, through awareness of climate change, are making efforts to move completely to sustainable healthcare. Environmental health problems are severe in the health sector, such as pollution, which can harm public health. Therefore, health managers use environmental health software to ensure safety and proper use of the resources by preserving the environment, and the software manages the enterprise risks and corporate sustainability data, and activities. Currently, pollution is a major step back for environmental healthcare management; it tends to cause severe damage to public health, leading to high demand for healthcare services (Sherman et al., 2020). Therefore, healthcare services need to ensure awareness and take further steps toward the complete implementation of sustainability to facilitate sustainable development. Quality management in healthcare is essential in ensuring safety, efficiency, time management, and equity through the use of procedures and processes. The main purpose of quality management is to ensure that healthcare facilities and hospitals provide better services and care to satisfy public needs. Therefore, quality healthcare services management enables an increase in gains and an outstanding reputation in the organization. However, it tends to face various challenges in ensuring the best quality of healthcare, such as increases in costs and maintaining safety and equity. Healthcare service quality management is essential, and it ensures safety (Endeshaw, 2021). However, it is a challenge to measure the quality of healthcare services, and

organizations need to ensure sustainable innovation to keep up with safety and quality in healthcare services. Therefore, it is essential to properly utilize and optimize the healthcare process, products, and services to facilitate cost reduction and effective administration. Inventory management is essential in healthcare systems to ensure customer service satisfaction and development in public health in general through periodic and just-in-time control systems. Moreover, hospitals use inventory management to ensure a systematic process that controls storage, availability, and medical supplies to ensure customer satisfaction. For instance, medical inventory involves materials for sanitizing, thermometers, and common medications, which are highly needed by the public. Furthermore, healthcare management practices include medical inventory optimization, which the project intends to measure and analyze the growing demand in healthcare that accelerates patient dissatisfaction. The best practice for healthcare inventory management is proper planning, organization, and scheduling to avoid misplacement of medical supplies and ensure stock availability. Procurement performance is essential in healthcare centers such as hospitals, as it ensures proper management of the inventory (Karani and Osoro, 2020). Therefore, the inventory management practices of the hospital tend to be affected by the inventory management and delivery systems. This activity tends to control the overstocking and understocking issues in the healthcare systems. However, there are challenges in ensuring procurement performance and improvements due to shortages of supplies, theft, improper forecasting, and planning. Customer service management in healthcare is essential to enable positive relations and connections that are long-term with the patients. Therefore, the healthcare systems need to be accountable, responsive, quality, and friendly to encourage customers to feel comfortable and satisfied. However, the challenge of customer service management in healthcare is costly and leads to investment in technology to keep up with the demands of public health. The importance of building positive connections, providing quality services, and proper planning in the health care systems enables effectiveness, efficiency, patient-centered care, and equity (Dcunha et al., 2021). Therefore, the success of healthcare service centers like hospitals depends on customer satisfaction, and proper attention, together with a good positive environment, should be given to public health. It is essential to assess the environmental emissions in the healthcare sector to enable policymakers to make improvements and solutions to protect public health (Eckelman et al., 2020). In addition, the healthcare sector is among the biggest sources of emissions due to fossil fuel energy consumption, greenhouse gases, and healthcare administration costs that lead to health system waste.

Sustainability development in healthcare management is a long-term investment that comes along with gains and profitable impacts in the healthcare sector (AlJaberi et al., 2020). It has facilitated the healthcare sector to operate efficiently by ensuring proper waste management and improvement in public health management. In addition, Sustainable development in health is essential, and it is committed to economic, social, and environmental. The 2030 Agenda aims to ensure proper health monitoring by identifying the gaps, reporting, and making further improvements (World Health Organization, 2016). The importance of health monitoring is to ensure control of health operations, detect disease outbreaks, and implement measures to avoid further difficulties, such as the COVID-19 disease outbreak and control.

2.5 The importance of sustainability in the health care services

Sustainability awareness is in great demand, and it attracts investors, stakeholders, the government, society scholars, and practitioners. Moreover, it improves the living standards of the individuals, the environment, and quality, which enables environmental conservation for future generations to have access to the resources. Therefore, sustainability is an essential approach that takes into account productivity to supply the service with the aim of sustainable development. Sustainability is a growing interest in green economy concept analysis and policy formulation; it enables sustainable development and an increase in performance (Ellili, 2024). The Sustainability process is accompanied by sustainable initiatives as a result of sustainable development, such as the economic benefits of cost reduction for healthcare services given to the public. The decrease in expenditures such as water, energy, gas, and other resources is among the benefits of practicing sustainability. Furthermore, sustainable management enables effective corporate decision-making and positive, sustainable solutions that may decrease harm to public health.

According to Whittingham et al. (2023), the United Nations Sustainable Development Goals aim to improve the corporate responsibility that enables sustainability integrations in the organization for the public benefit. Moreover, transparency is among the potential benefits that sustainability reporting has in healthcare, which tends to create future opportunities for healthcare facilities and organizations since the government, shareholders, and the public want to know and understand the general involvement of the organization in Sustainability actions. Moreover, the public wants to have control over it. The sustainability involvement of the healthcare facilities can use the opportunity to create several customer service improvements to ensure customer service efficiency. Therefore, the customers will be able to have access to digital healthcare

services, hence facilitating growth in the healthcare sector. The broken relationship between the customers and healthcare facilities, such as insurance, due to bureaucratic processes, limitations, and waste, will be amended as a result of sustainability in the healthcare sector. Therefore, sustainability can use the gap left by the healthcare services management to generate various services that will invite customers to opt to use the healthcare services. Sustainability improvement in healthcare services is a vital and ongoing process due to advanced technology and public needs. Sustainable business practices are essential due to the growing awareness of sustainability in society, and they provide various benefits such as to the organization and the public, such as efficiency, cost reduction, and access to new markets (Chungyalpa & von Rosing, 2025). Therefore, companies opt for sustainable practices and implementation to ensure corporate responsibility and attain a competitive advantage.

Mousa and Othman (2020) investigate the importance of sustainability in healthcare services. The author argues that sustainability is a critical part of healthcare development, healthcare innovations, and performance increase, as it helps to reduce costs, optimize resource allocation, and provide access to new technology inventions. According to the author, sustainability can also help to reduce risks such as environmental risks, as sustainable healthcare maintains proper waste management and advanced hygiene practices to protect the public from becoming unwell. Furthermore, sustainability provides essential access to innovative improvements and optimal use of resources, which can facilitate the development of healthcare services. The author also suggests that the success of sustainable healthcare depends on the ability to achieve a balance between awareness and implementation of sustainability practices, proper sustainable reporting, and sustainable innovative decisions in the healthcare sector. They also highlighted the benefits of sustainable healthcare services in developing customer satisfaction and loyalty. For instance, sustainable healthcare services tend to attract government support, investors who have sustainability awareness, and support the movement financially to improve healthcare services. Additionally, sustainable healthcare services are an effective way to access new technology inventions and services like medical devices that would otherwise be new to the market, and create new business opportunities.

Sustainable human resource management is a new approach that facilitates people management by focusing on and ensuring long-term human resource management and proper operations. The advantages of Sustainable human resource management are the retention of loyal and quality employees through proper organization, value proposition approaches, and firming relations. However, it faces various challenges during sustainable human resource management, such as building a sustainable organizational culture to enable improvements in

environmental sustainability. There is an increase in sustainable human resource management to push sustainability activities and implementations in the organization among the shareholders, stakeholders, and employees. Sustainability reporting is a procedure that involves publishing data regarding the company's sustainable activities and environmental concerns to the public and government. The advantages of sustainability reporting to the organization are attracting new customers, risk management, and a competitive advantage. However, the challenges of sustainability reporting and the procedure are time-consuming and pose big data issues. Also, organizations are increasingly becoming aware of the importance of sustainable development and the incentives accompanying it to an organization (Ehnert et al., 2016). Most organizations are becoming willing to report sustainability actions and ensure positive internal and external relations to achieve sustainable goals.

According to AlJaberi et al. (2020) investigation of the measurement of sustainability in the healthcare system based on Middle East facilities' healthcare systems. The authors found that health organizations gain from sustainability implementations, and there is a need to reduce costs and improve healthcare services due to growing demand, government policy, potential inventions, and business opportunities. The author cites several examples to support his argument. For instance, he discusses the importance of awareness and training to the employees regarding the importance of sustainability in healthcare services management to reduce costs, waste, and increase productivity. He also mentions the impact of green human resource management practices on sustainable performance in the healthcare organization. In both cases, the authors argue that sustainability is essential in healthcare services to achieve the desired and intended goals. Furthermore, sustainability can help to ensure that the healthcare services are properly planned and managed to enable the reduction of risks and misuse of resources. AlJaberi et al. (2020) also noted that sustainability is one of the basic aspects for the consideration of healthcare professionals in the healthcare organization. Moreover, it could help to create proper optimization of the resources, equity, and sustainable environment to enable public health satisfaction. This can be achieved by focusing on the public needs and demands by involving the public to share their views on how the healthcare systems can improve and achieve sustainable development. Additionally, sustainable healthcare services can bring the communities together in ensuring safety and waste reductions in the environment through participation in different projects that provide awareness and implement sustainability. Therefore, sustainable healthcare services can help to create an environment of trust and collaboration, which can be beneficial in the long run. Finally, AlJaberi et al. (2020) suggest that sustainability reporting and analysis should be made by the healthcare systems to

enable the measurement of the organization's performance and ensure the public health benefits, and there is no greenwashing. This can include assessing the sustainability practices in the healthcare systems and identifying the potential for new opportunities. Furthermore, it is important to assess the brand image of the healthcare services because customers feel connected with healthcare systems that are friendly and caring. It is also important for the healthcare systems organization to keep up with the latest sustainable innovations and ensure customer satisfaction with sustainable healthcare systems, like hospitals, to create a more equitable and sustainable environment.

According to Soyege (2025), the contribution of sustainability in healthcare services should be made through environmental conservation practices as a result of artificial intelligence to ensure proper public health management and waste reduction. Sustainability has captured the interest of regulators in both developed and developing countries during the third era due to innovations and market competition. Therefore, the regulators are favoring sustainability actions during organizational operations and environmental activities to attain market confidence and minimize costs. Moreover, the experience of the customer matters, leading several businesses, such as insurance and health care facilities, to integrate the administration to improve the healthcare services through the use of technology. Furthermore, proper policy and governance facilitate sustainability integration in the healthcare sector, which aids in sustainable growth and development.

The healthcare services are dynamic, evolving, and tend to be complex, and are evaluated by Lenzen et al. (2020), who consider the factors for the complexity to be environmental conservation, safety, innovation, and social issues in society. As healthcare services ensure human well-being and may increase access to new services and technology that will improve services to the public health. Moreover, healthcare services have the potential to boost innovation and sustainable development. However, healthcare services tend to cause harm through pollution, such as water and air pollution, which tends to harm public health. In addition, healthcare services are facing major challenges in data reporting and proper planning that will enable the mitigation of the misuse of resources and inefficiencies to allow growth through technical solutions and better service provision to the public. This activity will enable proper resource allocation, risk management, and sustainable development. Sustainability is crucial for increasing effectiveness and improvements in healthcare services, according to Lenzen et al. (2020). Sustainability is an evolving framework through people, profit, and the environment, leading to sustainable development that tends to benefit the public directly or indirectly. Sustainability development is the best practices and accomplishments made by

companies, corporations, as well as the government, in ensuring the production, distribution, and consumption of goods and services.

Moreover, it enables improvement in living standards and social development, allowing people to integrate and increase sustainability awareness in the public. It facilitates continuous economic development, environmental conservation, and protection. For instance, healthcare services are the most fundamental economic sector to the government, and they provide the government access to quality healthcare services that enable growth and gains. Therefore, proper planning and decision-making assist in healthcare management and enable the government to control public health. After deep research analysis, Lenzen et al. (2020) argue that healthcare services are growing and expanding due to the boost in population growth, and the need for the government to properly manage public health and resources has facilitated the increase in healthcare services expenditures. The increase in healthcare supply and demand due to a growing population leads to challenges in measuring sustainability and providing a proper report regarding the emissions caused by healthcare for future improvements.

Furthermore, the advancement of technology due to market changes and demand growth has enabled and facilitated efficiency in healthcare management, leading to improved healthcare services. The authors argue that healthcare services management linked to sustainability will enable cost reductions, fast delivery of services, improved supply chain, quality, and increased access to technology advancements. Therefore, a well-persevered environment is the essence of good health and proper waste management in society. For instance, the authors emphasize the importance of public management through proper sustainable healthcare due to an increase in population and growing awareness.

According to Tomoh (2024), the collaboration between sustainability and healthcare services companies tends to accelerate the efficiency level compared to when the two parties work differently. Moreover, it enables healthcare improvement and promotes healthcare equality that will benefit the public. Sustainability and healthcare services often have numerous intermediaries and operate at a complex level; on the other hand, when the healthcare sector and sustainability collaborate, the complexity is rather low, and there is disintermediation. Moreover, the costs incurred during the collaboration between the healthcare sector and sustainability are minimal compared to separate operations. Similarly, the time costs incurred during the collaboration between healthcare facilities and sustainability tend to be relatively low. Likewise, the safety level resulting from the collaboration between the healthcare sector and sustainability will increase. Therefore, the healthcare sector and sustainability integrate to improve financial services offered while keeping up with technological change. In addition,

sustainable healthcare plays a big role through technology software in the managerial activities in the healthcare sector by integrating the departments in the organization such as human resources, marketing, finance, and sales to ensure proper resource management efficiency and efficient level increase plus improving the quality of life using advanced technology (Flessa & Huebner, 2021). Therefore, the workforce can communicate and connect through the use of cloud computing to speed up operational activities. Similarly, sustainability innovations have assisted the healthcare sector in eliminating the problem of data redundancy that was caused by operating based on the traditional structure. The result of turning towards digital operations has enabled the banking sector to reduce duplication of data and misplacement of customer information, and improve the provision of services.

The digitalization of the healthcare sector through the integration made by sustainability innovation has led to massive changes in the provision of healthcare services, such as digital administration, datafication, and tracing (Begkos et al., 2024). Moreover, the author argues that digitization enables proper public administration and management, which enables improvements and proper environmental care. The healthcare sector is investing hugely in technology to allow customers to access healthcare services digitally, to enable the reduction of service costs, and the elimination of intermediaries. The healthcare sector is seen to move closer to sustainability innovation through sustainability awareness. The collaboration between the healthcare sector and sustainability tends to facilitate the improvement and development of healthcare services. Therefore, there will be control of risks to enable stability and an increase in customer service efficiency.

The healthcare services are transformed and improved by sustainability through innovation and proper utilization of resources. The reason for sustainable innovation and optimization of resources is to accelerate improvements in healthcare services offered to customers and the public in general through the use of technology (Sharma & Tripathi, 2024). The author emphasizes that sustainability in healthcare is possible through initiatives from healthcare providers. Moreover, identifying the barriers while using it to ensure the customer is secure while using it to ensure the customer and the public, in general, are secure while using digital healthcare services regulates the healthcare sector. Therefore, the government tends to set regulatory laws to limit and control healthcare. Moreover, sustainable healthcare has facilitated e-business, e-commerce, and digital health to take place by collaborating with sustainability to facilitate proper public health management. The emergence and development of sustainable healthcare tends to be a positive analysis in the healthcare sector as a means of innovation and proper public health management (Zanobini et al., 2024). Therefore, sustainability innovations

and developments are rather positive for healthcare improvements than disruptive and competitive by filling the gaps left to satisfy the public needs with suitable healthcare services.

According to Vasileiou (2024), sustainability plays a key role in efficiency in healthcare, leading to operational efficiency through process optimization and waste reduction. Moreover, sustainability plays a big role in ensuring customer service efficiency in the healthcare sector through advancing services provided via technology, such as digital healthcare, data management, and proper public health management. The healthcare sector often aims to attain a competitive advantage at minimal costs while satisfying the public with quality healthcare services. The emergence of sustainability has led the healthcare industry to move digital and form positive connections, such as environmental conservation, to satisfy the public's needs. Moreover, sustainability is transforming the healthcare sector and is predicted to make new inventions in the healthcare services through the improvement and introduction of new services (Hussain, 2024). The author emphasizes that the challenges faced by the healthcare sector, such as rising costs, rising demand, and the need for sustainability, have led to healthcare sector development and advancement by concentrating on long-term investments and decisions, such as better policy that will lead to long-term benefits. Moreover, the use of mobile apps has facilitated the use of digital health technologies and services. Since the consumers of healthcare services use the internet due to globalization and high-speed technology, this has been the case in recent years. Therefore, sustainable healthcare takes over to fill the gap in service provision and simplification of healthcare tasks using sustainable technology. Therefore, the concept of sustainable healthcare stimulates various benefits, including the accumulation of investments through gaining supporters who have an awareness of sustainability. Also, it enables operational-level improvements and transparency to the public, giving ongoing awareness of sustainable healthcare services. Sustainable healthcare services come along with high technology use, and this process has led to time savings for customers and banks since previously. It took time for the public to acquire healthcare services due to bureaucratic procedures and the use of insufficient technology.

Customer service includes all activities that facilitate the provision of service to the customers before and during the purchase of the product (Juanamasta et al., 2019). The services offered by the healthcare facilities to the patients and the public, in general, are such as insurance, dental services, maternity care, mental care, and social care services. Moreover, collaboration involves cooperation between two parties to achieve the intended goal. Therefore, efficiency will be achieved when healthcare providers provide proper customer service. In addition, efficiency involves performing at a preferred state with less waste of time, resources, and effort. For

instance, operational efficiency in the healthcare. The benefit of efficiency is an increase in profit margins, cost reduction, and maximization of production. In addition, efficiency involves performing at a preferred state with less waste of time, resources, and effort, for instance, operational efficiency. The benefit of efficiency is an increase in profit gains, cost reduction, and maximization of production. However, inefficiency leads to an increase in costs in an organization. Therefore, the healthcare sector tends to be among the essential facilitators in investments leading to the development of the economy. Sustainable healthcare demands the involvement of the public, environment, government, innovation, quality, supply chain management, labor power, awareness, demand, and supply.

A review of existing literature on the topic was used to develop a conceptual model that was used to carry out this study. The conceptual model is proposed as shown in Figure 6 below.

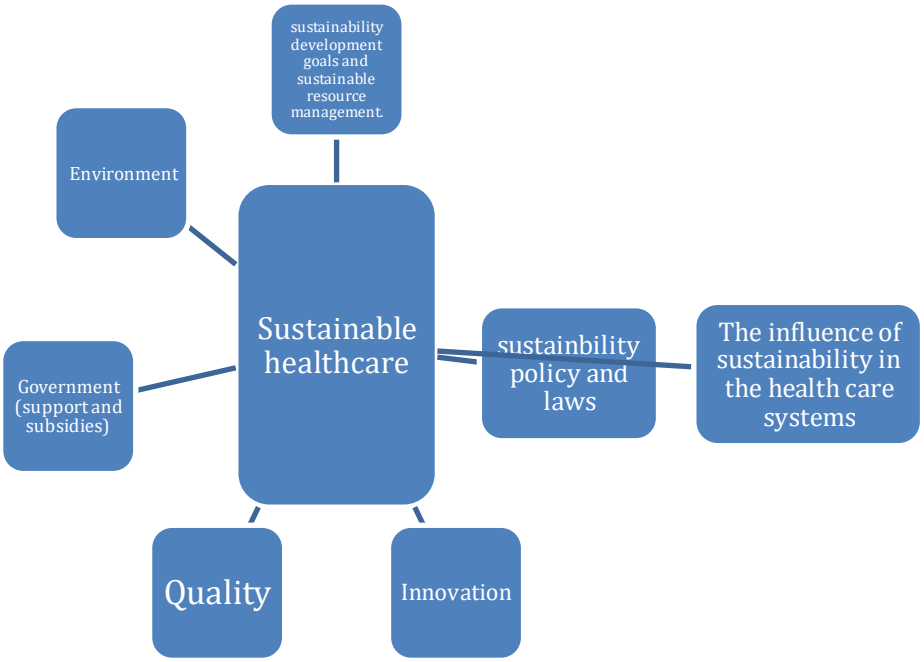


Figure 6: Sustainable Healthcare Framework

The conceptual frameworks provide a structure for organizing and interpreting data. Moreover, it shows the relationship of sustainability in health care management. The conceptual framework proposed for this study aims to assess the influence of sustainability in healthcare systems from other sources of literature. This framework explains how the government has a great influence on the sustainable healthcare systems and healthcare projects' completions using various

policies and laws that favor sustainable healthcare. The healthcare system involves proper coordination and organization of the people, institutions, and resources available that enable the proper rendering of healthcare services to meet public needs. Therefore, the government supports the healthcare systems with funding through the use of policies to assist in project completion and the provision of better healthcare support to the public. Moreover, the patients play a major role in providing accurate information and opinions towards a sustainable healthcare system. Also, it explains further how the public, researchers, and shareholders play a big role in ensuring that quality and innovation activities align with sustainability to ensure improvements and an increase in productivity. Additionally, the framework takes into consideration the sustainable development goals in the health care systems, risk management, and data management through proper sustainable reporting that is essential for health care systems improvements. The framework also explains how sustainability can successfully influence healthcare systems and operations in a positive direction. This framework aligns with the existing literature to enable the basis for the research study. The proposed framework will help to identify the importance and challenges of sustainability in healthcare services. The framework will also provide an understanding of how sustainability can contribute to the development and improvement of healthcare systems, and innovations that will impact healthcare services. Sustainable resource management is a procedure that involves proper planning, developing, and implementing methods that will provide solutions towards protecting resources such as water from waste and pollution due to human activities. The advantages of sustainable resource management are a reduction in negative impacts on the environment, such as waste reduction. It enables the development of green management and ensures proper utilization of resources despite the growing expansion in economic activities (Chams and García-Blandón, 2019). The procedure is successful through society's awareness regarding sustainability and corporate social responsibility. However, the challenges of sustainable resource management are the growing population and urbanization, which increase resource usage and waste. Moreover, the overutilization of resources is another challenge to attaining sustainability by considering future needs. The framework emphasizes the importance of Sustainable resource management to ensure proper planning and use of the available resources. When evaluating the impact of sustainability in healthcare, this framework will provide a proper perspective and insights into all aspects that must be considered. As a result, scholars, experts, and researchers acknowledge the importance of sustainability in healthcare developments. Next to that, the framework will also provide insight into the sustainability influence in healthcare for further assessments, analysis, and future research studies.

Therefore, the framework will facilitate scholars and academic experts to make further studies and recommendations that might pave the way for the implementation of positive sustainability actions in the healthcare systems. Lastly, the framework might pave an in-depth study regarding sustainable healthcare and how it will create new opportunities and benefits to public health.

2.6 The challenges of sustainability in the health care services

Pollution is the activity that involves harmful materials entering the environment, causing various harm and damage to health, water, land, and air. Moreover, it is associated with various diseases such as respiratory diseases, cancer, and heart diseases that lead to endangerment of human health. Sustainability in healthcare has brought enormous benefits and opportunities to society and environmental preservation. However, sustainability in healthcare is associated with various challenges, such as pollution due to the increasing demand for healthcare services and uncontrolled waste (Sherman et al., 2020). The author stresses the importance of sustainability in healthcare services as it enables an increase in quality and proper use of resources. Moreover, the author portrays the pollution decrease due to healthcare emissions as a result of sustainability actions implemented in the healthcare services, such as recycling and reuse of medical products used in the healthcare services, and proper quality control. In light of this, Sherman et al. (2020) argue that the best practices for sustainable healthcare services are clinical care pathways that enable efficiency and proper utilization of resources. The clinical care pathways include treatment plans, screening, assessment, team-based care, achieving the target goals, and ongoing quality improvements. Implementing sustainability actions in the clinical care pathways will enable the decrease of misuse of clinical resources. Moreover, the authors stress the need for implementation of the health care records to measure productivity and performance that will enable proper use of the resources and environmental conservation. Therefore, the practice of sustainable healthcare reporting using technology and data management skills will enable an increase in efficiency in the environmental healthcare systems and public management.

The organization leaders are facing various challenges in understanding and implementing sustainability in business operations. The reason is that the business aims to maximize profits, and sustainability implementations increase costs and limit companies from properly utilizing the resources available (Assoratgoon & Kantabutra, 2023). Therefore, organization leaders in healthcare need to make efforts to understand sustainability implications and innovations to align them with the organizational structure. The process will enable the organization to achieve a competitive advantage to keep up with the market demands. Sustainability tends to face

various challenges during reporting due to time cost and limited stakeholder engagement. Moreover, greenwashing tends to mislead the public that the organization is practicing proper sustainable actions and practices during business operations (Moodaley & Telukdarie, 2023). Therefore, the procedure will limit sustainability developments and discourage customers from practicing environmentally friendly actions. In addition, an organization's greenwashing activity leads to problems such as a lack of transparency and improper waste management during the use of resources.

Digitalization enables the organization to move to a digital business with proper data management using technology and new inventions. Sustainability digitalization tends to ensure optimal use of resources and development while using technology. The interconnection enables proper use of the resources and enables a decline in environmental degradation that allows proper transportation and supply chain connections (Kwilinski et al., 2023). However, integrating digitalization and sustainability faces various challenges, such as the absence of awareness of sustainability innovations systems, leading to resistance to change and a shortage of skilled labor. In addition, proper waste management is another major challenge for the link between digitalization and sustainability, as electronic waste leads to climate change.

The process of integrating the healthcare supply chain and the sustainable development goals was not easy because it demanded modification of strategies, changes, and the use of advanced technology. Also, communication barriers occur during the implementation of sustainability in supply chain management (Boström et al., 2015). Moreover, the challenges faced during the adaptation of the supply chain in retail companies' sustainability are an increase in costs, such as administrative costs, because the organization needs to operate under sustainable corporate goals. Therefore, the organization needs to manage the costs through inventory management and prepare a proper budget in advance to avoid mismanagement and unnecessary costs. In addition, the company needs to ensure proper time management to ensure proper monitoring and control in the organization.

The major challenge of sustainability in the healthcare sector is the waste management procedure, as the institutes and healthcare facilities need to manage various costs to ensure proper sewage procedures, reduction of waste, and recycling procedures (Khizar et al., 2022). There have been various ambiguities and uncertainties in the measurement of sustainability performance in the organization, leading to the creation of gaps in how to understand and make proper sustainability reports that will enable improvements and problem-solving in various circumstances.

Healthcare management faces various challenges during the undertaking of sustainability actions and ensuring proper waste management, as proper resource utilization and cost reduction have to be made to enable public health users to have access to quick services. Moreover, the issue of data management and healthcare management is a challenge to healthcare facilities and companies since the EU and each country formulate health policies to safeguard the public. For example, the European Council has formed a privacy policy to ensure the protection of individual data for users of the Internet and technology. Besides that, the cybersecurity issue is also a challenge facing healthcare companies in the healthcare sector, as protection techniques need to be installed and adhered to secure the users of the Internet and technology. Therefore, cybersecurity adherence will assist in safeguarding and avoiding threats and exploitation. Furthermore, the sustainability of healthcare design is also a challenge in healthcare services due to growing awareness among the public and the need for proper use of resources for future generations to have access (Sagha Zadeh et al., 2016). Therefore, healthcare faces challenges of proper design by including sustainability in the future directions to ensure environmental conservation, to prevent wasteful use of resources, and to ensure the proper economic and social approach to sustainability.

The healthcare sector is facing various challenges from the emergence of greenhouse gas emissions from the manufacturing of healthcare products, healthcare services, and waste disposal from healthcare facilities such as hospitals, which lead to climate change (Hu et al., 2022). The author elaborates on the case study of the company Kaiser Permanente health care products producing company that attained zero carbon emissions in 2020. The company was dedicated to reducing energy consumption by developing solar energy hospital microgrids and was committed to recycling, reducing, composting, and reusing all nonhazardous wastes. Healthcare facilities need to adapt to the sustainability changes in healthcare management through collaboration that leads to changes in operations and ways of offering services, such as digital medical services and payments. Likewise, the healthcare sectors are faced with challenges on how to manage customer data to improve customer service. The healthcare companies tend to use customer data as an advantage towards the improvement of services, leading the healthcare sector to find ways to properly usage of data for efficiency and efficient improvements since it holds numerous customer data. Lastly, the risks associated with sustainability innovation in healthcare services pose challenges in the healthcare sector, as it leads the healthcare sector to use healthcare apps, report sustainability actions through sustainability reporting, and adopt further measures towards security and proper data management.

The issues of data management are also a challenge in the organization during sustainability implementation in the organization's structure and operations due to resistance to change and competition in the market, where firms aim to maximize profit at any cost, leading to the endangerment of human health and the environment. Besides proper use of technology and skilled labor to enable sustainable innovation development is also a major challenge in the organization's data management. Big data enables organizations to gain insight by assessing different data sources, which are varied and complex, and enables various gains like customer satisfaction and profitability (Wu et al., 2019). The author argues that big data is essential in the supply chain, and it enables the organization to meet the supply and demand.

2.7 Review of the Existing Literature

Climate change is caused by emissions and pollution to the environment from manufacturing processes and deforestation, leading to an increase in sea levels and heat waves. Moreover, the effects of climate change are server, such as increased drought leading to water problems and anger in the world. The healthcare services align with sustainability to reduce emissions that cause climate change because due to high investment in health care leads to an increase in emissions that endanger human health (Richie, 2022). Healthcare services are essential in ensuring public health and well-being management. However, it causes various emissions to the environment, and society does not concentrate on healthcare emissions (Lenzen et al., 2020). The author goes further with analyses of the environmental footprint of global health care and the negative impacts of health care services, such as air pollution and water pollution, which leads to a shortage of water. Thus, proper healthcare practices and waste management increase performance, environmental conservation, and efficiency. Therefore, the author discusses in depth in this literature the development of environmentally sustainable technology and the use of artificial intelligence in health care.

According to Kessler et al. (2025), traditional, complementary, and integrative medicine systems are essential and recognized worldwide for addressing unmet healthcare needs and promoting various sustainable practices. Moreover, it enables healthcare to achieve diversification, sustainable development, and increasing attention that will continuously improve healthcare. Furthermore, it accelerates continuous learning, advanced technology use, and awareness that promote modern healthcare, which will enable proper public health management.

European Union countries such as Germany have become aware of the sustainability development benefits in the health care system and demand from the public regarding the improvements in the health care system to achieve better approaches that will enable suitable health care delivery, especially for patients with chronic diseases (Nolte et al., 2012). Therefore, the government has been making various changes in regulations and new approaches to meet public needs. The growing number of patients with chronic disease is high, and healthcare facilities need to make further implementations to mitigate the healthcare problems through quality control, proper coordination in the organization, and eliminating the barriers between the shareholders, government, and healthcare facilities through a well-defined communication approach and systems. Moreover, the need to adopt better policies and regulations is a major target to be implemented to achieve a better approach in the organization and minimize risks. Lastly, the author emphasizes that the government is providing various support and direction to the health care systems with strict policies to be followed to ensure improvements and increase productivity. Therefore, the author discusses in depth in this literature regarding health care, health economics, policy, and laws in Germany, the Netherlands, and Austria.

2.8 Conclusion

In conclusion, the researcher conducted in-depth studies from the literature review and recognized that the literature review did not discuss in particular the importance and challenges of sustainability in the healthcare services in Germany. The secondary data has revealed that sustainability tends to improve healthcare services rather than being disruptive. It has also been confirmed that sustainability innovations are transforming healthcare services from the use of traditional methods to digitalization. Moreover, the review of the historical and conceptual development of the literature review was made with selective citations of an up-to-date topic overview of the importance and challenges of sustainability in healthcare services by specifically using a chosen geographical area, Germany country was gained. The conclusion summarized that there was a narrow, detailed knowledge and sources published associating the importance and challenges of sustainability in the healthcare services.

The reason for the transformation is to improve healthcare services, such as digital medical supply and data management via online access. Generally, the literature review showed that the emergence of healthcare led to several improvements, as changes had to be made to facilitate proper resource management, such as the use of digital software instead of the use of paper. Therefore, sustainability has caused changes in the healthcare sector that have positive impacts

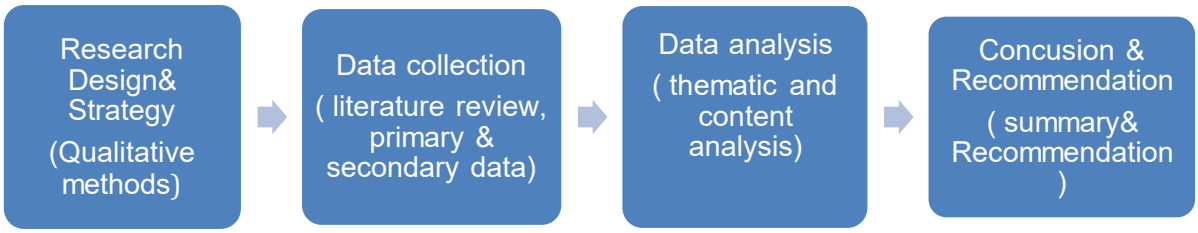
on public health, like risk management, reduction of waste, and proper use of resources for future generations. However, healthcare technologies will find ways to solve various risks, like financial risks, to make the healthcare sector sustainable because the healthcare sector aims to attain sustainable development and improved services. Furthermore, the collaboration between healthcare and sustainability is faced with numerous challenges, such as data management, cost, resource availability, and cybersecurity issues, as cyberattacks occur while using the technology. In addition, the government and healthcare facilities are investing in sustainable development to regulate and eliminate waste management and risks in the economy.

Despite the deficit in literature to understand sustainability's influence on healthcare services and unexplored areas, the literature review related to sustainability in healthcare services remains important because the links with the extant published literature related to sustainable healthcare provide the exploratory data to be collected in this study, with additional information. Since various lectures show that sustainability is important globally, and improving various sectors, including the healthcare sector. Also, the main aim of the literature review is to get findings related to the research topic in general. The literature review revealed that no prior study with a similar focus or research objective exists or has been undertaken before. Therefore, this dissertation constitutes the first known research to explore drivers of success in achieving truly sustainable healthcare services. As the business community, scholars, practitioners, and some authors speak generally sometimes casually and non-theoretically of sustainable health care services which has gradually become an attractive interest due to the growing awareness regarding sustainability in public health, the previous and extant record of an academically and empirical study which was found relevant to sustainable healthcare services specific application and practices, is not in evidence. Therefore, the study’s originality and significance build on the applicability of the knowledge from practical and managerial perspectives to understanding key drivers of success for sustainability in healthcare services. In addition, the literature review is among the secondary sources used to provide academic data from other sources and researchers that are relevant to the study regarding the importance and challenges of sustainability in healthcare in Germany. So, the knowledge gap relating to the sustainability influence on healthcare services laid the foundation of this dissertation, and thus formed the basis of the research problem: In achieving sustainable healthcare services, what are the importance and challenges of sustainability in the healthcare services in Germany?

Chapter 3.0 Methodology

This section will outline the research design, data collection methods, techniques, instruments, research strategy, and data analysis methods utilized in this study. It will also discuss the study's ethical considerations and the limitations and delimitations of this research topic. Research methodology is essential in the research study, with specific procedures and techniques used in the selection, procedure, interpretation, and analysis of information regarding the topic, which enables evaluation and critical analysis to come up with a proper data conclusion. The research methodologies are the methods and techniques used to solve various research problems with a logical approach (Verma et al., 2024). The author shows the significance of the research methodology by displaying it in a wider scope than the research methods during the study. The significance of the research methodology is that it enhances accuracy and reliability as a result of proper specific research steps outlined, such as research design, strategy, data collection to data analysis, and conclusion, which enable risks and error minimization. However, the research methodology faces various limitations such as the absence of previous research, limited data access, and time constraints. Research onion is also used in the research methodology as a model of designing research methodology; it includes philosophical assumptions and opinions that shape the understanding of the research questions and the choice of the research method to be used during the research study.

Figure 7: Methodology Framework



The methodology framework illustrates the review and steps done during the research study to complete the procedure by beginning with the research design and strategy, explaining the qualitative methods used during the research study. The data collection step explains in depth the literature review, primary data, and secondary data collected during the research study regarding the importance and challenges of sustainability in the healthcare services of Germany. Thirdly, the framework explains the data analysis procedure that involves thematic analysis and content analysis. Lastly, the framework shows the final step of conclusion and recommendation that explains the summary of the research, recommendation, and future gaps are detailed to assist future research studies.

During data analysis, the researcher used both thematic analysis and content analysis to understand and collect data regarding the research topic of the importance and challenges of sustainability in healthcare services. Thematic analysis is a flexible research method, well–established, qualitative method, and structured that organizes qualitative data into various series of patterns by careful reading and interpretation. Moreover, the analysis involves themes with core ideas and opinions regarding certain issues or concepts responding to the purpose of the research (Clarke& Braun, 2017). The thematic analysis involves becoming familiar with the data, generating initial codes, searching for the themes, reviewing the themes, defining the themes, and final write-up. Coding in data analysis involves the identification of data items, relations, and concepts in the text and enables data linkage to the research idea. The type of thematic analysis used in this research is inductive thematic analysis. The inductive approach

involves data collection relating to the research study, data analysis, reasoning, and understanding to come up with new interpretations and theories. Furthermore, content analysis is among the qualitative methods used by the researcher to analyze the concepts and relations by quantifying. The author emphasizes that content analysis is a powerful data reduction technique (Stemler, 2000). Moreover, it is a research tool used to determine the presence of certain words and themes. The procedure of content analysis involves preparation, organization, analysis, and interpretation of the research questions.

3.1 Research Choice

The type of research used is qualitative research; qualitative research tends to focus on understanding and interpreting behaviors and experiences to come up with data for analysis (Sutton & Austin, 2015). Therefore, it gathers in-depth information to solve the research problem and generate ideas for future research studies. Moreover, the researcher will use explanations and interpretations of the research choice to gain data and reliable information. Despite that, the researcher from the start of the research study aimed to use mixed-method research, but constraints in the quantitative method occurred, such as limitations in data analysis and measurement constraints. Moreover, this selection of the research type by the researcher was based on the intention of allowing exploration measures to be taken into account to collect data. Furthermore, the qualitative research tool will facilitate flexibility in acquiring information regarding the importance and challenges of sustainability in healthcare services. Similarly, the use of qualitative research through a survey enables the researcher to understand the characteristics of the representative of the population. In addition, the research choice tends to allow the researcher to use the interview method that facilitates the formation of new theories and findings. Lastly, the researcher used the questionnaire method through Survey Monkey and directly handed the papers with the questions to the participants to collect data.

3.2 Research Philosophy

The research philosophy used in the conduction of this research was the interpretivism approach, allowing the researcher to explore and draw a conclusion from the analysis of the data (saunders et al., 2009). Therefore, the research philosophy elaborated and involved the collection of data through research methods such as interviews and questionnaires to comprehend how sustainability influences healthcare services in Germany. Moreover, the

researcher chose to follow the research philosophy to acquire in-depth knowledge about the research study. In addition, the researcher had the aim of following the basic procedure of the research process through the knowledge given by the interpretivism approach.

Research Philosophy is among the foundations of the research study, with a set of basic beliefs that guide the research design and execution of a research study, and different research philosophies offer different ways of understanding scientific research. The research philosophy tends to use beliefs to investigate reality, and the choice of the research philosophy to be used is applicable based on the knowledge and data needed (Kirongo & Odoyo, 2020). The research study will use interpretivism research philosophy; interpretivism is a sociological method of research that tends to analyse an action based on the beliefs, norms, and values of the society in that certain area. The interpretivism research is based on the essential patterns during the gathering of data (Sanchez et al., 2023). The research philosophy is the basic foundation of the research study, and it has a direct influence on the methodology, which consists of data collection, data analysis, and the techniques used. The interpretive approaches rely on questionnaires and observation techniques to discover deep information regarding the topic. The main strength of the approach is that it understands the nature of human emotions through qualitative research. Furthermore, the research paradigm is the framework that guides and creates the research plan through theories and practices related to the research study. The research plan includes the aim of the study, research question, instruments, and analysis methods (Kirongo & Odoyo, 2020). The research paradigm used during the study regarding the importance and challenges of sustainability in healthcare services was interpretivism, which reduces bias and allows better research instruments during the research process. During the research study, qualitative research that uses an interpretive paradigm will be used, using methods like surveys and experiments, and seeks measures by testing hypotheses and dealing with numeric data.

3.3 Research design

Research design is the process that uses a strategy to understand and answer research questions. Moreover, it is an analytical approach used to logically integrate to ensure proper investigation of the research problem. It outlines the theories that enable the formulation of strategies for gathering data and information and producing answers from the data through interpretations. The research design includes research objectives, questions, data collection methods, sampling, data analysis, time frame, resources, and data presentation and reporting.

The research design used in this study regarding the importance and challenges of sustainability in healthcare services, specifically focusing on Germany, involved a qualitative research method because the qualitative techniques are essential in exploring in-depth studied subjects. This enabled the researcher to study the opinions and experiences of multiple stakeholders engaged in such collaborations, which led to extended knowledge of the importance and challenges of sustainability in healthcare services and the importance of sustainable development. Qualitative research effectively examines experiences, perceptions, and behaviours by focusing on the participants (Salter, 2023). Qualitative research allows deeper insights regarding the topic by digging through the real-world problems through flexibility and an exploratory approach, unlike quantitative research, which depends on qualitative techniques because it introduces numerical data points. The qualitative research design is composed of different approaches that are used in data-gathering techniques within a research paradigm (Kekeya, 2021). During the research procedure, the researcher selected the qualitative research design in the data gathering process through methods such as interviews methods, observation, and analysis of the documents. This method enables detailed data collection, including experiences and descriptive information from a research study.

The qualitative techniques procedure takes a lot of effort to gather data, and the efforts demanded for completion involve case studies, interviews, questionnaires, focus group observations, and evaluation data. Therefore, qualitative research challenges occur due to diverse thoughts and opinions, causing difficulties in generalization and the possibility of bias (Kekeya, 2021). Moreover, the procedure is time-consuming, from the collection procedure to the analysis procedure of the data. However, this was solved using many data sources and data analysis techniques, which helped guarantee that the results were valid and consistent. Triangulation was also utilized to guarantee that several sources of information backed up the conclusions. Also, secondary data sources such as reports and publications were used to save time and resource utilization during data gathering. Additionally, qualitative research helps the researcher to access the thoughts and feelings of research participants, which brings a pool of data to analyze and answer the research questions. This research design is essential in collecting quality data, matching the aims of the research, analyzing and answering research questions.

3.4 Research Approach

Throughout the research study, the researcher used both inductive and deductive research approaches to gather information about the importance and challenges of sustainability in healthcare services in Germany. The research approach tends to assist the progress of the research study and draw a conclusion based on the analysis of the data (Thomas, 2006). Furthermore, the research approach tends to use qualitative analysis of data and formulate a theory from the analyzed data. Afterward, the theory obtained through the inductive research will be used in problem-solving and for further studies. In addition, the research approach tends to apply data collection methods to gather data. The data collection methods used during the research process were the interview method, observation method, and questionnaire method. The procedure was done through Survey Monkey and direct contact to collect data. In addition, the researcher applied the quantitative method through a deductive approach to test the existing theory and conduct reasoning that will assist in generalization.

3.5 Research Strategy

Research strategy is essential to adopt, and it includes surveys, case studies, action research, and experiments. Moreover, it assists in clarifying the research questions, sources, data organization, and communication regarding the findings. The research strategy facilitates the research study undertaken to obtain the final results (Malhotra, 2017). It is a plan that guides the research study activities and helps in achieving the research goals. The research strategy used is a survey and experimental strategy to collect data regarding the importance and challenges of sustainability in healthcare services. Furthermore, the research strategy introduces the main components of the research topic, research design, and research methods. The research strategy used by the researcher was the survey strategy; the survey strategy tends to collect in-depth information by using the interview method or questionnaire method in collecting data (Fowler, 2013). The completion of the research required proper planning and direction to collect data and provide critical evidence that will inform conclusions for the research questions and hypothesis. Throughout the research, a survey will be used as a research strategy to collect data and information. Therefore, the use of questionnaires and interviews as instruments facilitates the acquisition of data. Moreover, cross-sectional survey methods will be used, based on which analysis will be made from Germany's representative subset population, and at a specific time.

The researcher used the following qualitative research techniques during the research study to collect primary data that will enable the research study to be reliable and valid. The first qualitative research technique used is the interview method, a qualitative research tool used to collect primary data through different techniques, like as in-person asking participants about their opinions and perspectives regarding a certain research study. The process occurs in various forms, like structured, unstructured, and semi-structured (Qu & Dumay, 2011). Moreover, during the study, the researcher used an unstructured interview with a friendly approach, allowing the healthcare employees to have the flexibility to answer the questions and provide more details regarding sustainability in the healthcare services. The advantages of the interview method are the ability to collect detailed data, rapport making, and relationship building between the interviewer and interviewee, which facilitates trust and the collection of raw data through questions. However, the disadvantages of the interview method are time-consuming, the respondents are limited to responding only to the questions asked, and risk of bias. Secondly, the qualitative research technique used was the questionnaire method is fast, efficient, and inexpensive popular research method that facilitates the gathering of information in large sizes and volumes. Moreover, It is a qualitative method that effectively measures the behavior, attitudes, and opinions during the research study. Moreover, Questionnaire styles can be both open and closed questions to collect data (Eckerdal & Hagström, 2017). The advantages of the questionnaire method are cost-effective, and respondents feel comfortable providing honest opinions regarding the questionnaires given as a result of anonymity. However, the disadvantages of the questionnaire method are the absence of flexibility, incorrect feedback, and low response rates due to ignorance. Thirdly, the qualitative research technique used was the observation method is a qualitative research technique used to collect primary data where an observation of participants and phenomena is made to gather information regarding the research study (Baker, 2006). The advantages of the Observations method are an inexpensive method and it leads to new information collection. However, the disadvantages of the observation method are time-consuming, expensive, and biased.

Lastly, the qualitative research technique used was a case study that involves a process of making a detailed investigation and data gathering regarding a specific subject, and often are medical studies, social studies, and business studies regarding a certain place, organization, or group (Barratt et al., 2011). The research study used the country of Germany as a case study to gather detailed information and gain information that will answer the research questions and assist future studies. Moreover, the advantages of case studies are flexibility in data collection and the ability to see relationships between context, people, and phenomena during the study.

However, the disadvantages of case studies are risks of bias due to personal preferences and opinions, and difficulties in generalizing.

The research strategy involved extracting data from secondary sources such as articles, books, and working papers to analyze the influence of sustainability in healthcare services that were made by previous researchers and academia.

The research strategy outlined above utilizes secondary data sources to investigate the influence of sustainability in healthcare services (Malhotra, 2017). The benefits of secondary data sources are cost and time-saving due to easy access to information, generally preventing the researcher from conducting duplicate research (Sutton & Austin, 2015). This strategy offers several benefits that yield the objective of the research study. First, it helps the researcher to make the proper choice of the proper data collection and analysis procedure. The approach of using the research strategy of secondary data use and qualitative techniques has examined the role of sustainability developments in health care. In addition, during the study, the researcher used the outside observer technique by maintaining a distance and interacting with the participants. Hence, the researcher observed the healthcare services in Germany concerning sustainability aspects. Moreover, the researcher observed the quality, supply chain process, customer service, and environmental aspects to obtain data that will assist in completing the research study conclusion.

3.6 Validity and Reliability

Validity tends to take into consideration the structure and methods used in the conduction of the research, aiming to conclude the claim (Mohajan, 2017). In the process of testing the validity of the research regarding the influence of sustainability in healthcare services, the researcher used the interview method by asking questions to the managers with knowledge, experience, and skills related to the research topic. Moreover, the use of the questionnaire method was among the methods used in testing the validity of the research statement by randomly asking questions to a sample of the German population. Having health insurance in Germany is compulsory for everyone to access public or private health care services. Therefore, the researcher selected randomly from the individuals who were willing to contribute. Afterward, the data validation was done through techniques such as observation, questionnaires, and interviews, and then the data was filtered using Microsoft Excel, followed by an analysis of the data to draw a conclusion based on the findings.

Reliability is a term that involves the measurement of the steadiness of the research study by checking the frequency of the results given during the research process. The research validity and reliability are good criteria for the research measurements (Mohajan, 2017). The author points out that validity and reliability need to represent the research methodology clearly, with stability in findings and truthfulness of findings. Therefore, to ensure good research validity and reliability tests must be taken carefully.

The researcher analyzed the data from the interview and questionnaire responses and concluded. Moreover, reliable sources such as literature reviews played a significant role in ensuring the research study is reliable. Similarly, the researcher formulated the research questions with guidance from the academic supervisor about the research study to obtain data. Therefore, the researcher included relevant samples such as public health users from hospitals and health insurance companies during the collection of data through conducting questionnaires and interviews.

3.7 Sampling Techniques

The sampling process involves taking into consideration a certain portion of the population as a representative of the whole population in collecting data for the research study (Tuckett, 2004). The sampling techniques can be probability and non-probability sampling techniques, as the difference is traced in probability sampling, given that the chance of selection is unknown due to the use of random selection, unlike non-probability sampling. The researcher used a probability sampling technique, such as random sampling, defined as the activity of taking a sample of a population irregularly without bias, and the probability tends to be unknown (Raguram et al., 2008). During the research study, the writer managed to collect responses to the questionnaires through a random selection of students from various Universities in Germany in different cities, a random selection of participants, and limited experts in the hospitals and pharmacies in Germany. Moreover, the researcher acquired feedback from the healthcare services managers and employees, with a combination of friends who live in Germany. Therefore, the response facilitated the attainment of data for analysis and proof provision. Research Sampling Techniques are crucial in the research study, and they tend to focus on a group of the population or units for analysis purposes (Van Haute, 2021).

The convenience sampling technique tends to collect information from convenient respondents, such as asking people who are present on the streets, in public buildings, workplaces, and universities (Taherdoost, 2016). The advantages of a convenient sampling technique are that it

is an easy method to use without training required, and it saves time. The researcher also used the convenience sampling technique in making the research successful by collecting responses at medical facilities in German cities such as Duisburg through the interview method. By doing so, the researcher intended to gain in-depth information regarding the importance and challenges of sustainability in healthcare services. Similarly, the researcher selected the sampling technique due to the use of a qualitative method that often aims at exploration. Therefore, the researcher focused on ensuring an accurate and vital collection of the information to provide proof for the research made. Therefore, the convenience sampling technique is a non-probability sampling that aims at collecting data by focusing on a certain group of samples. Furthermore, the sample sizes used by the researcher were 120 respondents during the research study. The survey obtained a response from the sample size and enabled the researcher to obtain accurate insights to draw conclusions.

3.8 Data Analysis

Data analysis is among the fundamental parts of the research because it evaluates and summarizes the collected data by involving data interpretation, proper relationships, and logical reasoning (Sutton & Austin, 2015). It is significant in identifying relationships in the data that enable understanding of the research problem. Data accuracy is crucial in the research study and project because it aims to reflect the variability, reliability, and findings to select the correct and true value measurement. It involves verification of the information sources to test and check the errors and avoid discrepancies in the information. The data analysis section is essential in the research study, and it identifies the study strategy, methodologies, and techniques used to collect data and evaluate the data obtained. Through data analysis techniques, the researcher draws conclusions based on the research findings.

Data editing is the process that involves review and application checks of the collected survey data to detect invalid and missing points. Therefore, the process enables adjustments, reduces bias, and eliminates inconsistencies for clear analysis of the research study. Lastly, the researcher conducted data editing after data analysis of the collected data to ensure the validity and reliability of the research study.

3.9 Ethical considerations

Research ethics involves the consideration of ethical principles during the undertaking of research activities such as data collection and research design. The advantages of research design are error minimization and promoting truth. However, the research ethics face limitations such as insufficient funds and the absence of diversity. The research ethical problems are due to authority and improper structure to adhere to during the research process (Drolet et al., 2023). Moreover, the author emphasizes that conflicts of interest and external pressures lead to ethical issues during research activities. In the collection of data, the researcher ensured the use of proper ethical conduct considerations by ensuring privacy. Therefore, the researcher gave the interviewees and respondents of the questionnaire freedom of participation based on their willingness and kept the respondents anonymous, depending on their choice. Moreover, the researcher avoided the use of force during the collection of data by not manipulating the respondents, being too demanding, and allowing the respondents to do it willingly. Furthermore, the use of good communication and a comfortable approach by the researcher was used during the collection of data to allow the respondents to take time and have the freedom to point out their views. In addition, the researcher ensured the report structure was up to the standards of Harvard referencing to avoid misconduct such as plagiarism and ignorance of anonymity.

During the research study, several ethical factors, such as fairness and impartiality, were taken into account. Fairness is equity by treating people in the right way and giving each and every person equal opportunity and access to public resources or roles regardless of background, nationality, sex, gender, and religion (Poe & Elliot, 2019). Moreover, impartiality is among the principles of justice, which operates under fairness and objective criteria rather than bias. The researchers should be objective and independent in conducting research and during engagement with the stakeholders (Shaw, 2013). To ensure objectivity and the validity of the results, the researcher abstains from bias during the data collection and analysis. Bias in the research study leads to various disadvantages, such as inaccurate interpretations and false conclusions.

Confidentiality in the research is the obligation of the researcher to ensure the private information of the participants through disclosure and consent to avoid access from unauthorized groups (Petrova et al., 2016). Moreover, anonymity is a situation where the data collected does not identify the individual information, such as name, address, or email address; therefore, the project cannot link the participants to the responses they made. It enables privacy and freedom of participants to respond in honesty and detail. The author argues that research anonymity is essential, especially when reporting a situation in a specific area that will make the people in the society uncomfortable (Nduna et al., 2022).

During the research study, confidentiality and anonymity were among the ethical considerations taken into account. The aim of the confidentiality and anonymity ethical consideration was to ensure that the researcher obtained secondary data would be kept private and anonymous. The act is crucial because the respondents need to be protected from any damage or danger resulting from participating in the research study. Data accuracy and reliability are other crucial ethical considerations that have been considered during the research study to enable future research studies, decision-making, and policy-making (Drolet et al., 2023). Furthermore, the researcher has taken careful measures to ensure that the secondary data collected is accurate and credible by examining existing literature and sources to verify. In addition, the researcher ensured that the study was conducted responsibly, in good conduct, and flexibly without bias.

3.10 Time Horizons

The research process was completed in a slightly short period of time as the researcher made early preparations, and the research questions were easily answered, as the topic was made specific. According to Saunders et al. (2009), the research was overlooked, and various challenges were encountered in attaining sufficient data and responses due to the time limit and insufficient resource availability.

The researcher has included the timetable showing the duration of the research as follows. The researcher has been working on the research topic for the last years to get Insights and prepare for future thesis submission in the best university.

Table 1

Duration of the research process completion

Month	Activities
Jan 2023 to May 2024	Research process, literature review, and research study
June 2024	Research proposal submission

July 2024	In-depth Literature review and collection of data both
August 2024	Results and analysis of the data
September 2024	Chapter 1 &2 &3 submission
October 2024	Chapter 4 & 5 submission
November 2024	Chapter revision and modification
December 2024 to 2025	Chapter's final reviews, conclusion, and Completion of the thesis. Also, the research report correction and finalization
Year 2025	Research report submission

Therefore, the researcher had enough time to correct and learn more about how to complete the research report with the help of the academic tutor. In addition, the researcher experienced various challenges during the completion of the research, and ultimately, the completion was achieved.

3.11 Limitations and Delimitations

The limitations faced during the conduction of the research were getting the data from the respondents, due to the organization's privacy policy, the employees, mostly at health care facilities, are not allowed to provide information without permission from the facilities. Therefore, the researcher had to get in contact with several managers to get information that would

facilitate the validity of the research and answer the research questions. Moreover, the time was so limited, as during the weekdays most respondents were often busy with normal work and daily life routines. Therefore, getting the feedback on time was a problem, and the researcher had to be patient with the situation to attain the intended goal.

During the research study, constraints and delimitations tend to occur, and it is unavoidable. The constraints and limitations during the research study regarding the importance and challenges of sustainability in the healthcare services, specifically in Germany, were time constraints during the gathering of the information. Furthermore, the time was limited in completing the research study as the researcher began the process in January 2023, and the days are moving fast. Therefore, the researcher would have done more when time was in favor. The researcher faced several problems in data finalization due to inexperience and the continuous need for improvements throughout the study to facilitate proper academic reports and formatting. Besides, time costs were among the limitations faced by the researcher, and several costs, such as transportation and Internet access in remote areas with limited access to Wi-Fi and Internet bundles to gain information to facilitate the research process. Lastly, the researcher could not attain detailed information from the native German-speaking society due to a failure to speak fluent German.

Also, bias is another limitation that was faced during the research study due to the use of the research strategy that is based on secondary sources and qualitative techniques, therefore impacting the accuracy and validity of the research study (Sutton & Austin, 2015). In addition, the limitation of using the specific scope of study may have restricted the researcher's overall understanding of the sustainability impact on healthcare services due to the absence of flexibility. Moreover, the research design tends to affect the data analysis for the research study's final results, especially when the design is not broad. Furthermore, personal issues and relations tend to impact the research study findings. However, the researcher may use mixed-method research methodology techniques to eliminate the disparity during the research study. Therefore, the identification of the limitations and delimitations is crucial in future research studies to close the gaps left and obtain useful information for the next research study.

3.12 Data collection

Data collection can be defined as the process of investigating and gathering data from various sources, followed by the evaluation of the data to answer the relevant questions and compile. During the research study, the researcher used both the secondary and primary data collection

methods while undertaking the main research study. The secondary data collection comprises other publications and research that have already been completed and published. The secondary data assists the researcher in knowing what research has already been done and what theories exist. Furthermore, the limitation of the secondary data is that the information is collected by another person. Hence, there can be a misunderstanding or invalidity of the data. The researcher used the secondary data collection through a literature review to answer the sub-research objectives that were intended to find out what other sources have regarding the importance and limitations of sustainability in the healthcare services that hinder the ability to ensure customer service efficiency. Furthermore, the other source of data collection used by the researcher during the research study was primary data collection, in which the data was gathered by the researcher through interviews and questionnaires. Although primary data collection tends to be accompanied by time costs and process costs during the collection of data, the data collected is firsthand, often enabling the formulation of theories. Likewise, the accessibility of the data tends to be easy and provides an alert to the researcher in case of any problems and limitations. Moreover, the researcher used primary data collection to achieve the research objectives that aimed at understanding the ways the collaboration between the two parties is made in ensuring customer service efficiency. Similarly, the challenges faced during the collaboration and recommendations to improve collaboration.

3.13 Data Analysis tools and techniques

The researcher used a qualitative approach as previously discussed in depth, with the benefits held in using the approach while conducting the research. Therefore, the researcher reviews existing publications that relate to the study and obtains the secondary data from the literature review, which the data will be used in drawing a conclusion and making further recommendations. Moreover, the researcher conducted several interviews in different forms Skype, telephone, and in-person in which the data will be analyzed and allow the researcher to prove the validity and reliability of the researcher obtained primary data through questionnaires data collection method in which the primary data through questionnaires data collection method in which the researcher will analyze primary data through questionnaires data collection method in which the researcher will analyze and interpret the data to conclude on the hypothesis and answer the research questions in order to achieve the research objectives. Therefore, in chapter 4, the analysis of data obtained from the questionnaire method and interview method is shown

with limitations held and the main results of the findings. Then, the next chapters 5 show the conclusions and the recommendations made by the researcher from the research study.

Chapter 4- Analysis of data

4.1 Introduction

Data analysis is the process of examining data in detail to identify useful information for the conclusion of a study or research project. It plays a big role in decision-making, government, policy-making making and various operational activities through data coding and data entry (Taherdoost, 2022). In this chapter, the logical interpretation of the data gathered from the managers with skills and working in the health sector and healthcare companies is presented. Moreover, findings were collected through random feedback from a sample of healthcare workers and users in the German population. Therefore, the analysis of primary data obtained from observation, questionnaires, and interviews illustrates the importance and challenges of sustainability in healthcare services. Moreover, the analysis of secondary data collection methods was made using the literature review method. The analysis displays the collaboration between sustainability and healthcare in ensuring customer service efficiency is achieved. Furthermore, Key insights drawn from the interpreted data will be reviewed and related to solving the problems the research addresses. This section will be presented in a narrative format, providing a detailed description of the findings regarding sustainable healthcare. Moreover, this section presents the secondary data collected from journals, books, and other sources, as well as the research findings, patterns, trends, and relationships deduced from the study. It also compares these findings with those of previous research in a clear and organized manner. The findings of the study will provide data regarding the importance and challenges of sustainability in the healthcare services. Additionally, the findings will focus on the roles of sustainability and innovation in healthcare, detailing the opportunities and challenges facing the implementation and sustainability of healthcare services, with sustainability as a key factor influencing the success of these factors. The section will also analyze the data presented and how it contributes to meeting the objectives and answering the research questions. The study's findings will be discussed in comparison to the literature review and the objectives.

4.2 Data presentation

Data presentation is the process that involves visual representation of data using methods like charts, graphs, and tables to effectively transmit the intended information to future researchers, readers, and the public. The advantages of data presentation are that it provides clarity of the

research findings (Ningi, 2022). Therefore, enabling great engagement in the research process to attain the research objectives. This section concerns how the researchers found and selected academic articles for the study on the sustainability of healthcare services.

The primary data collection method was used during the research study regarding the importance and challenges of sustainability in the healthcare services to gather original information and accurate insights into the research objectives (Saunders et al., 2009).

During the analysis of the data, the researcher used descriptive statistics to summarize and describe the data collected. Consequently, the statistical tool used during the analysis of the data was measures of central tendency, including the arithmetic mean, the median, and the mode. Therefore, the researcher managed to calculate the result and conduct an analysis of the data as follows, based on the questions asked. From the survey made the following data was found, which is graphically presented below one by one based on the separate questions. The evaluations were made to give data and information regarding the research work.

The questionnaire method is a method of data collection that is used to collect data in a population by using a research survey (Saunders et al., 2009). The method is essential as it enables the researcher to collect data, analyze, and achieve the research study objectives. Moreover, the method is inexpensive since it does not need the presence of the researcher while collecting data and allows the respondents to remain anonymous.

The characteristics of the respondents participating in the research study regarding the importance and challenges of sustainability in the healthcare services in Germany are demographic characteristics of the respondents, including the Age of 18 and above, the gender was all genders, and ethnicity was varied and inclusive. Socioeconomic characteristics of the respondents included income and occupation were inclusive of all classes, but mostly average were middle class, employment status was employed in various sectors, and students, and social status, the public was involved despite the social status. The respondents' health-related characteristics vary because the researcher selected from a random sample without considering the health status of the respondents or their medication use. Moreover, the behavioral characteristics of the respondents were mainly of different lifestyle choices, and the majority were aware of sustainability impacts. In addition, the psychological characteristics of the respondents included healthcare with awareness of sustainability and innovation, motivated by high demands in ensuring proper environment management and public management.

The researcher analyzed the main and sub-research questions, as shown below, to collect data for analysis.

The main research questions are

- What is the importance of sustainability in the healthcare services in Germany?
- What are the challenges of sustainability in the healthcare services in Germany?

Sub-research questions are

- What are the ways used to enable sustainability in healthcare services for the benefit of public health?
- What are the opportunities offered in health care services to enable sustainability growth?
- What does the literature review sources holds regarding the influence of the sustainability in the healthcare services?
- What are the ways used by healthcare facilities while considering sustainability to create public health service efficiency?
- What are the limitations faced by the healthcare services institutes and facilities while ensuring sustainability?
- What improvements need to be done in ensuring public health service efficiency by the healthcare services institutes while undertaking sustainability measures?

The conduction of the questionnaire method in this research study was mainly aimed at understanding and receiving various opinions from the sample of healthcare users and the public in Germany regarding the importance and challenges of sustainability in healthcare services. The researcher used a monkey survey and traditional methods of distributing the questions to the healthcare students, experts, teachers, and public with an aim of collecting raw data and opinions regarding sustainable healthcare in Germany.

Question one

What is your gender?

A. Female

B. Male

Result:

The respondents of the questionnaires were both male (67) and female (53), adding up to a total of 120, as shown in Figure 8. Moreover, the details given elaborated on the situation of healthcare facilities and centers since the respondents have access to and are using the healthcare services. And the following was the depiction of the feedback given.

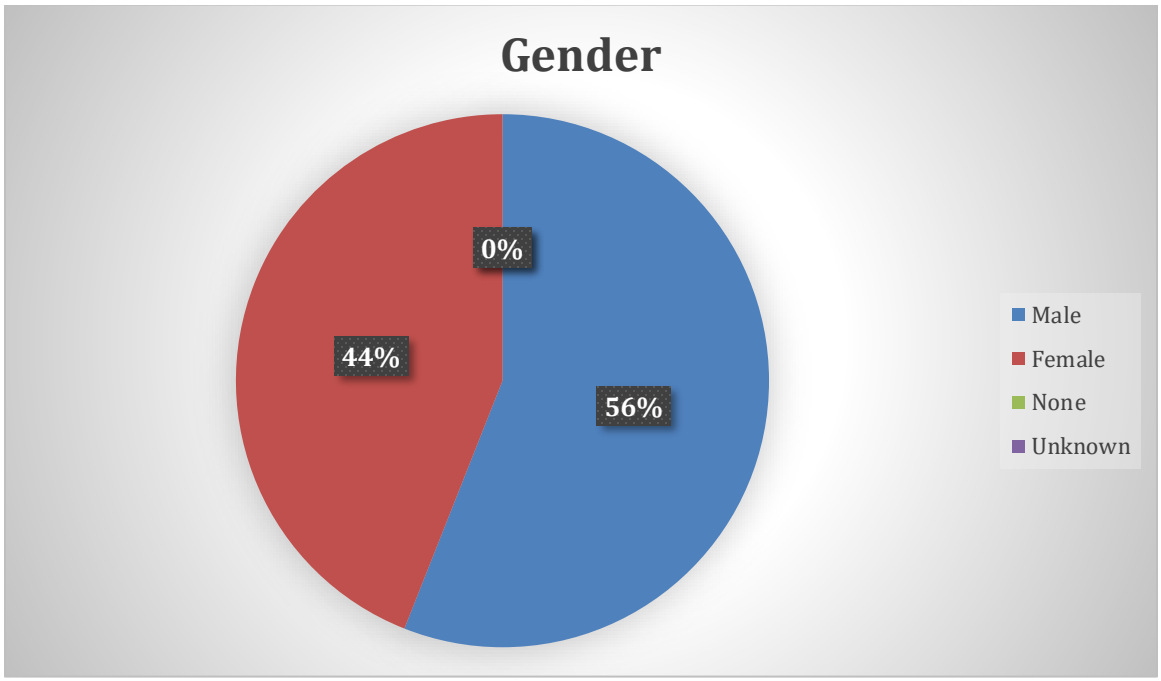


Figure 8 illustrates the distribution in percentages of the respondents' gender, which was male and female.

The illustration of Figure 8 shows the percentage based on gender analysis. During the analysis of the data, the researcher used descriptive statistics to summarize and describe the data collected. Consequently, the statistical tool used during the analysis of the data was measures of central tendency, including the arithmetic mean, the median, and the mode. Therefore, the researcher managed to calculate the result and conduct an analysis of the data as follows, based on the questions asked.

Question two

Is the collaboration between healthcare services and sustainability in healthcare satisfactory in ensuring customer service efficiency within the country?

A. Very satisfied
B. Satisfied
C. Neither satisfied nor dissatisfied
D. Dissatisfied
E. Very dissatisfied

Illustration of Figure 9: Satisfaction level of the collaboration between the sustainability and healthcare services

The illustration of figure 9 shows that based on the data obtained, the respondents in 14.04 percent were completely satisfied that the collaboration between the sustainability and healthcare services facilities and companies tends to ensure customer service efficiency by taking into consideration the use of online digital healthcare services that seemed to save costs and time of dislocating from one place to another. And the results showed that 64.91 percent of the respondents were satisfied with the collaboration done by between the sustainability and healthcare services facilities, and companies tend to ensure customer service efficiency. However, some of the respondents, with 21.05 percent, had neither satisfaction nor dissatisfaction, leaving room for questions for the researcher.

Result:

From the above table, it is clear that the healthcare internal environment and the public are satisfied with the collaboration between healthcare services and sustainability in the healthcare satisfactory in ensuring customer service efficiency within the country.

Question 3

How well do healthcare facilities and sustainability collaboration facilitate proper public health management?

A. Extremely well
B. Very well
C. Somewhat well
D. Not so well
E. Not at all well

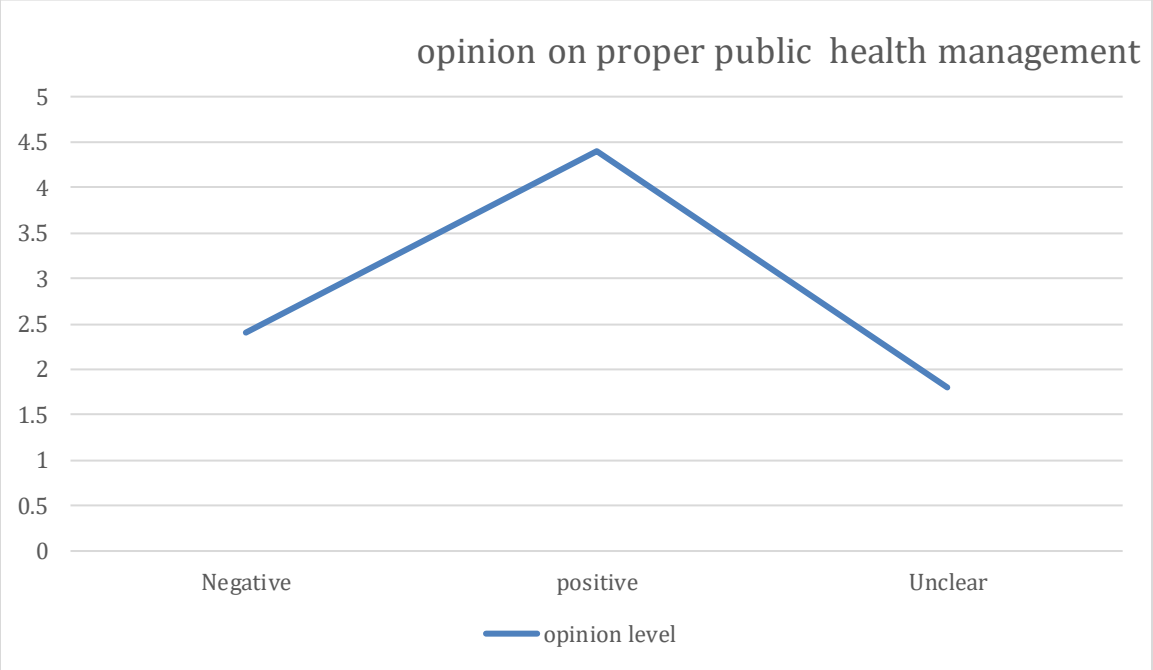


Illustration of Figure 10: Opinion on proper public health management

The illustration of Figure 10 shows the contents regarding the opinion of the respondents concerning the integration between the sustainability and healthcare services facilities and companies. Most of the respondents had a positive view, with 86 percent, towards the collaboration between both parties that helps in facilitating proper public health management. The positive views mentioned by the respondents were that the digital healthcare services save time and are convenient for the users. Moreover, the positive side of the collaboration between

the sustainability and healthcare services facilities and companies tends to ensure customer service efficiency, which was the integration of the data of customer data, improving quick response and service provision. Furthermore, the respondents mentioned the importance of stakeholder involvement and engagement in sustainability, technical innovation, and policy and regulation have all been identified as important determinants of the success of healthcare services initiatives. However, other issues like available funding and human capital should also be considered. These results highlight the necessity for a proper strategy for implementing sustainability in the healthcare services that considers the many variables that might affect their performance. However, 9 percent seemed to have a negative opinion of the collaboration between the two parties in ensuring proper public health management. Lastly, 5 percent of the respondents had an unclear view regarding the collaboration in ensuring proper public management.

Result:

From the above table, it is clear that the healthcare internal environment and the public are satisfied with sustainable healthcare services practices and activities using innovation to ensure proper public management.

Question Four

What are the limitations faced by the healthcare services institutes and facilities while ensuring sustainability?

Result

The respondents of the questionnaire made several suggestions regarding the limitations faced by the healthcare services institutes and facilities, while ensuring sustainability, including the costs associated with the process of integrating the healthcare services and sustainability and advancement of technology, leading to high demand and changes to meet the customer wants while ensuring proper public health management.

Question Five

The collaboration between sustainability and healthcare services will reduce waste disposal and ensure proper resource management

A. Strongly Agree
B. Agree
C. Neutral disagree
D. Strongly disagree

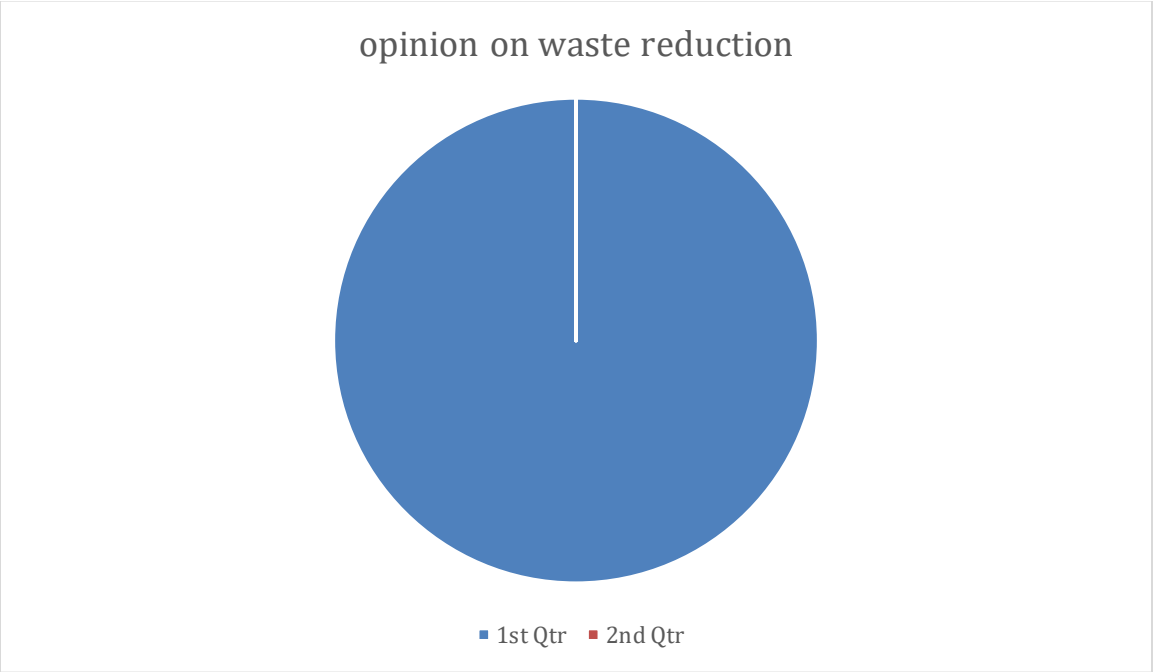


Illustration of Figure 11: opinion on waste reduction

The illustration in Figure 11 shows that all respondents agreed that collaboration between sustainability and healthcare services would reduce waste disposal and ensure proper resource management. The reason is that the healthcare sector administration and services are accompanied by various wastes that endanger public health.

Result

The respondents of the questionnaire made it clear that it is essential to emphasize and promote collaboration between sustainability and healthcare services to reduce waste disposal and ensure proper resource management.

Question Six

What are the opportunities offered in healthcare services to enable sustainability growth?

Result

The respondents of the questionnaire made several suggestions for the opportunities to be offered in the healthcare services to enable sustainability, such as proper waste management to enable a clean environment, and proper public health management. Moreover, the respondents came up with ideas such as the healthcare services should invest in sustainable innovation

because the digitalization process comes along with various new services that enable simplification and cost minimization.

Question Seven

What improvements need to be made in ensuring public healthcare service efficiency by the healthcare services institutes while undertaking sustainability measures?

Result

The respondents of the questionnaire made several suggestions for improvements to be made in ensuring public healthcare service efficiency by the healthcare services institutes while undertaking sustainability measures, such as internal and external healthcare sector environment involvement through sustainability training and practices involvement to enable engagement and awareness. In addition, the respondents emphasize that the healthcare sector should ask for government support where needed to enable sustainable healthcare services improvement and advancement where needed.

Furthermore, Big data refers to a large volume of both structured and unstructured data that tends to be hard to manage by the use of traditional methods (Batko and Ślęzak, 2022). The management of big data is among the challenges pointed out by the respondents that are faced between healthcare services and sustainability while collaborating in ensuring customer service efficiency. The challenges of big data are such as data storage, data analysis, and data sharing. Secondly, respondents indicated that the risks of theft during the digital health service process are among the challenges faced between the two parties while ensuring customer service efficiency, since the internet has leakages in which experts can misuse the gaps by taking advantage of the opportunity to even steal some money.

Lastly, the feedbacks given by the respondents from managers, professors, phd students, medical students and public surrounding the medical and healthcare centers in Germany regarding how to improve the collaboration between the healthcare services and sustainability were taking into consideration the issue of risk management by avoiding risks such as operational risks, information technology risks, environmental risks and credit risks. Moreover, the feedback of the questionnaires highlighted the importance of public management and extending the cross-border healthcare services towards digital to provide the public users with accessibility that will ensure customer service efficiency and proper public management. The implementation of sustainable healthcare services requires crucial aspects such as sustainability and innovation. Moreover, the

success of sustainable healthcare services is successful through the involvement and participation of the government and stakeholders

However, a few respondents insisted that the collaboration should not eliminate the existence of the day-to-day administering of healthcare services that will assist the public, but improve it with alternative digital services. As sustainable development in the healthcare system tends to encourage technology improvements that move the public to use online digital healthcare services, and as a result, the patients get limited options, as some prefer face-to-face services.

In conclusion, the writer reviewed all questions and portrayed the response as shown above. It is clear from the respondents that there is importance and challenges of sustainability in the healthcare services. Despite the challenges faced by the researcher during data collection through the questionnaire method, the respondents were active and able to assist with information. In addition, the structure of the questionnaire was short in order to allow the respondents to save time and be collaborative.

The interview method is a method of data collection that allows the researcher to collect in-depth information and primary data through the conduct of an interview that involves personal conversation (Saunders et al., 2009). Similarly, the method is significant as it is less costly and facilitates the analysis process in the research study. In the collection of data, the researcher got an opportunity to conduct a few interviews with the managers who have experience in the field of healthcare and sustainability. The researcher conducted a few interviews with the managers working in the healthcare sector, such as the University Hospital Frankfurt-am-Main, the Charité University Hospital, the University Hospital in Düsseldorf, and the Helios Hospital Berlin-Buch Buch to ask questions regarding the collaboration between healthcare facilities and sustainability in ensuring proper public healthcare management and the customer service efficiency. The selection of the managers was based on the skills they had and the field of specialization that related to the research study. Moreover, the researcher got an opportunity to ask more about the future of sustainable healthcare services and how the healthcare facilities are prepared to catch up in order to satisfy the public with better operational services. Furthermore, the researcher managed to talk and get a response from the healthcare experts and companies regarding the research study.

Grounded theory qualitative research is an inductive methodology that involves the gathering of data, evaluation, and developing a theory (Kolb, S.M., 2012). It enables the collection of data at a wide range, and the theory tends to adapt to the research study. The researcher used the theory during the research process while conducting the interview method. During the interview process,

the researcher obtained data that will be described, and anonymity will be taken into consideration as the medical expert from The University hospital Frankfurt-am-main will be respondent 1, the medical expert from The Charité University Hospital will be respondent 2, the medical expert from The university hospital in Düsseldorf will be respondent 3, and the medical expert from The Helios Hospital Berlin Buch will be respondent 4. Also, the template showing the response to the questions is shown in the appendix, and the following was the analysis. Furthermore, the researcher managed to have an interview with the mentioned medical expert to understand more regarding the healthcare sector conditions and future goals, challenges, opportunities, and in relation to the collaboration with sustainability in ensuring proper public management, customer service efficiency, aiming to satisfy the public.

Sustainable healthcare services are an essential criterion for public health management, and healthcare services innovation has several benefits. Moreover, it can encourage more sustainable development in public health management and improvements. The researcher summarized the questions for an interview session to obtain data comfortably and easily.

Table 2

Respondents to the interview questions

Interviewed the best healthcare centers' sample of managers and professors	Identified in analysis as
The University hospital Frankfurt-am-main	Respondent 1
The Charité University Hospital	Respondent 2
The university hospital in Düsseldorf	Respondent 3
The Helios Hospital Berlin Buch	Respondent 4

The University Hospital Frankfurt am Main is among the top hospitals in Germany, operating to ensure safety and proper medical care services located in Frankfurt.

It is a healthcare operation dedicated to providing accessible healthcare to the public and satisfying the patients. It is well organized and structured, offering consultation for a wide variety of treatments and healthcare, like cancer care. Various experts are working in healthcare, like the best doctors, professors, and cooperative healthcare workers. Moreover, the healthcare system tends to allow digital health to prevail through online appointments and online healthcare services like medicine ordering after consultation.

The healthcare system tends to observe sustainability in the healthcare system management and operations through the influence of the government in ensuring sustainable healthcare. The characteristics of the respondents from the University Hospital Frankfurt am Main in the interview method data collection regarding the research study about the importance and challenges of sustainability in the healthcare services in Germany include the demographic characteristics, female gender, socioeconomic status, and a good career as a professor supporting various health-related tasks in the hospital. She had behavioral characteristics of sustainable lifestyle choices by ensuring proper health care, nutritional lifestyle choices, and activism in a clean environment. However, due to the healthcare expert's insistence on remaining anonymous, the name was not included.

Moreover, the Charité University Hospital is ranked high in the world and famous in medicine, and training located in Berlin. It is the oldest public healthcare hospital in Berlin, aiming to provide proper healthcare services to the public. The teaching hospital has shone for several years with numerous successes in developing medicines and vaccines for various diseases such as cholera. Various experts are working in healthcare, like the best doctors, professors, cooperative healthcare workers, and medical students. The healthcare system tends to observe sustainability in the healthcare system management and operations through the influence of the government in ensuring sustainable healthcare and sustainable innovation, with an aim of developing modern medicines and vaccines through modern teaching using advanced technology. The characteristic of the respondents of the Charité University Hospital in the interview method data collection regarding the research study about the importance and challenges of sustainability in the healthcare services in Germany is that the gender of the professor and medical expert from the Charité University Hospital was a male gender, with a high position of employment status and occupation in medicine studies. He had healthy and positive lifestyle choices with high motivation, and personality traits of going towards change and improvement to make the world a better place, and ensure proper public health management. However, due to the healthcare expert's insistence on remaining anonymous, the name was not included.

Furthermore, the university hospital in Düsseldorf is a medical hospital offering public health services, and it is located in Düsseldorf. The healthcare system tends to observe sustainability in the healthcare system management and operations through the influence of the government in ensuring sustainable healthcare. It offers various healthcare services such as treatments, consultancy, and care. The characteristics of the respondents of the university hospital in Düsseldorf in the interview method data collection regarding the research study about the

importance and challenges of sustainability in the healthcare services in Germany are that the gender is female, with a middle age range, and with occupation status a nurse with high motivation in ensuring sustainable health care services. However, due to the healthcare expert's insistence on remaining anonymous, the name was not included.

In addition, the Helios Hospital Berlin Buch is located in Berlin, offering various public health services and medical services such as clinical services, treatments, and care services. The healthcare system tends to observe sustainability in the healthcare sector management and operations through the influence of the government in ensuring sustainable healthcare. The characteristics of the respondents of the Helios Hospital Berlin Buch in the interview method data collection regarding the research study on the importance and challenges of sustainability in the healthcare services in Germany are the respondent is a male with the socio-economic characteristic of occupation as a doctor, with a healthy lifestyle choices and positive attitude towards sustainable innovation in the healthcare services and highly motivated to ensure proper public health care management. However, due to the healthcare expert's insistence on remaining anonymous, the name was not included.

The interview question findings are based on the questions

1. The existence of the collaboration between the healthcare services facilities and sustainability

   The question regarding the topic was formulated as follows:

   Does the collaboration between sustainability with healthcare services in ensuring proper public management and customer service efficiency exist?

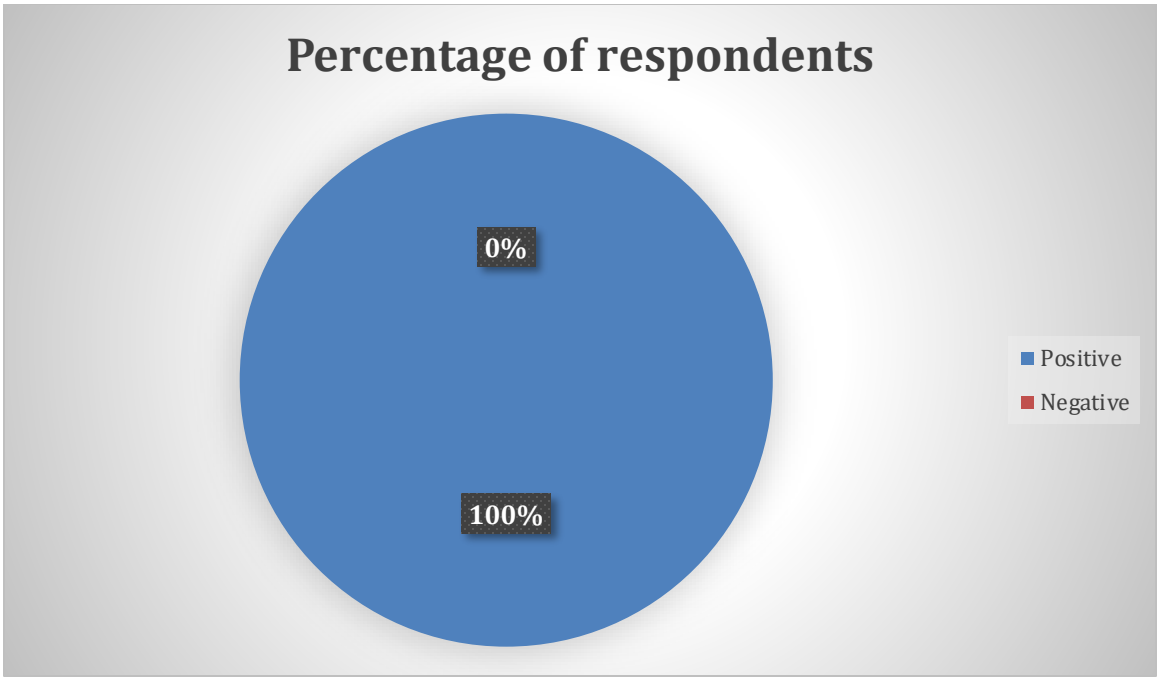


Illustration of Figure 12 illustrates the opinion of the respondents regarding the intergration between sustainability and healthcare services.

The illustration of Figure 12 about the response regarding the collaboration between sustainability and healthcare services in customer service efficiency and proper public management from all the interviewees who are currently working in the healthcare services companies selection was in agreement that the healthcare services and sustainability do collaborate in ensuring customer service efficiency and proper public management.

2. The way healthcare services companies and sustainability collaborate in ensuring customer service efficiency.

The question regarding the topic was formulated as follows:

Do the healthcare services and sustainability facilitate customer service efficiency and proper public management, and how?

The answers to this question from the respondents were that there is collaboration, but differed on how the collaboration is made by the sustainability and healthcare services company in ensuring customer service efficiency and proper public management. The first respondent gave out how the sustainability and healthcare services companies collaborate in ensuring customer service efficiency and proper public management is through the use of sustainable technology that allows the public to make online purchases, such as medicines, through digital payments.

Moreover, the first and second respondents gave out the example of digital healthcare services as proof of the existence of the collaboration between the healthcare services facilities and sustainability through sustainable technology developments that have massive investments in shaping the healthcare system. Furthermore, the fourth respondent pointed out the way the collaboration is made by the corresponding healthcare service facility and sustainability through policy formulation, implementation, public and environmental involvement. Similarly, the third respondent insisted that the collaboration between the two parties is positive and aims at improving customer service efficiency and proper public management by integrating digital services and proper data storage through sustainable development.

3. The opinion regarding the collaboration between sustainability and the healthcare facilities in ensuring customer service efficiency and proper public management

The question regarding the topic was formulated as follows:

What is your opinion regarding the sustainability of healthcare services in customer service efficiency and proper public management?

The response to this question from all respondents differed due to individual views about the collaboration between the sustainability and healthcare services in ensuring customer service efficiency and proper public management. The first respondent had an opinion specifically based on working in the healthcare facility regarding the collaboration between sustainability and healthcare services as an improvement step towards customer service efficiency and proper public management enhancement. Moreover, the second respondent viewed sustainability emergence in the health care services as a change in the health care sector at the operational level and service provision. Therefore, the healthcare service facilities have to get along by adopting digital technology and enter into collaboration with sustainability in order to gain market confidence and facilitate customer service efficiency and proper public management. Next to that, the fourth respondent viewed sustainability in the healthcare services as an improvement change to the healthcare system rather than a competition. Since the healthcare companies have various trends used in service provisions, such as digital health medical services, such as insurance, pharmacy, and consultancy, using apps and websites that allow customers to have accessibility and reduce costs, such as operational costs and time costs.

4. Challenges towards the collaboration between the sustainability and the healthcare services facilities in ensuring customer service efficiency and proper public management.

The question regarding the topic was formulated as follows:

What are the challenges faced between the sustainability and the healthcare services facilities in ensuring customer service efficiency and proper public management?

The feedback for this question from the interviewees was slightly similar at the operational level, and in contrast, due to the difference in companies and healthcare services rendered.

Respondent 1 pointed out the proper waste management as a challenge towards the integration between the healthcare services and sustainability in ensuring customer service efficiency and proper public management. Since the healthcare sector needs to ensure proper environmental practices, which come along with high costs and regulatory practices. Similarly, respondent 2 pointed out that the challenges facing the healthcare services during the integration with sustainability are the regulations set that tend to limit healthcare services, and more regulations need to be put in place in order to stabilize the healthcare sector. Moreover, respondent 1 insisted that the collaboration between the healthcare services and sustainability faces various challenges at an operational level due to the existence of regulations. Therefore, the regulations tend to limit the healthcare services companies in operating towards ensuring customer service efficiency and proper public management. Lastly, respondent 4 mentioned the challenges of the healthcare services rendering while integrating with sustainability in customer service efficiency and proper public management as challenges in data management, sustainable innovation implementation, and awareness among the employees and the public. The adoption of new sustainable technology leads to hardship in understanding and keeping up with the digital healthcare services and sustainable healthcare services by moving from the traditional process.

5. Recommendation regarding the improvement of the integration between sustainability and healthcare services in ensuring customer service efficiency and proper public management.

The question regarding the topic was formulated as follows:

Please suggest the recommendations to be made in order to improve the integration between sustainability and healthcare services in ensuring customer service efficiency and proper public management.

The interviewees completed the questions by pointing out recommendations that will facilitate improvement in customer service efficiency and proper public management through the collaboration between healthcare services facilities and sustainability by answering the above question. Respondent 1 suggested that the provision of training and education to employees would facilitate several improvements in the collaboration between the sustainability and healthcare services in ensuring customer service efficiency and proper public management in order to make an impact and understand the current technology trends, since innovations are

gradually changing. Moreover, the customers should be given proper training on how to cope with the service changes and digital healthcare services, as some fail to understand, leading to an accumulation of errors. Next to that, respondent 2 emphasized the importance of teamwork by forming proper teams, engaging with the public, and making further emphasis on critical decision-making and the use of proper communication skills. Lastly, respondent 3 recommended that the government should support and aid further in ensuring sustainable healthcare services and facilitate innovation that will enable customer service efficiency and further innovations.

The observation method is a primary method of data collection that involves data gathering through observing things around us, it can be through structured or unstructured and planned with awareness that people are being observed or unpanned (Mazhar et al., 2021). During the conduction of the research, the researcher used the observation method to collect data for analysis regarding the importance and challenges of sustainability in the healthcare services in Germany. The researcher observed that Germany is among the leading countries with proper healthcare facilities, systems, and services. The healthcare system in Germany tends to prioritize customer service satisfaction by ensuring continuous improvements through investing in technology. Moreover, the observer noticed that sustainability is taken into consideration during the healthcare management as the country ensures proper waste disposal in the healthcare facilities and the public in General to ensure proper public health management. The characteristics of the respondents participating in the research study regarding the importance and challenges of sustainability in the healthcare services in Germany are based on random selection and observation in the location. The researcher made the observations in various medical healthcare centers by focusing on social workers' traits, professors, medical students, the public using the healthcare services, the environment, and other healthcare workers, such as pharmacy and hospital workers.

All the respondents had a positive collaboration and assisted the researcher in obtaining the data regarding the importance and challenges of sustainability in the healthcare services in Germany. Figure 9 shows that there is an existence of collaboration between healthcare services and sustainability in ensuring customer service efficiency and proper public management. Moreover, Figure 10 shows that the use of digital health services led to improvements in customer service efficiencies, time management, and cost reduction through the collaboration between sustainability and healthcare services. Furthermore, the collaboration between the two parties faces various challenges at an operational level due to the differences

in policies, goals, and structures. Similarly, the regulations made by the government are seen as a challenge to operating freely. Lastly, the results show that there was collaboration and the importance of sustainability in the healthcare services. The respondents (table 2) gave out the data regarding the collaboration between sustainability and healthcare services, and the future of the collaboration is seen to be in continuity due to technology development and an increase in customer demands due to simplification of tasks, such as online digital healthcare instead of the manual healthcare process.

The Secondary data collection method was used during the research study regarding the importance and challenges of sustainability in the healthcare services to analyze the already used information for the purpose of gathering accurate insights into the research objectives (Saunders et al., 2009). Moreover, the secondary data collection method will discuss the significance of the research questions and existing literature on the subject. Relevant tables and figures will accompany the data to aid in demonstrating the key finding. In summary, this section will provide a comprehensive understanding of the influence of sustainability in healthcare services from the perspective of a healthcare expert and consultant. The study's findings will be discussed in comparison to the literature review and the objectives.

During the data presentation process of the secondary data collection method, the researcher searched several journal articles aiming to find out the relevant articles to the study after screening and proper selection. The researcher found the studies focused on sustainability, healthcare, and innovation. The identified relevant articles in the literature review studies focused on the process of sustainability in healthcare. They included these studies in their content and thematic analysis to synthesize qualitative evidence, as shown below in the table of relevant articles. The researcher's study aims to assess the influence of sustainability on the success and performance of the healthcare services and identify best practices for successful collaboration between government, healthcare facilities, and the public. They selected academic articles focusing on sustainability in healthcare services to achieve the aims. The study's findings will detail the opportunities and challenges facing sustainability in healthcare services. The study will also examine emerging themes of interest in sustainable healthcare service activities. The selected articles include various studies, such as empirical studies and review articles. The selected articles include various studies, such as empirical studies and review articles. The researcher's literature review focuses explicitly on the emerging themes of interest in sustainable healthcare services. The researcher hopes to identify the patterns that will aid in research and practice by examining the studies. Generally, the

researcher used a systematic process to select relevant academic articles for their study on sustainability in healthcare services. The researcher screened many articles and selected the ones that would be most useful in achieving their research objectives. The relevant articles are listed below as follows

Table 3: The relevant articles

Article	Author	Content
The environmental footprint of healthcare: a global assessment	Lenzen et al.(2022)	Assess the importance of healthcare services and their impacts on the environment
Environmental sustainability and the carbon emissions of pharmaceuticals	Richie (2022)	Elaborates on Environmental sustainability and the carbon emissions of pharmaceuticals
Overcoming fragmentation in health care: chronic care in Austria, Germany, and the Netherlands.	Nolte (2012)	Discuss the approaches to overcoming fragmentation in the healthcare.
Social sustainability reporting and board structures in the healthcare industry	Adamu & Tyasari (2022)	Analyze the structures that trigger social sustainability reporting in the healthcare industry
A framework for measuring sustainability in healthcare systems.	AlJaberi et al. (2020)	Measurement of sustainability in the healthcare systems.

Advancing Environmental Sustainability in Healthcare	Badanta et al. (2025)	Assess the environmental sustainability in healthcare.
Innovations in healthcare	Flessa & Huebner (2021)	Analyze the innovations in healthcare.
Decision-making model for more effective decision-making by healthcare managers.	Guo (2020)	Identifying the essentials of decision-making practices in healthcare management.
Sustainable healthcare design: Existing challenges and future directions for an environmental, economic, and social approach to sustainability	Sagha et al. 2016)	Provides information about the energy consumption of healthcare facilities and identifies barriers to sustainability.
Sustainable healthcare system: Providers' initiatives for quality improvement of healthcare organizations	Sharma & Tripathi (2024)	Analyze the initiatives for quality improvement of healthcare organizations
Exploring Sustainability and Efficiency Improvements in Healthcare	Vasileiou et al. (2024)	Asses Sustainability and Efficiency Improvements in Healthcare

The analysis involved an in-depth content and thematic analysis of the empirical studies identified in the literature search as relevant to the study from the literature search regarding the importance and challenges of sustainability in the healthcare services, which will provide details to answer each research question as summarized in the table.

Table 4: Summary of objectives and focus of the literature review

Objective	Focus
Assessing the importance of sustainability in healthcare services	Sustainability, stakeholder roles, and engagement,
Identifying the challenges of sustainability in healthcare services	Policy and regulations, innovation

Sustainability in healthcare services improves processes and enables various benefits, such as proper public management and a clean environment. It is successful when there is engagement of the public, government, stakeholders, and the healthcare services management in implementing sustainable healthcare.

Based on the literature review analysis, the author discusses the essentials of sustainability in healthcare and the achievement of sustainable healthcare (AlJaberi et al., 2020). Sustainability innovation is essential in improving the quality of life of a human being, and it facilitates improvement in the healthcare sector in general (Flessa & Huebner, 2021). The assessment of the selected relevant literature and articles aligns with the research study goals to understand the importance and challenges of sustainability in healthcare services.

Sustainability and healthcare services integration tends to face various challenges such as policy and regulations that tend to be the challenge. Moreover, the advancement in technology and emerging innovations tends to be a challenge.

Based on the literature review analysis, the author discusses that healthcare services are essential to the public (Lenzen et al., 2022). However, it is associated with various impacts, such as carbon emissions to the environment, that tend to harm the health of human health. Moreover, the pharmaceutical industry is associated with barriers in reducing waste to ensure a clean environment due to medical and clinical services (Richie,2022). Therefore, the healthcare services need government support, shareholders, the public, and the healthcare internal working team to ensure waste reduction. The assessment of the selected relevant literature and articles aligns with the research study goals to understand the importance and challenges of sustainability in healthcare services. This analysis suggests that effective implementation of sustainability in the health care services depends on government supportive policies and regulations, incentives, a clear strategy, the use of technology, and stakeholder engagement and participation.

In addition, the study aims to assess the importance and challenges of sustainability in healthcare services. The success and positive performance of sustainability in healthcare lead to proper public health management. Therefore, sustainability is essential and useful in the success of healthcare services by optimal utilization of the resources available well and investment in advanced technology and innovation. When implementing sustainability in the health care services, the benefits and challenges need to be carefully considered to make a proper decision. Moreover, stakeholder involvement and engagement in sustainability, policy, and regulation have all been identified as important determinants of the success of healthcare services initiatives. The effectiveness of sustainability in healthcare services initiatives also depends on stakeholder participation. According t the literature review analysis sustainability is essential in the health care sector and it will enable future evolvement of the sustainable healthcare services and may support the development of more environmentally friendly infrastructure for public satisfaction and attract investment, provide employment opportunities, and boost the economies Although the literature examined for this analysis highlights the importance and challenges of sustainability in healthcare services, other factors should be considered when analyzing the interaction between sustainability and healthcare services, such as proper waste management and climate change.

During the social media analysis, the researcher used data visualization and reading insights from various Internet applications to collect data from public opinions and activities regarding sustainable healthcare services. Data and information visualization is the process that involves designing and using visual elements like charts, graphs, or maps to represent data, making it easier to understand, analyze. Moreover, it translates complex, numerical data and high-volume big data to a visual presentation that is easy to process and enables visual communication. The importance of data visualization is crucial because it improves understanding through visual presentations and faster analysis through identification of trends and patterns (Olowe et al., 2024). Besides that, the researcher used social media analysis by reading insights from Facebook, Instagram, and Twitter regarding sustainability integration with healthcare in general and sustainable healthcare services. Therefore, the researcher discovered through data visualization and social media analysis that sustainability is essential in the healthcare system in general, and through sustainable innovation, it will enable improvement in healthcare facilities, such as easy access through digital healthcare and proper waste management.
However, the sustainable healthcare services are costly to establish and maintain the administrative process. In addition, the researcher used a recent trend of Social media to collect

data due to the influence of globalization and growing consumer use. Therefore, it is an easily accessible and fast method to collect data regarding various topics, as the public shares various opinions regarding several topics.

In addition, the researcher used a recent trend of Social media to collect data due to the influence of globalization and growing consumer use. Therefore, it is an easily accessible and fast method to collect data regarding various topics, as the public shares various opinions regarding several topics.

The characteristics of the respondents participating in the research study regarding the importance and challenges of sustainability in the healthcare services in Germany using social media analysis are demographic characteristics of the respondents, including age above 18 years, and the researcher was inclusive in both gender and ethnicity to avoid bias. Moreover, the socioeconomic characteristics of the respondents are doctors, teachers, students, and the public in general, with employment status, housewives, and covering all social statuses from the rich, middle class, and the poor. The health-related characteristics of the respondents are that some had chronic conditions, some were on medication, some of them are in positive health status, and the public in general who use the healthcare services from time to time. This analysis suggests that effective implementation of sustainability in healthcare services depends on supportive policies and regulations from the government, incentives, clear rules and regulations, adoption of emerging technologies, and stakeholder engagement and participation.

4.3 Limitations

During the conduct of the data collection through the questionnaire method and the interview method, the researcher faced several problems, including the failure to attain in–depth information due to the company policy. Moreover, several selections of respondents were in denial of participation in the survey and interview due to time limitations and trust issues. Therefore, the researcher experienced hardship and barriers in attaining data to the extent of missing in-depth information on exact collaborations made by sustainability and health care services companies in ensuring proper public management and an increase in customer service efficiency. Furthermore, the conduct of the analysis was time-consuming and required assistance from various experts with researchable data in order to achieve the research objectives.

4.4 Recommendations Findings

From the survey, the findings are given below:

1. Sustainability is essential in the healthcare sector, as it has evolved healthcare services using innovation and technology, leading to high use of digital healthcare services
2. Sustainability is important and beneficial to the healthcare services in Germany
3. The German government tends to support and encourage sustainability in the healthcare services.
4. Sustainability in the health care services is integrated in the hospitals, insurance, pharmacy, social healthcare activities, and services.
5. The healthcare management provides awareness to the internal environment and the public regarding the importance of sustainability and implementation.
6. The public, employees in the healthcare and consumers are satisfied with the integration of sustainability in the healthcare services.

Chapter 5. Conclusions and Recommendations

This section summarizes the research findings, key insights, and implications for practitioners, including potential areas for improvement and best practices. Based on the findings, limitations of the study, challenges faced in the research, and the potential for further exploration of the topic, recommendations for future research will also be outlined.

5.1 Summary

It examines the importance and challenges of sustainability in healthcare services by using a case study of Germany. Furthermore, it identifies the role of sustainability in the success, performance, and development of healthcare services. The study on sustainability in healthcare services used a systematic approach to select relevant academic articles. The research mainly investigated the collaboration between healthcare facilities companies and sustainability in ensuring customer service efficiency and proper public management. The research had a hypothesis regarding the cooperation between healthcare facilities companies and sustainability. Moreover, the testing of the hypothesis was made during the research process using a qualitative method approach. As the hypothesis statement states ``It is hypothesized that the healthcare services and sustainability collaboration has facilitated the increment in customer service efficiency and proper public management''. Therefore, the testing of the hypothesis was done through investigation and in-depth literature review to come up with the validity of the statement based on the primary data collected from research methods such as the interview and questionnaire methods through a survey, and secondary data collected from the literature review the hypothesis is stated to be true. As the secondary sources provided several data points during the research study regarding the importance of sustainability and healthcare services collaboration, and the challenges faced during the integration. Similarly, the researcher concludes the hypothesis from the primary data collected from the questionnaire made through the survey method and the interviews of a sample of managers from several sustainability policymakers and healthcare companies. The respondents pointed out that the collaboration between sustainability and healthcare facilities has facilitated an increase in customer service efficiency and proper public management.

Moreover, the research study had the main research question that aimed to understand how healthcare services companies collaborate with sustainability in ensuring customer service efficiency and proper public management in Germany was answered through primary and

secondary data obtained by the researcher. In which the researcher obtained primary data through an interview process with healthcare workers and supervisors. The analysis in Chapter 2 showed that the respondents pointed out that healthcare companies integrate with sustainability in ensuring customer service efficiency and proper public management through several ways, such as offering sustainable services and ensuring environmental conservation during healthcare activities. The overall collaboration between the two parties is attached to the sustainable innovation process. Sustainable technology is forcing the traditional healthcare process to move towards digital to catch up with the innovative sustainable markets and improve customer service efficiency and proper public management with accuracy, good quality, and proper operational procedures.

The researcher took time and search various journal articles and used the relevant articles in Chapter 2. The process of viewing and reading various articles has aided in the data collection regarding sustainable healthcare services for the analysis process. The researchers organized and analyzed the selected articles by comparing and contrasting them, allowing for analysis and synthesis. They aimed to assess the influence of sustainability on the success, performance, and sustainability of healthcare services, identify the importance of sustainability in healthcare services, identify the challenges of sustainability in healthcare services, and identify best practices for successful collaboration between sustainability, government, and health care systems in ensuring public health satisfaction and sustainable development in general. Therefore, the researcher aimed to collect data regarding sustainable healthcare services. Furthermore, the study highlights that sustainability can improve healthcare services through innovations and proper resource management through sustainable innovation and resource management. However, implementing sustainability in healthcare services presents benefits and challenges; the government and stakeholder engagement are essential to ensure advancement in sustainable healthcare services.

Furthermore, the secondary data in Chapter 2 responded to the main research question that healthcare facilities, such as hospitals and pharmaceutical companies, are investing and integrating with various sustainability policies and goals to gain public confidence and facilitate customer value, such as quality, efficiency, and effectiveness. Therefore, the research objective was achieved as the researcher managed to understand and know how healthcare services organizations integrate with sustainability actions into customer service efficiency and proper public management in Germany.

The research also pinpoints the importance and challenges of sustainability in healthcare services in Germany while focusing on sustainability resource management and innovation.

The study also offers helpful advice for public administrators while carrying out sustainable healthcare services. As a result, the research adds to the expanding body of sustainable development in healthcare and offers insights into improved public health satisfaction. Also, the research conducted enabled the researcher to obtain data from primary and secondary sources to answer the sub-research question asking about the opportunities offered to healthcare service facilities in integration with sustainability. The opportunities offered to financial technologies to facilitate sustainable healthcare services are such as government investments in sustainable innovations and startups, so that they can come up with new ideas and innovations. In addition, from several in-depth interviews, it seems that the integration between healthcare services and sustainability is an evolutionary process in the healthcare sector, leading to increased public health value provision, customer service efficiency, and proper public management by providing suitable service, proper data management, and quick response through the use of information technology.

Similarly, during the analysis of Chapter 4, the researcher managed to answer the sub-question regarding the challenges faced while integrating healthcare service facilities and sustainability into ensuring customer service efficiency. Therefore, the researcher recognized regulations as among the main challenges between healthcare service facilities and sustainability in ensuring customer service efficiency and proper public management. Moreover, the speed of learning and teamwork to catch up with the change and operate in sustainable actions is also a challenge. Also, proper waste management to ensure sustainable healthcare services was among the major challenges discovered during the literature review and data collection process. In addition, Chapter 4 has revealed that the management of data is also a challenge, as healthcare is broad and provides various services to the public. Hence, the issue is how to manage the big data to ensure customer service efficiency and proper public management ends up as a challenge for healthcare facilities while integrating sustainability in various processes like digital health. Lastly, the researcher managed to achieve the research objective of understanding and knowing what the literature review sources hold regarding the collaboration between sustainability and healthcare services in ensuring customer service efficiency and proper public management through secondary data obtained from the literature review.

5.2 Alternatives

The alternatives for the case study about the importance of sustainability to healthcare services are training the employees and management about sustainability to create value in the

business. Therefore, the employees will have a clear understanding of the sustainability concept and improve productivity through creativity. Moreover, the company needs to invest in advanced technology to keep up with the customers' demands and needs. The company will generate numerous profits and attain a competitive advantage through the use of advanced technology (Flessa & Huebner,2021). Also, healthcare facilities and companies can opt to reduce waste. For instance, medical services should go completely digital using technology advancements from registration to payment receipt to reduce the use of paper and ensure sustainable development through environmental care. The recycling of waste is another option that healthcare facilities can use to minimize environmental degradation and pollution. For instance, medical services should recycle medical devices to reduce costs and dangerous waste in the environment. Also, the recycling of waste can be done using the reuse procedure, for instance, the reuse of clothes, especially cotton-based materials, and it can be done by proper dry cleaning services. This will reduce costs and enable the company to properly utilize the resources. In addition, the healthcare services, facilities, and companies can adopt a sustainable business strategy to reduce costs and utilize raw materials efficiently.

5.3 Recommendations

The first recommendation is that the healthcare sector should take a further step to start up an external sustainable action trend that will connect internal operations with it. Thus, healthcare companies will avoid several risks, such as operational risks, market risks, and credit risks associated with sustainability collaborations. Moreover, it is recommended that the government of Germany should play a big role together with the healthcare sector and sustainability in formulating various laws by agreeing with the intentions of safeguarding the public from risks such as data manipulation and theft while using the internet in making transactions and using digital health services.

Based on the results depicted in Chapter 4, the researcher suggests that healthcare facilities should put more effort into investing in sustainability. Public users tend to expect healthcare services to adapt to various innovations to keep up with the current market solutions. For instance, most pharmacies are limitedly open and sometimes closed, which brings an urgent need for digital healthcare services where they can order online first aid kits and other effective medical drugs to save lives through online sustainable healthcare services.

Healthcare management should take further steps in prioritizing stakeholder and government engagement to ensure proper planning, effective decision-making, optimal resource

management, creative design, efficient administration activities, and the implementation of sustainable healthcare to facilitate effective public health management. The study's findings and data analysis regarding the importance and challenges of sustainability in healthcare services lead to several recommendations for incorporating sustainability into healthcare services. Sustainability involves collaborating on the operation, innovation, financing, design, and resource management to execute sustainability in healthcare services. Also, promoting sustainability in the healthcare sector can help attract investment increment, create employment opportunities for the public, and economic growth while facilitating the development and implementation of sustainable healthcare services and sustainable technologies in the healthcare sector with an aim of reducing greenhouse gas emissions or promoting a sustainable environment for public use.

Likewise, it is recommended that healthcare services invest in and collaborate with sustainability policies. The reason for the collaboration is to facilitate further improvements in the provision of public services with the target of attaining efficiency, quality, and cost reductions. The limitations existing while using healthcare services need to be solved. For instance, customers need to have access to healthcare services from morning to midnight, at least by making a specific point to give access to the public in that neighborhood and enabling proper public health management. Similarly, based on the analysis of the data, it is recommended that healthcare facilities should not completely move to digital through the Internet and digital innovations. Since some patients or customers in need prefer meeting the customer help desk for information, instructions, and healthcare services, to avoid errors and feel safe. Moreover, it was recommended that training and education should be provided to the public and employees regarding sustainable healthcare to enable the collaboration between the healthcare services facilities and sustainability actions, and ensure customer service efficiency and proper public management.

The solution and the recommendation of the healthcare service facilities are to modify their strategy and include sustainable development in the organization to keep up with the public demands. Moreover, the organization should encourage positive relations between the customers and the employees to ensure customer value. Also, the organization should encourage internal and external training to encourage awareness, build a positive brand, and ensure proper public health management. The technology involves various methods, systems, and devices that are a result of inventions from scientific practices (Flessa & Huebner,2021). The advantages of technology are time management and effective communication. However, the disadvantages of technology are costly, and the healthcare sector needs to increase

investment in technology and innovation. Also, it is accompanied by risks and uncertainties that lead to mismanagement. The additional recommendation plan for the case study about the importance and challenges of sustainability in healthcare services is to use advanced technology to improve the supply chain in various aspects, like just-in-time delivery and increasing customer engagement.

Moreover, the advanced technology will enable healthcare sector facilities to achieve a competitive advantage over other competitors in the same field that have no advanced technology and do not practice sustainability in their operations, supply chain, and service administration. Furthermore, the company will train the employees on how to use the advanced technology of recycling and sustainability to improve the production process (Chams & García-Blandón,2019). Also, the company needs to improve its business strategies by including sustainability in its healthcare services and its supply chain systems. In addition, the organization needs to encourage efficiency in management and proper planning to reduce costs during healthcare management. The costs incurred during the healthcare services process can be reduced through the process of recycling clothes and reusing materials to reduce waste, damage, and pollution.

The company should use cost-saving techniques by reducing unnecessary costs during business operations. Lastly, the researcher recommends further studies to be made on the research topic about the assessment of the sustainability influence on the healthcare services markets and systems. The researcher recommends further studies to be made on the research topic about the assessment of the sustainability influence on healthcare. The researcher came up with the idea during the conduct of the research study and identified the potential of sustainability in healthcare services in ensuring customer service efficiency and proper public management.

In addition, as a result of the study findings, the study recommends that other future researchers consider conducting longitudinal studies to assess the long-term impact of sustainable healthcare impact to the public in Germany, as the advancement of technology is continuously ongoing. Therefore, they should explore the role of the government in sustainable healthcare services to provide insights into government policy and ways to benefit and satisfy the public.

5.4 Implementation plan

The implementation plan for sustainable healthcare services to improve the healthcare services quality, and the supply chain using advanced technology and sustainability will involve proper

planning and management for the healthcare services companies and facilities to ensure the attainment of gains. Moreover, the healthcare company needs to improve engagement between the customers and the employees to enable effective communication that will improve the supply chain management concerning sustainability. Also, the company will involve itself in various advertising and marketing activities to improve recognition of the company's commitment to observing sustainability during business operations and production. The customers will value the healthcare services efforts as a result of an increase in awareness about sustainability in public health. Furthermore, the company needs to use technology to research and develop the firm through the comments and data collected from the market. Lastly, the company needs to ensure proper planning and budgeting to reduce costs.

Moreover, the other implementation to be taken into consideration in healthcare facilities is the implementation of sustainable human resource practices. Sustainable human resource practices tend to involve implementing green human resource policies, such as reducing paper usage or implementing virtual expat assignments, to help organizations reduce their energy consumption and greenhouse gas emissions. This cannot only benefit the environment, but it can also save the healthcare facility business money.

Sustainable healthcare involves the collaboration between government bodies, healthcare sector entities, and the public to develop and manage healthcare services to achieve mutual benefits. The relevant stakeholders, including the public, healthcare experts, government officials, and other interested parties, should be identified and encouraged to participate in sustainable healthcare services. Participating in the planning and execution of sustainable healthcare services with these stakeholders can help ensure that the project's goals align with the interests and expectations of these stakeholders. Stakeholders' involvement may also contribute to increased sustainability implementation and participation in the public. By including stakeholders, projects may be improved by fostering teamwork and the development of shared purpose. Additionally, they should make sure that decision-making is transparent and that stakeholders are kept up to date on the project's status. Building trust and ensuring that initiatives satisfy community requirements may be achieved through effective communication channels. Therefore, the use of sustainable resource management in healthcare can also utilize exact measurements to cut waste. Therefore, Sustainability is essential, and it should be integrated into healthcare services improvement and innovation, and be environmentally conscious in public health (Flessa & Huebner,2021). Finally, incorporating sustainability into the healthcare service management criteria can help enhance transparency and accountability in public health.

5.5 Future studies

The study was mainly done regarding the importance and challenges of sustainability in healthcare services, but there are many other scopes available to study in the near future. Concisely, some potential future research scopes remain undone, such as sustainability waste management in healthcare management, and sustainability and healthcare procurement. In addition, the researcher proposes that future studies should conduct further in-depth studies regarding sustainability in healthcare projects that will continue to occur based on the timeline that impacts the public both positively and negatively, to ensure proper public management. Future research may use a proper strategy for data gathering over a prolonged period and assist in an in-depth study. Researchers will be able to account for the progress of sustainable healthcare services by gathering information from both modern and historical sources using a proper strategy. This strategy would gather both qualitative and quantitative data, allowing researchers to confirm their findings and draw their conclusions. This strategy would provide insightful information on how sustainability affects patients' access to healthcare services, quality of life, and overall satisfaction with digital city initiatives. Researchers might discover other areas for development in sustainability in healthcare service activities by considering the public viewpoints through the demand and supply in the market.

Despite the limitations and delimitations of the current study on sustainability in healthcare services, valuable insights were gained. The researcher suggested that future studies might improve this study by using other research methods and methodologies to provide more details regarding the subject using a proper strategy and mixed methods research, both qualitative and quantitative data approaches. Also, the researchers will attain more knowledge regarding sustainable healthcare services using advanced technology, optimized resources, and proper planning to achieve gains and success.

The relevance of the case study about the importance of sustainability to the healthcare services supply chain and quality to society is the importance of the ongoing campaigns regarding sustainability and environmental conservation. Also, the case shows the lessons faced by healthcare service facilities while adapting and implementing the sustainable supply chain, technology, and various issues and limitations during the implementation of sustainability and environmental conservation. Also, the case shows the lessons faced by healthcare service facilities while adapting and implementing sustainable healthcare service systems, and it relates to companies facing various issues and limitations while implementing sustainability in the

business because they need to observe sustainable ethics, over high costs that result in incomplete plans (Chungyalpa & von, 2025). Moreover, when the healthcare sector implements sustainability in the supply chain management, the costs will be reduced, and environmental pollution will decline as a result of recycling and reuse, especially of cotton materials.

In conclusion, sustainability is essential, and healthcare services company benefits from its adoption through recognition and increasing profits as a result of high demand and supply. This research study aimed to conduct research and analysis about the importance and challenges of sustainability in healthcare services in Germany. It goes in-depth by reviewing various literature and article sources to discover more about sustainable healthcare services from the existing literature and answer the research questions. Furthermore, the study provided evidence through various data collection methods that sustainability is essential and improving healthcare services despite the minimal challenges associated with the procedure of attaining sustainable healthcare service provision. Moreover, supply chain management in the healthcare sector is considering sustainability by enabling waste reduction and cost minimization. The sustainability process is essential for the company's success and gains through creativity and the use of advanced technology. It enables the healthcare company to improve relations with both the internal environment (the employees) through motivation and positive actions by working in a sustainable company. Furthermore, the organization aims to ensure proper relations with the external environment (customers and society) to achieve a competitive advantage through customer satisfaction. Moreover, the healthcare management integration with sustainability leads to an increase in the productivity of goods and services, proper communication, and an increase in profits as a result of just-in-time delivery and a sustainable healthcare supply chain. Lastly, sustainability is essential in the healthcare organization's operations because it enables the company to cut down costs, such as over-supply costs, and properly utilize the available resources.

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Questionnaire questions

Research methods (Data collection)Questionnaires through SurveyMonkey to the public, who are mainly healthcare service users.

1.What is your gender?

A. Female

B. Male

2 Is the collaboration between healthcare services and sustainability in the healthcare satisfactory in ensuring customer service efficiency within the country?

F. Very satisfied

G. Satisfied

H. Neither satisfied nor dissatisfied

I. Dissatisfied

J. Very dissatisfied

3 How well do healthcare facilities and sustainability collaboration facilitate proper public health management?

F. Extremely well

G. Very well

H. Somewhat well

I. Not so well

J. Not at all well

4 What are the limitations faced by the healthcare services institutes and facilities while ensuring sustainability?

5 The collaboration between sustainability and healthcare services will reduce waste disposal and ensure proper resource management

E. Strongly Agree

F. Agree

G. Neutral disagree

H. Strongly disagree

6 What are the opportunities offered in healthcare services to enable sustainability growth?

7 What improvements need to be made in ensuring public healthcare service efficiency by the healthcare services institutes while undertaking sustainability measures?