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Advancing Environmental Sustainability in German Hospitals:

Challenges and Practices

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Nora Johanna Suessenguth

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Abstract

This study focuses on the German healthcare sector, more specifically on German hospitals. In Germany, the healthcare sector is responsible for 5.2% of the national greenhouse gas (GHG) emissions and therefore has a substantial impact on environmental sustainability. Despite growing awareness about the importance of minimising their environmental impact, this aspect is still often neglected. Limited pressure and support, limited financial means, the difference of priorities in the healthcare sector, such as high quality patient care, and lack of knowledge about environmental management in hospitals are known reasons for this. Despite these barriers, a few hospitals in Germany have been able to dedicate resources to address environmental sustainability. This study aims to provide practical insights for hospital management and enhance understanding of how hospitals in Germany can advance in environmental sustainability despite the multiple barriers they face. Three research questions are addressed: (1) What actions are hospitals taking to improve their environmental sustainability? (2) What challenges do hospitals face in implementing these actions? (3) What practices enable hospitals to overcome these challenges and advance in environmental sustainability?

This study draws on three theoretical frameworks regarding governance, development, and organisational change. To analyse how hospitals can advance in environmental sustainability based on these frameworks, the adaptive capacity needs to be examined, which determines how well an organisation is able to respond to changes and implement change initiatives to progress towards sustainability. Therefore, change initiatives of hospitals are examined, as well as four dimensions shaping the implementation of these initiatives: strategy making, organising processes, management capabilities and relational assets, thereby highlighting the challenges of implementation.

For this study, a multiple explanatory case study design was adopted. Data were collected via semi-structured interviews with people in four German hospitals whose task is to address sustainability, and with one managing director of an overarching organisation, linking the healthcare sector to sustainability. Findings were identified via thematic analysis. Three domains, with eight themes and various subthemes, categories, and codes were identified. Domain 1 (sustainability actions) includes theme 1: change initiatives, domain 2 (challenges in implementation) includes themes 2–5: strategy making, organising processes, management capabilities, and relational assets, and domain 3 (enabling practices) includes themes 6–8: establishing structures, collaboration and knowledge sharing, and openness to alternative approaches.

First, sustainability actions were identified. They include initiatives to reduce environmental impact, change behaviour, increase resilience, and assess the environmental impact. Then, several challenges in implementing initiatives were identified within the dimensions of strategy making, organising processes, management capabilities, and relational assets. They include lack of external pressure and support, lack of knowledge, time, and personnel, organisational complexity, lack of funding, difficulty to change behaviour, and the competition of environmental sustainability with hygiene and patient safety. Finally, enabling practices to overcome these challenges were also identified. They include establishing structures within hospitals, engaging in collaboration and knowledge sharing with external and internal stakeholders, and openness to alternative approaches. These practices were found to improve implementation of change initiatives, which could impact the adaptive capacity of a hospital, leading to them being able to advance in environmental sustainability.

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Chapter 1: Introduction

1.1 Research Background and Justification

Hospitals considerably influence sustainability (McGain & Naylor, 2014; Seifert et al., 2020; Weimann & Weimann, 2022), which consists of three pillars: economic, social and environmental sustainability (Alhaddi, 2015). While all hospitals are forced to focus on economic and social sustainability due to the context in which they operate, environmental sustainability often gets neglected (Seifert & Guenther, 2020). Their impact on the environment, however, is substantial (McGain & Naylor, 2014; Seifert et al., 2020; Weimann & Weimann, 2022). In Germany, the healthcare sector is responsible for 5.2% of total national carbon emissions (*CO2-Fußabdruck*, n.d.), they are the fifth largest waste producer, producing seven to eight tons of waste per day (Lenzen-Schulte, 2019), and use 300–1000 litres of water per day, per patient (Braun et al., 2015). Therefore, they exert a considerable environmental footprint, significantly contributing to climate change (McGain & Naylor, 2014; Seifert et al., 2020; Weimann & Weimann, 2022).

Climate change, in turn, affects the healthcare system in a variety of ways, from extreme weather events, such as heat waves that lead to heat strokes, to disruptions in food systems, to the emergence of new diseases (*Climate change*, n.d.; Seifert & Guenther, 2020). Environmental pollution, wellbeing and community resilience impact hospitals and their ability to effectively care for patients. Therefore, mitigating air pollution, achieving food security and promoting healthy lifestyles also have co-benefits for the healthcare sector (Karlsson et al., 2020; Kingo, 2019). Clearly, given that the primary goal of any hospital is to ensure both short- and long-term patient safety, there is a pressing need for hospitals to actively address a wide range of environmental concerns. Within the broader remit of environmental sustainability, at least three distinct roles of the healthcare sector can be identified: minimising the environmental impact of their internal operations (Seifert & Guenther, 2020), being resilient in the event of disasters, and supporting sustainability initiatives with clear human health benefits in their locality (Bundesministerium für Gesundheit, 2021).

Despite growing awareness of environmental sustainability, hospitals often struggle to prioritise it and evidence suggests that most hospitals in Germany and internationally, are not dedicating sufficient resources to address it (Seifert & Guenther, 2020). According to current research, there are multiple reasons for this, which will be presented in more detail in chapter 2. First, while there is abundant policy support and guidance for integrating environmental sustainability into businesses, there is relatively little that address hospitals or the healthcare sector (Dettenkofer et al., 2000;

Levsen & Filser, 2022; Seifert et al., 2020; Triguero et al., 2016). The few guidelines that exist and directly encourage hospitals to minimise waste, and energy and water consumption, only provide limited means and tools to support hospitals in developing these practices (Seifert, 2018). Secondly, health authorities are not involved in political decision-making (Bickler et al., 2020), nor is the government invested in the day-to-day business of healthcare, as most of the responsibilities are directly delegated to the hospitals (Weimann & Weimann, 2022). Third, the German healthcare system prioritises optimal healthcare over environmental concerns. With regard to sustainability, their focus has been to ensure disaster resilience and access to healthcare (Bundesministerium für Gesundheit, 2021). Fourth, hospitals face increasing financial pressures and limited funding for environmental actions (Seifert, 2018; Seifert et al., 2020), forcing them to prioritise financial considerations alongside high-quality patient care over environmental sustainability (Seifert et al., 2020). Finally, in addition to experiencing low political pressure to address environmental concerns, hospitals also experience little pressure from external and internal stakeholders. The opinions of patients, media, or competitors regarding hospitals' environmental actions are largely irrelevant because hospitals operate outside typical market dynamics, making the concept of competitive advantage inapplicable (Seifert & Guenther, 2020; Seifert et al., 2020). Moreover, employees favour providing best possible healthcare, instead of environmental concerns (Guetter et al., 2018; Pinzone et al., 2015; Seifert, 2018). All in all, there is little motivation for hospital management to address environmental sustainability in addition to focussing on high quality patient care and financial sustainability (Seifert & Guenther, 2020).

Further limitations of addressing environmental sustainability arise from limited knowledge about environmental management in hospitals. To date, research on organisational sustainability has focused primarily on environmental management in commercial businesses, investigating a variety of different topics, ranging from barriers and drivers (e.g. Mabrouk & Ibrahim, 2021) to specific environmental management practices (e.g. Hassan et al., 2024), to managing sustainability transformations and development (e.g. Lahtinen & Yrjölä, 2019; Morioka & Monteiro de Carvalho, 2016). When investigating how to improve environmental sustainability in commercial businesses, it has been observed that various levels of sustainability exist. Businesses can be characterised according to certain criteria in order to assign them to a distinct level and indications exist on how they can advance from one level to the next (Benn et al., 2018; Edwards, 2009; Jacobsen et al., 2020). To investigate specifically how they can advance from one level to the next, Zollo et al. (2013) introduced a framework suggesting to analyse the business's change initiatives and four dimensions influencing the implementation of these initiatives (strategy making, organising processes, management capabilities, and relational assets). Together, they shape the adaptive capacity, which in

turn affects how well a business responds to change and implements change initiatives to advance in environmental sustainability.

Simultaneously, however, research suggests that hospital management cannot be equated with commercial management, indicating that environmental management practices that have been effective in commercial business settings may not be feasible for hospitals. Fundamentally, the drivers for environmental change and priorities within the healthcare sector differ from those in commercial businesses (Trisolini, 2002). For hospitals and their employees, quality patient care is always the highest priority (Seifert, 2018; Seifert & Guenther, 2019). Hospitals and commercial businesses differ in the way they are financed and operating structures also vary (Blümel et al., 2020). Hospital management personnel often have clinical experience as opposed to a business management background, while commercial business managers may lack the clinical experience and understanding of the operational needs and priorities within hospitals (Trisolini, 2002). These distinctions indicate that hospitals may face different drivers, opportunities and challenges for environmental sustainability than commercial business and therefore, require different skill sets and guidelines on how to advance in environmental sustainability.

Implementing environmental changes requires a fundamental shift in organisational culture, structure, and practices (Lahtinen & Yrjölä, 2019; Loorbach & Wijsman, 2013). This is suggested to be challenging, especially, when management is not familiar with managing such fundamental changes, as often is the case for hospital management (Seifert, 2018). Driving change within hospitals often revolves around improving healthcare directly, such as changing standards of care or responding to new diseases. These changes tend to be well received as their need is visible to healthcare professionals (Gabutti et al., 2023). However, sustainability concerns are uncertain, complex, resistant to simple solutions and consequences might not be directly visible (Lahtinen & Yrjölä, 2019; Loorbach & Wijsman, 2013). Furthermore, any changes implemented in hospitals could potentially harm patient care, as it disrupts the routine that is essential for optimal healthcare and therefore, could have far-reaching consequences on patient health (Seifert, 2018). Combined with the financial pressure, this presents a major challenge to implementing environmental changes while maintaining a hospital's core operations (Seifert, 2018; Seifert & Guenther, 2019).

To summarise, research indicates that the healthcare sector and sustainability are complexly intertwined. Furthermore, hospitals appear to prioritise economic and social sustainability over environmental sustainability. Three aspects that make up environmental sustainability have been

identified. Two of these aspects (resilience to climate related disasters and strengthening the community to benefit human health) are usually addressed by hospitals, while most hospitals appear to be struggling to address the third aspect: minimising their own environmental impact. While evidence shows that hospitals' environmental impact is substantial, German hospital management often neglects the topic due to the aforementioned barriers. A rich literature documents best practices and strategies for sustainable business management on how to address sustainability.

However, literature for hospital management is scarce. In addition, studies show that within hospital settings, driving environmental changes differs from implementing other, healthcare related changes. Yet, research to this point is lacking information about how specifically hospital management can integrate environmental management measures into their hospitals. In Germany, only a few hospitals to date have been able to dedicate resources to addressing environmental sustainability, in addition to economic and social sustainability. In these cases, management has initiated innovative measures to overcome barriers, often driven and coordinated by departments for sustainability. This study focuses on the German healthcare sector, and aims to understand how hospital management is able to overcome these systemic barriers by analysing management of four hospitals and one overarching organisation that links the healthcare sector with sustainability.

1.2 Research Aim, Contribution, Questions and Thesis Structure

This study aims to identify factors that allow hospitals to advance the level of environmental sustainability despite the context specific challenges facing the healthcare sector. Specifically, it aims to examine motivations for undertaking environmental initiatives, identify barriers, strategies and management practices that hospitals have taken to promote environmental sustainability despite their need to address financial sustainability and patient care. Drawing on the findings from case studies, this study intends to explore best practices which could be informative for hospitals, beyond the case studies analysed, to support integration of environmental sustainability. By conducting this study in the pragmatic research tradition, it aims to provide practical contributions as it may help hospital management operating in similar healthcare contexts navigate the transition to advance in environmental sustainability.

To achieve these aims, following research questions (RQ) will be addressed:

1. What actions are hospitals taking to improve their environmental sustainability?
2. What challenges do hospitals face in implementing these actions?
3. What practices enable hospitals to overcome these challenges and advance in environmental sustainability?

This thesis is structured as follows. Chapter 2 sets out the foundation for this research, reviewing environmental impacts of the healthcare sector. It also sets out the context of this study, which focuses on the German healthcare system. It further provides information on how the German healthcare system operates and on the drivers and challenges to sustainable healthcare practices. Then it reviews evidence and evidence gaps for implementing environmental changes and environmental management in German hospitals. Chapter 3 outlines the theoretical and conceptual framework, focusing on governance aspects for sustainability actions, development of organisations through multiple sustainability levels and the analysis of organisational change. Chapter 4 justifies the qualitative case-study design and presents the process of data collection, case selection, and analysis. Chapter 5 presents findings which emerged from the interviews, followed by a discussion in chapter 6 which is structured around the three research questions. The thesis concludes with chapter 7, which outlines practical contributions and recommendations.

Chapter 2: Literature Review

The relationship between health and sustainability is multifaceted, ranging from sustainability impacts of healthcare operations to the broader influence of sustainability practices, and environmental challenges on public health infrastructure and risks. In section 2.1 “Relationship between healthcare sector and sustainability”, this chapter first identifies and expands on these relationships and reviews sustainability issues, solutions, and practices in each of these domains (internationally and within the German healthcare sector). It then hones in on the German healthcare context in section 2.2 “Drivers, barriers and challenges to environmentally sustainable healthcare practices in German healthcare governance”. The section identifies how the healthcare governance context in Germany shapes drivers and barriers for environmentally sustainable practice. Subsequently, section 2.3 “Managing environmental change in hospitals” analyses the challenges in managing changes towards environmental sustainability. This chapter concludes by summarising challenges and gaps in evidence on the integration of environmental sustainability into the German healthcare sector.

Literature was sourced via three databases (Scopus, Google Scholar, and Massey University’s Discover database), along with hand-searching. Keywords were developed for two categories, the first category addresses environmental sustainability and the second one the healthcare sector. Searches were conducted within and between each category. Keywords in the first category included: environmental management, environmental sustainability, environmental impact, environmental change, change management, climate change, resilience, barriers to environmental sustainability. Keywords in the second category included: German hospitals, healthcare Germany, hospital management, healthcare, social determinants healthcare, sustainable healthcare practices. When the titles seemed fitting for this research, their abstracts were read, from which relevant papers were read in their entirety. Further relevant sources that emerged from those papers were also included in this research.

2.1 Relationship Between Healthcare Sector and Sustainability

This section explores the multi-faceted relationship between the healthcare sector and environmental sustainability, focusing on the impacts of healthcare operations and the role of resilience and community support in sustainability efforts.

2.1.1 Environmental Impacts of Healthcare and Mitigation Practices

Hospitals are at the forefront of healthcare delivery and therefore play a critical role in achieving global health, especially, since their environmental impact is significant (Seifert et al., 2020; Weimann & Weimann, 2022). Impacts include energy consumption, which is used for heating, ventilation, light, and equipment, such as washers and sterilisers, as well as water usage in the bathrooms, laboratory, cooling tower, washer, steriliser, and food preparation (McGain & Naylor, 2014). In Germany, hospitals consume an average of 23.41 MWh of electricity per year per hospital bed. The electricity required for heating alone is 29,000 kWh per bed, comparable to heating two single-family homes (González et al., 2018) and the average daily water consumption per patient is 300–1000 litres of water. This is more than three times higher than the average water usage in residential buildings in Germany (Braun et al., 2015). Other concerns are transport emissions for staff and patients and waste generation. The latter seems to be particularly important. It includes paper, plastic and infectious waste and goods, including pharmaceuticals and single-use items, which make up the largest contributor of hospital waste. In the past, the need for single-use products has grown, despite the concerning amount of waste they generate, because concerns about costs and infections regarding reusable items trump concerns over waste (McGain & Naylor, 2014). According to Sijm-Eeken et al. (2023), waste generation is mentioned most often when assessing hospitals' environmental impacts worldwide. They attribute this to the direct visibility of waste in hospitals, while other impacts, such as energy and water usage, are less easily observable and less noticeable. Although, the actual relative extent of these issues is difficult to assess because only limited data exist.

In Germany, the lack of mandatory reporting on environmental impacts has hindered hospitals' ability to track and address their environmental footprint (Quitmann et al., 2021). Quitmann et al. (2021) found that only 62 hospitals out of a total of roughly 1900 hospitals in Germany reported on their environmental impacts. The ones that did, usually only reported on directly caused emissions by the hospitals, while no hospital reported emissions generated along the supply chain. This absence of reporting poses a challenge, as it complicates the process of benchmarking hospitals and the extent of their environmental impacts, as well as identifying the optimal starting point for potential environmental initiatives. For now, the primary involvement of hospitals regarding environmental sustainability is still preparing for changing disease patterns, extreme weather events, and water and food insecurity (Kingo, 2019), instead of additionally, addressing and mitigating their own environmental footprint (Seifert et al., 2020; Weimann & Weimann, 2022).

2.1.2 Resilience of Healthcare in Context of a Changing Climate

While hospitals are significant contributors to environmental impacts, they are also on the frontlines of addressing the health related consequences of climate change. Climate change is considered to be the greatest health threat of the 21st century (Campbell-Lendrum et al., 2023) because it impacts human lives and global health (*Climate change*, n.d.). Climate change leads to extreme weather events, such as heatwaves, floods and storms. It also causes food systems to disrupt, introduces new diseases, facilitates the spreading of diseases and impairs the quality of air and drinking water. Worldwide, climate change is expected to cause a quarter million additional deaths per year caused by malnutrition, malaria, diarrhoea and heat stress between 2030 and 2050. By 2030, the costs directly related to health are assessed to be US$ 2–4 billion per year (*Climate change*, n.d.). In Germany, an increased occurrence of foreign diseases has already been observed due to the changing climate, such as dengue fever and zika virus. Furthermore, the pollen season is prolonged which triggers asthma attacks and in 2023, 3200 heat-related deaths have been recorded (Hepp & Hügler, 2024). This means that the direct consequences of climate change are already clearly visible, highlighting the need for change.

In addition to directly causing poor health, climate change also undermines the social determinants for good health. The aforementioned effects of climate change will affect the vulnerable and disadvantaged nations the most (e.g. developing countries), as they are not able to prepare for such weather events to the same extent as developed countries. This could lead to further poverty and inadequate housing, which in turn further deteriorates their health, creating a vicious cycle (*Social determinants*, n.d.; Tishman, 2017). This problem is reflected in the United Nations Sustainable Development Goals (SDGs). SDG 3 (good health and well-being) aims to improve global health, focusing on ensuring access to healthcare for everyone, minimising illnesses and deaths and strengthening healthcare in developing countries *(Ensure healthy lives*, n.d.). However, the SDGs neither directly address the healthcare sector or climate related effects, nor do they pressure hospitals to invest in reducing their own environmental impact, which would also contribute to achieving global health (Bickler et al., 2020).

Hospitals face the consequences of climate change directly by caring for the affected patients, which increases the need for action (Seifert & Guenther, 2020). When addressing resilience, hospitals in Germany focus primarily on heat protection. Two organisations, the German Medical Association (BÄK) and the German Alliance for Climate Change and Health (KLUG) launched a Heat Action Day in 2023. Since then, several hospitals have joined the initiative and raised public awareness of the

dangers that heat can pose to health. Furthermore, sample heat protection plans have been created, and all hospitals are called upon to create individual plans for their respective facilities (Osterloh, 2024). Currently, hospitals are trying to alleviate the consequences of heat with easily implemented means, such as ice-packs, fans and blinds (*Kliniken*, 2024). So far, however, the German healthcare system is not resilient enough to cope with the consequences and is not making a sufficient contribution to reducing the effects of climate change (Hepp & Hügler, 2024). To improve their resilience, Lenzen et al. (2020) suggest that hospitals have to adapt their healthcare delivery strategies not only by preparing for the changes in disease patterns, but also by offering social benefits to the communities they serve and reducing their own direct contributions to climate change.

2.1.3 Supporting Sustainable Communities as a Form of Preventative Healthcare

Prioritising environmental sustainability is associated with social and health benefits (co-benefits). Therefore, instead of only preparing to manage the aforementioned changes, mitigating one's own environmental impact to prevent further damage improves resilience and helps achieving global health (Menne et al., 2020). These co-benefits arise from mitigating air pollution, achieving food security and promoting healthy lifestyles among others, as they have potential to prevent diseases (Karlsson et al., 2020; Kingo, 2019) and result in emission mitigation, health improvements and cost savings for the healthcare sector (*Sustainable development,* n.d.). For example, as multiple studies show, promoting walking and biking instead of driving a car, results in lower environmental impact and better air quality, while also promoting higher physical activity, both leading to better personal health, which in turn reduces health related costs. Other co-benefits include the health benefits that occur from a plant-based and healthy diet (*Climate change,* n.d.; Karlsson et al., 2020; Kingo, 2019) and enabling adequate housing. This impedes pests and mould that can trigger respiratory diseases, and simultaneously improves energy efficiency (Tishman, 2017). Thus, in addition to the direct health benefits of quality care, hospitals also provide social and health benefits to the communities when promoting environmental actions (Lenzen et al., 2020), which in turn improve the social determinants for good health (Cronin et al., 2022). Cronin et al. (2022) also observed that in the United States, hospitals collaborate with local schools to improve health and lifestyle education, promote buying locally produced and healthy food, donate excess food, and support adequate housing for low-income patients. All of this can strengthen the health status of the local community and impact climate change. This reinforces the need for hospitals to concentrate on community

support and climate control to strengthen the healthcare system and prevent diseases induced by climate change, as this will be of environmental, social and financial significance.

In Germany, hospitals also offer support to the community and focus on prevention of diseases, such as joints and heart diseases, how to handle eating disorders, or childbirth preparation, providing prerequisites for healthier lives of the members in their community. For this, they organise specific meetings at which they provide information and educate about the topic in question (Veranstaltungskalender, 2024). A slowly growing number of hospitals are beginning to address the consequences and risks of heat in the community, further contributing to the health of the community (Osterloh, 2024). Most of the time, however, these meetings usually do not include topics regarding climate change or co-benefits (Veranstaltungskalender, 2024). Some hospitals engage in further practices that value co-benefits, such as adjusting the meal plan based on the Planetary Health Diet (Hügler, 2023), or encouraging bike-leasing for employees (*Mobilitätsangebot*, 2021). However, these supportive actions regarding climate change are usually limited to the hospitals themselves and do not go beyond their borders to address or educate the wider community.

Overall, it becomes apparent that the relationship between the healthcare sector and sustainability is complex. While most hospitals in Germany address resilience in the event of disasters and support general sustainability initiatives that promote human health in their locality, they struggle with minimising their environmental impact, even though the importance of this is evident. The next section will address the key drivers and barriers that hospitals face in implementing sustainable practices, linking these challenges to hospital governance and management.

2.2 Drivers, Barriers and Challenges to Environmentally Sustainable Healthcare Practices in German Healthcare Governance

In Germany, the minority of hospitals address their environmental impact due to a number of challenges and barriers, with which hospital management is confronted (Seifert & Guenther, 2020). To provide a starting point for possible solutions, it is crucial to comprehend the specific context in which German hospitals operate. This requires a deep understanding of possible drivers for environmental change, as well as the barriers and challenges for hospital management in the context of German hospitals, which are illustrated in the following sections.

2.2.1 Drivers and External Barriers for Implementing Environmental Practices

The adoption of environmental practices in hospitals is influenced by a range of drivers and external barriers. Waxin et al. (2023) investigated the drivers that lead management to adopt environmental management practices in organisations of the public sector (organisations that provide a service instead of producing products), which includes hospitals. They suggest categorising the drivers in four themes: regulatory drivers, stakeholder pressure, environmental strategy, and organisational efficiency. These drivers present an overview of motivations for management to address environmental concerns. In the following paragraphs, they are analysed in more depth and put into context with the German healthcare sector, which highlights the external barriers for hospital management to integrate environmental practices into their hospitals. The review of these four categories shows that hospitals encounter weak regulatory drivers, limited stakeholder pressure, and financial constraints, which together lead to low prioritisation of environmental strategies and a lack of organisational efficiency in adopting sustainable practices.

Regulatory drivers

Regulatory drivers are political drivers, such as legal requirements and international and national standards with which management is seeking to comply (Waxin et al., 2023). Regarding environmental measures, the legal framework governing hospital operations is limited. A few recommendations exist for hospital management, such as aiming to reduce energy and water consumption, as well as waste generation (Seifert, 2018). These are reinforced by the use of financial pressure by introducing fees depending on the amount of waste generated and water used (Seifert et al., 2020). However, these recommendations often ignore the prioritisation of safe healthcare, hygiene and the need for emergency preparedness in hospitals (Seifert & Guenther, 2019).

One reason for the lack of regulatory drivers could be that the German Government does not prioritise environmental sustainability in the healthcare sector. With regard to sustainability, the Government's focus is on building strong healthcare systems that offer best possible healthcare and endure future generations (Bundesministerium für Gesundheit, 2021). However, legal frameworks or requirements supporting, guiding, and pressuring hospitals to address environmental sustainability and reduce their environmental impact are almost non-existent (Seifert et al., 2020). For example, so far, no legal obligation to report sustainability impacts for hospitals exists. However, guidelines are

slowly changing, and in 2026, publishing sustainability reports (Corporate Sustainability Reporting Directive, CSRD) will be mandatory for most hospitals in Germany (*Berichtspflicht*, 2024). It is likely that regulatory drivers will therefore increase in the following years. Until then, however, it is clear that regulatory drivers in hospitals are scarce.

Stakeholder pressure

The second category of drivers for environmental change defined by Waxin et al. (2023) is stakeholder pressure, which can be sub-categorised into pressure by external stakeholders (pressure from the public) and internal stakeholders (pressure from within the organisation, such as management, owners or employees). Waxin et al. (2023) suggest stakeholder pressure to be one of the key drivers for environmental change in public organisations. When it comes to hospitals, however, they play subordinated roles (Seifert & Guenther, 2020). External stakeholders, such as patients, media or competitors, do not primarily demand environmental practices in healthcare. Patients and media focus on best possible healthcare instead, and hospitals usually do not compete with each other, but rather work together and complement each other to save resources (Seifert & Guenther, 2020; Seifert et al., 2020). Hospitals are not part of the competitive market situation, so no competitive advantage comes from implementing environmental strategies (Waxin et al., 2023). Additionally, hospitals do not get their approval from the public but from the federal states (Seifert & Guenther, 2020). Other groups of external stakeholders are environmental groups. Usually, environmental groups have the opportunity to emphasise pressure on businesses to shift towards sustainable practices (Seifert & Guenther, 2020; Waxin et al., 2023). However, Seifert and Guenther (2020) found that the healthcare sector is usually overlooked by environmental groups as they assign them different priorities, such as optimal healthcare. They found that pressure from environmental groups, media, competitors, and patients was generally perceived to be very low or low by hospital management.

Other external stakeholders include organisations and projects that aim to raise awareness and assist hospitals in reducing their own environmental impact, for example the German Alliance for Climate Change and Health (German: Deutsche Allianz Klimawandel und Gesundheit e.V.; KLUG) and KlikGreen. While they do not explicitly pressure hospitals to implement environmental measures, they do offer assistance to hospitals should they choose to participate. KLUG is an association that connects individuals within the healthcare sector that wish to be more environmentally friendly (*KLUG*, n.d.). KlikGreen is a project that specifically focuses on climate friendly practices within hospitals, building a network of 250 German hospitals and rehabilitation units that joined with the

aim to collectively save 100,000 tons of carbon dioxide emissions within a period of 3 years. The KlikGreen initiative organised for individual employees of participating hospitals and rehabilitation units to be trained as sustainability managers and held regular meetings to exchange new gained experiences, success stories, and ask for input if needed (*Krankenhaus trifft Klimaschutz*, n.d.). These organisations have the opportunity to offer support and guidance. However, participation is entirely voluntary and pressure to participate is low (*KLUG*, n.d.; *Krankenhaus trifft Klimaschutz*, n.d.).

Internal stakeholders in hospitals usually consist of employees, such as healthcare professionals, administrators and owners. Especially employees often connect environmental strategies with more bureaucracy, which lowers their motivation to demand change (Seifert & Guenther, 2020), and they usually also prioritise adequate healthcare over environmental concerns (Guetter et al., 2018; Pinzone et al., 2015; Seifert, 2018). Recently, however, perception has started to change, and some employees began requesting environmental actions from management, although these are the minority of employees who are willing to take on the additional workload that comes with fulfilling these requests (Seifert & Guenther, 2020). For administrators and owners, it often is most important to be financially sustainable rather than implementing environmental measures (Seifert, 2018). Therefore, only limited pressure from internal, and no pressure from external stakeholders are exerted on hospital management to start reducing hospitals' environmental impacts. However, Seifert and Guenther (2020) found in their study that when hospitals had implemented environmental management practices, the most efficient drivers were the owners, meaning that owners actually have potential to be key drivers for environmental change in hospitals, but often miss the opportunity.

Environmental strategy

The third category of drivers defined by Waxin et al. (2023) is environmental strategy. When management is motivated by the desire to improve their environmental performance, their image or reputation, or to set a good example for society, the driving force is environmental strategy (Waxin et al., 2023). Improving its environmental strategy or performance usually is not on the agenda of hospital management, even though it is argued to lead to a competitive advantage (Seifert & Guenther, 2020; Waxin et al., 2023). These benefits however, are not a priority in hospital settings (Seifert, 2018) and if hospital management wishes to make improvements, their focus is on patient care instead of environmental engagement. However, if hospital management and healthcare professionals intend to set a good example for society and use their function as role models, environmental strategy can be an effective driver (Seifert & Guenther, 2020).

Organisational efficiency

The fourth and last driver for environmental change described by Waxin et al. (2023) is organisational efficiency. In this case, the motivation arises from the desire to improve efficiency, quality, or the financial situation, as introducing environmental management can be an incentive to innovate, which in turn may improve efficiency (Waxin et al., 2023). Furthermore, it could reduce costs long-term which therefore strengthens the financial situation (Seifert & Guenther, 2019; Waxin et al., 2023). This is of great importance for German hospitals, with many finding themselves under enormous financial pressure and facing tremendous financial difficulties (Kurz & Beerheide, 2024). However, the benefits arising from environmental change are still overlooked by most hospital management, as the high initial costs act as hindrances for investments and the top priorities are always patient care and proper hygiene (Seifert, 2018). This leaves organisational efficiency as an ineffective driver for hospitals at present, despite the benefits that environmental change could bring.

Taken together, it becomes apparent that drivers that typically enforce environmental changes within other organisations do not necessarily exist in hospital settings. Therefore, hospital management is facing low pressure to adopt environmental measures. To achieve an environmentally friendly healthcare system, many aspects need to change, most of which are beyond the capabilities of individuals in the healthcare sector, and therefore represent external barriers, such as the absence of the aforementioned drivers. To fully understand the impact of these drivers and external barriers for hospital management in Germany, it is important to understand how the German healthcare system operates and how it is financed. The following sections 2.2.2 and 2.2.3 present a more detailed overview.

2.2.2 German Healthcare System

Simplified, the German healthcare system is based on five principles: compulsory insurance, solidarity, contribution-based financing, benefit-in-kind, and self-governance. The first four principles are about health insurance and financing of the healthcare system, while the latter focuses on decision-making and leadership and will be explained in more detail in the next paragraph. Compulsory insurance means that everyone living in Germany must have health insurance. The principles of solidarity and contribution-based financing refer to the financing of the health system and mean that the membership fees of all insured people cover the costs that arise in individual cases. Membership fees are aligned to the individual income and split by employer and employee.

Regardless of how high the fee is, all people are entitled to the same benefits of insurance. The benefit-in-kind principle means that patients are not obliged to pay for treatment, as the healthcare provider will directly charge the insurance companies. These four principles make the German healthcare system a social insurance system, meaning that health insurance companies finance medical care (Bundesministerium für Gesundheit, 2022).

The last principle that also makes up the German healthcare system is the principle of self-governance. This principle signifies that even though the federal government legislation and Ministry of Health are setting a legal framework, the specifics of how the healthcare system is operated within this framework, are established by the healthcare service itself. More specifically, they are determined by the Federal Joint Committee, formed by stakeholders representing different interest groups in each federal state of Germany, including medical professionals, hospitals, insurances, municipal health departments and patients. Therefore, the specifics may vary slightly between the individual federal states, provided they comply with the established framework (Blümel et al., 2020; Bundesministerium für Gesundheit, 2022). On the one hand, this principle offers great scope for action for the Federal Joint Committee, as well as stability and development of expertise in day-to-day management. Another advantage is that decision makers potentially have more insight into day-to-day management of and knowledge about hospital operations than federal government legislators because they are directly involved in the healthcare system. On the other hand, any change they wish to promote has to be limited to the legal framework and therefore can only be minor. Implementing fundamental changes depend on continuing negotiations among the Federal Joint Committee and the legislature and therefore, could only be implemented gradually. Additionally, the Federal Joint Committee shows a tendency to agree on decisions that reflect the priorities of health insurances and healthcare providers and not necessarily those of patients or the public (Blümel et al., 2020). This simplified description of the German healthcare system describes how it operates and highlights the difficulty of driving fundamental changes within the healthcare sector.

2.2.3 Financing

The importance for hospitals to improve their financial situation becomes even more apparent when investigating how hospitals are financed. It also becomes clear that the funding system presents a key challenge for hospital management in addressing environmental concerns. The German healthcare system is financed by two different sources (dual financing system). Insurance companies cover operating costs, while investment costs are carried by the individual federal states. Coverage

for operating costs is determined by a specific code for each medical issue, so a fixed amount of money is set for each disease and treatment, which includes medical goods, personnel costs, board and accommodation. This concept should ensure fairness in distributing money to hospitals and cover all the expenses a hospital has per patient. However, when a patients' recovery takes longer than expected and is therefore hospitalised longer than intended by health insurances, hospitals usually do not receive more funds. Hence, all hospitals are forced to prioritise profitability over certain aspects of patient care (Flintrop, 2006; *Krankenhausfinanzierung*, 2024) and many hospitals in Germany are currently struggling financially to maintain operations and not declare bankruptcy (Kurz & Beerheide, 2024).

Funds for investment costs, including for climate protection measures, are distributed at state-level and are taken from budgets of the Ministries of Health (Blümel et al., 2020). However, as already mentioned, the states' priorities often lie on different aspects of sustainability, such as guaranteeing the best possible quality of patient care. Therefore, funding for environmental sustainability measures is low. It has even been reported that states' investments in hospitals have been declining for years, from 25 percent in 1972 to only around 3 percent in 2020. The amount of investment varies greatly from state to state, depending on the number of inhabitants and the liquidity of public coffers and has to be negotiated between hospital and state (*Krankenhausfinanzierung*, 2024). Therefore, due to the states' low funding of investment costs and the problematic coverage of operating costs, hospitals often lack sufficient resources to invest in anything else besides quality healthcare, particularly environmental concerns (Seifert, 2018). These external challenges limit hospitals' ability to address environmental concerns, leading to the need to explore internal barriers within the hospitals themselves.

2.2.4 Internal Barriers

In addition to the external barriers that consist of the absence of environmental drivers and the challenges arising from the context in which German hospitals operate, current literature suggests that there are also internal barriers that prevent hospital management from implementing environmental changes. These include employees' attitudes and awareness toward environmental concerns (Seifert, 2018; Seifert & Guenther, 2020; Waxin et al., 2023), the hierarchical structure within hospitals (Battilana, 2011), and competencies of management itself (Trisolini, 2002; Waxin et al., 2023). These barriers are described in the following paragraphs.

Employees' attitudes and awareness

Often employees in hospitals lack awareness about the severity and potential benefits of addressing environmental concerns (Seifert, 2018; Waxin et al., 2023), leading to low commitment for executing environmental measures (Pinzone et al., 2015; Seifert & Guenther, 2020). If they are aware, they are still often not motivated or committed to allocate any more resources to them (Dettenkofer et al., 2000; Seifert & Guenther, 2020). In the healthcare sector, professionals often believe they are already contributing sufficiently to the common good, and that therefore no further need exists to also address environmental concerns (Weimann & Weimann, 2022). The closer employees work with patients, the less importance is attributed to environmental measures, as their top priority is patient care (Seifert, 2018). Employees in hospitals are already under a lot of pressure, usually do not have much time (Dettenkofer et al., 2000; Seifert, 2018; Seifert & Guenther, 2020; Waxin et al., 2023), and are often understaffed (Waxin et al., 2023). The prospect of new and additional tasks or the need to adjust their routine further discourages them, as this would add to existing pressures. These attributes contribute to employees' resistance to change (Seifert, 2018) making it more challenging for management to implement change.

Hierarchical structure within hospitals

Even though management has the authority to be the key decision-maker for implementing change, research indicates that in hospital settings, employees, especially physicians, are typically included in decision-making processes. Physicians are highly respected throughout hospitals and while different groups of healthcare professionals work in different areas and have different tasks, physicians are still expected to be in charge (Battilana, 2011). Regarding environmental measures, physicians and other healthcare professionals often see them as a threat to their mission of providing optimal healthcare and refuse to execute measures decided by management (Seifert, 2018). So, implementing such measures beyond legal requirements can lead to disputes between employees and management (Pinzone et al., 2015) and often even management refrains from contradicting and prefers to operate in ways that facilitate physicians' work, rather than implementing certain changes that physicians resist (Battilana, 2011).

Competencies of management

In addition to these challenges, management also faces challenges due to their own lack of knowledge and experience. First, Trisolini (2002) noted that the position of hospital management is often filled with managers that have business management experience in general, but no clinical

expertise. So, even though they are competent to make management decisions, these decisions are not always implementable in practice when managers are missing knowledge about clinical operations and clinical priorities. In turn, when managers do have knowledge about clinical operations, it often is because they are former physicians. Then, however, they often lack actual managerial expertise and experience (Trisolini, 2002). The absence of effective communication skills, problem-solving skills, or the ability to manage change in particular have been mentioned as strong barriers to implement environmental measures (Waxin et al., 2023). Lastly, environmental management within hospitals has just recently started to gain attention and therefore, hospital management is missing knowledge, capabilities, and experience in this specific topic as well (Seifert & Guenther, 2020). Furthermore, it has been observed that it is challenging to find a manager who is capable of implementing environmental change practices in hospitals (Seifert, 2018), as this manager needs to be knowledgeable about environmental issues, have experience in management practices, especially in implementing changes, and be familiar with hospital settings.

Overall, it becomes clear that drivers and the specific context of German hospitals, that make up external and internal barriers, hinder hospital management to implement environmental sustainability measures. While drivers for environmental change hardly exist, financial support for environmental investments is also limited. Further, internal barriers such as lack of awareness, responsibility, and knowledge about environmental measures of employees and hospital management, as well as their resistance, reinforce the issue. Thus, hospital management faces extensive barriers and limited pressure to address environmental sustainability.

2.3 Managing Environmental Change in Hospitals

This section looks at how hospitals can manage internal barriers and make changes to improve environmental sustainability. Given the lack of environmental drivers, such as overarching environmental regulations, the existing internal barriers and the principle of self-governance in the healthcare system, it has been argued that the most direct point of influence when implementing change is directly within healthcare settings (Campbell-Lendrum et al., 2023). Therefore, it is important for hospital management to directly enforce change in their individual hospitals to impact environmental sustainability of the healthcare system. Lahtinen and Yrjölä (2019) argue that such a change towards sustainability requires a fundamental change in organisational culture, structure, and practices. While changes occur regularly in hospitals, they usually refer to patient care, such as responding differently to new diseases (e.g. COVID-19; Campbell et al., 2022; Gabutti, 2023).

Therefore, initiating such a fundamental change of organisational culture could pose a particular challenge for hospital management.

When planning on changing organisational culture, a transition of values and behaviour must occur (Griffin et al., 2015). This costs time and money (Burnes, 2020), two resources that usually are not found in abundance in hospitals (Seifert, 2018). To facilitate the process of implementing fundamental changes, it has been observed that preparation and actions to maintain the changed culture are key. Before creating change, it is beneficial to identify the status quo of the organisational culture and raise awareness that change is needed. Once that has been accomplished, the change can be conducted. Afterwards, to make the changes permanent, it is crucial to integrate the changed culture into organisational life (Burnes, 2020; Griffin et al., 2015). This is a continuous progress, which needs to be constantly reassessed and adjusted. Throughout the process of change, employees need to be involved and motivated to continue working towards the new goal (Abeygunasekera et al., 2022; Savoie, 1993). When motivation is high and employees are as committed to the changes as management is, it is more likely to implement and sustain the changes (Savoie, 1993). This theory is based on implementing fundamental changes in organisations, not specifically for hospitals or environmental changes. However, as mentioned, it is argued that environmental changes require fundamental changes in organisational culture (Lahtinen & Yrjölä, 2019), so this concept could give insight into how to implement environmental changes.

Most research that focuses on how to implement environmental changes, only researches the topic in the context of business organisations generally, rather than hospitals specifically. For instance, Loorbach and Wijsman (2013) focused on practical implementation of environmental change in business organisations, and suggest that it could be valuable to start implementing changes in one small and outsourced area to work out flaws and mistakes, while keeping the rest of the business running as usual. This way, environmental strategies can be tested without compromising the functioning of the business. Once they have been tested and approved, the rest can also change successively. Transferring this approach to hospitals, however, could be difficult, since it requires additional staff and premises, while staffing (Waxin et al., 2023), time (Dettenkofer et al., 2000; Seifert, 2018; Seifert & Guenther, 2020; Waxin et al., 2023) and money (Seifert, 2018) appear to be key internal barriers for implementing environmental changes in hospitals. Buysse and Verbeke (2003) investigated three different management strategies regarding environmental management in business organisations: reactive, pollution prevention, and environmental leadership. They distinguished drivers that lead to each management strategy, such as stakeholder pressure and

policy changes. They conclude that a shift in management strategies for business organisations requires investments into green products, employee skills, organisational competencies, and the ability to change planning processes, as well as managing systems and procedures. Trumpp et al. (2015) found that business organisations and their environmental performance consist of two dimensions: environmental management and operational performance. The dimension of environmental management has five subdimensions: policy, objectives, processes, structures, and monitoring. They also found that management performance is impacted by the specific industry in which the organisation operates, highlighting the need to analyse environmental management in the specific context of the respective industry.

Only very limited research exists regarding implementing and managing environmental changes in the context of hospitals. Based on the framework by Trumpp et al. (2015), Seifert et al. (2020) examined whether the multidimensional concept could be transferred to the healthcare sector. While they agree on the importance of having clear and achievable goals and environmental policies, they further recommend environmental training to raise employees' awareness, and that management needs to be proactively engaged to go beyond guidelines and be innovative. Therefore, they additionally attach importance to managements' personal attributes. Kallio et al. (2018) also investigated the implementation of environmental strategies in hospitals. They examined five hospitals in Finland and found a similar range of results as Buysse and Verbeke (2003), Seifert et al. (2020), and Trumpp et al. (2015). They conclude that having clear policies, objectives, and structures are crucial to the implementation of environmental strategies in hospitals. However, they attribute the greatest importance to the employees, their education, guidance, and motivation. They justify their findings with the employees being the ones executing new environmental actions, as they play a key role in minimising unnecessary waste generation and resource consumption. Therefore, management must support and guide them in implementing the new measures.

Other research on environmental measures in hospitals focus on the specific measures that could be implemented in hospitals. Seifert and Guenther (2019) for instance, analyse the specific measures that reduce the environmental impact of hospitals, such as reduction of energy, emissions into air, and material, water, and waste consumption. These studies give great insight into the topic. However, to date, frameworks to evaluate sustainability levels or progression have not been applied to the healthcare sector (Benn et al., 2018 ; Edwards, 2009; Jacobsen et al., 2020). Therefore, the questions of how to overcome challenges and how to move towards environmental sustainability in German hospitals still remain unclear.

2.4 Summary of Literature Review

Summing up, the relationship between the healthcare sector and sustainability is multi-faceted. Due to their line of work, hospitals always address economic and social sustainability. Within environmental sustainability, many German hospitals address resilience and health prevention in their community, while they often neglect minimising their own environmental impact, even though it is proven to be critical to further advance the goal of global health. Accordingly, this thesis aims to provide insights into how management can improve their level of environmental sustainability, especially regarding minimising their environmental impact. Extant research indicates that there are multiple challenges to integrating environmental sustainability into hospitals, all leading to one key challenge: that hospitals cannot be equated with other businesses, on which most environmental management research focuses. The drivers that allow other management to implement environmental measures do not exist for hospital management. Political guidelines that force other businesses to shift towards sustainability thinking also do not exist for hospitals. Investment funds that are necessary for environmental measures are not provided to hospitals, as the focus is on optimal health care instead of environmental issues. Employees' attitude and awareness towards the environment as well as management's own competencies are also evidence that different priorities are set in hospitals, and that hospitals function differently than other organisations. Therefore, hospital management requires different support and capabilities than other management.

Research has either examined challenges, barriers and drivers for environmental change within hospitals, or examined how to distinguish different levels of sustainability and implement changes in general in business organisations. As to environmental management in hospitals, research has focused on managements' personal attributes, such as being innovative and proactively engaged, while overlooking other aspects likely to be important, such as the organisational structure of management, the ability to implement change, environmental strategies and context-specific barriers regarding the German healthcare sector. To the best of the author's knowledge, no research has investigated how hospital management is able to implement changes to advance the level of environmental sustainability in German hospitals. However, despite the barriers, a small number of hospitals in Germany have been able to dedicate resources for a transition to environmental sustainability. This thesis examines the experiences of management from four such hospitals in their efforts to advance their level of environmental sustainability.

Chapter 3: Theoretical and Conceptual Frameworks

Now that the previous chapter has explored the literature on the challenges and drivers of environmental sustainability in hospitals, this chapter introduces the theoretical (3.1) and conceptual frameworks (3.2) that guide this research. This thesis aims to generate a better understanding of how hospitals can move towards environmental sustainability and how some hospitals were able to implement more changes than others facing the same pressure and challenges. To achieve this and to identify possible approaches to overcome these challenges, this thesis applies a conceptual framework which is adapted from theoretical frameworks regarding governance, development, and organisational change proposed by Benn et al. (2018), Edwards (2009), Jacobsen et al. (2020) and Zollo et al. (2013). Drawing on these frameworks, this chapter develops a conceptual framework to analyse hospitals' adaptive capacity in overcoming challenges and advancing their environmental sustainability.

3.1 Theoretical Frameworks

In order to explore how hospitals can improve their level of environmental sustainability, this research draws on a range of theoretical frameworks that provide insight into the integration of sustainability at the organisational level. These are informed by different theories and literatures that highlight the different perspectives with which the integration of all three pillars of sustainability can be analysed. These different frameworks range from the perspective of governance to developmental progress to organisational change. The governance framework focuses on organisational systems of managing itself within a broader setting (Edwards, 2009) and is crucial to understanding how hospitals can structure their sustainability actions and how decision-making processes can impact their environmental goals. The developmental framework maps out the progress on sustainability as a mutually building system and categorises different levels of sustainability (Benn et al., 2018; Edwards, 2009; Jacobsen et al., 2020), and can help assess the stages hospitals have to undergo when advancing in sustainability. The organisational change framework focuses on how organisations can move towards sustainability (Zollo et al., 2013) and can assist in investigating how hospitals can progress through the determined stages.

3.1.1 Governance Framework for Sustainability Action

This thesis draws on governance, developmental and organisational change perspectives to shed light on the emergence and development of sustainability, and to illuminate barriers and opportunities in the context of hospitals. In this section, the governance framework will be explained, which is crucial for analysing how governance may influence sustainability actions.

The framework by Edwards (2009) distinguishes three governance aspects: (i) decision-making, (ii) organisational culture, and (iii) monitoring implementations. They influence opportunities for sustainability action. (i) Decision-making determines strategic direction, sustainability practices and principles. It also entails how stakeholder pressure and different hierarchy levels within an organisation, or in this case in hospitals, influence the process of decision-making. It is also crucial to consider how sustainability influences decision-making and vice versa, as well as to strike a balance in decision-making between the survival of the hospital and the challenges associated with pursuing sustainability goals. (ii) Organisational culture addresses consideration of value creation, managements' and employees' behaviour and beliefs regarding sustainability, motivation and communication throughout different hierarchy levels and managing internal and external stakeholder opinions. The third aspect is (iii) monitoring implementations throughout the hospital, to ensure that they are anchored at all levels of the hospital and support the desired sustainability goals (Edwards, 2009).

3.1.2 Developmental Framework for Sustainability Action

Since the governance framework outlines structural elements but lacks focus on progression, the developmental framework is added to assess the different levels hospitals have to undergo on their way to sustainability maturity. To fully grasp the development of sustainability, various developmental frameworks have been established. Their aim is to characterise organisational evolution and sustainability performance and to differentiate the factors that lead to different levels of sustainability. These different levels build on each other, and the higher the level, the higher is the level of sustainability maturity (Benn et al., 2018; Edwards, 2009; Jacobsen et al., 2020).

Multiple studies identified different levels of sustainability. Benn et al. (2018) found that organisations can be categorised into six different levels: reject, non-responsiveness, compliance, efficiency, strategic proactivity, and sustaining corporation. The first two levels (reject and non-

responsiveness), however, ignore and actively reject sustainability measures and are therefore neglected. The third level (compliance) is characterised by organisations that follow minimal standards to avoid fees and raise general awareness about sustainability in the workforce, mainly concerning social sustainability. The subsequent level (efficiency) is characterised by organisations that aim to reduce costs and increase efficiency through sustainability initiatives, thus focusing on the advantages that derive from addressing sustainability. In particular, at this level, low-hanging fruits are addressed because they lead to quick and easy results. At the fifth level (strategic proactivity), organisations begin to incorporate sustainability into their strategy. Their aim is to gain a competitive advantage and create shared value with and for stakeholders. Organisations at this level also address changes of the organisational culture and view sustainability as an opportunity to improve. Furthermore, they grasp the importance of reducing materials and using sustainable products. Finally, the sixth level (sustaining corporation) is characterised by organisations that completely incorporate sustainability into their daily life. They voluntarily go beyond guidelines and are fundamentally committed to sustainability. They also ensure sustainability throughout the entire supply chain, function as role models and engage in knowledge transfer with other organisations in the same sector. Additionally, they cooperate with politicians and the government to change rules for the entire industry. Therefore, their objective is to induce changes that could lead to a sustainable world, instead of just focusing on the progress within their own organisation.

Similarly, Edwards (2009) differentiates between seven different levels. Again, the first two levels (subsistent and avoidant) reject and ignore sustainability initiatives. The third (compliant) and fourth (efficient) levels are similar to the respective levels described by Benn et al. (2018) and focus on compliance to guidelines and viewing sustainability as an opportunity to save costs. The fifth level (committed) is characterised by organisations that are committed to sustainability, go beyond legal guidelines, and are connected to others in their community. The sixth level (sustaining, local) includes organisations that incorporate sustainability into their strategies and support their local communities, while the seventh level (sustaining, global) aims to offer support globally. This framework does not include changing behaviour as a characteristic for one of the sustainability levels. However, it is mentioned that changing behaviour is crucial to transform and advance the sustainability level.

In a more recent model, Jacobsen et al. (2020) identified four levels. At the first level (inspire and inform) organisations are generally interested in sustainability, but there are uncertainties on how to integrate it. To overcome this, external help is often sought. Additionally, they focus on practices that

could inspire their staff to further raise their interest in sustainability. At this level, the main focus is to create internal value within the organisation. The second level (productize) is about creating value for external customers and creating sustainable products. Organisations at this level focus on practices to increase social sustainability and change behaviour within the organisation and to improve the relationship to the customer. The third level (co-create) is characterised by organisations that cooperate with stakeholders. Organisations engage in partnerships to design and produce more sustainable products, and also engage in knowledge partnerships, where they transfer knowledge to other organisations in the same sector. Their main focus is on advancing sustainability within the entire value chain. At the fourth and last level (system-building), organisations aim to completely incorporate sustainability into their strategy, influence the entire industry beyond the organisation and push for a socio-cultural change. Notably, Jacobsen et al. (2020) noticed that the level of sustainability is positively correlated to the intentionality of sustainability and stakeholder engagement, meaning the higher the level, the higher is the intent to be sustainable and the higher is the stakeholder engagement. Furthermore, they argue that organisations of different industries may vary in their characteristics and therefore, the particular context of the industry that is analysed needs to be considered.

The sustainability levels described in each of these three studies have been compared and merged into three levels to offer a holistic overview of different aspects influencing each sustainability level: 1: understand and comply, 2: integrate and cooperate, 3: ecosystem building. They are summarised in table 1. Furthermore, the characteristics have been complemented by criteria described by Pandey et al. (2019), who compared organisations of the global food industry and distinguished between two levels, leaders and laggards, which can be compared to level 1 and level 3 of the following adapted framework (Table 1).

Table 1

Adjusted Developmental Framework Based on Benn et al. (2018), Edwards (2009), Jacobsen et al. (2020) and Pandey et al. (2019).

Sustainability level	Characteristics
Level 1: Understand and comply	Sustainability framed as a cost saving opportunity (Benn et al., 2018; Edwards, 2009, Pandey et al., 2019)
	Meeting regulatory guidelines and legal standards to avoid fines (Benn et al., 2018; Edwards, 2009)
	General interest for sustainability, but uncertainty on how to integrate into daily life (Jacobsen et al., 2020)
	Focus on low-hanging fruit and practices to start growing awareness (Benn et al., 2018)
	Limited data collection and understanding of material impacts (Benn et al., 2018; Pandey et al., 2019)
	Sustainability is often an add-on, no devotion to the topic, no sustainability reporting (Pandey et al., 2019)
	Scope within firm, focus on sustainability practices to create internal value and inspire staff (Jacobsen et al., 2020)
Level 2: Integrate and cooperate	Sustainability framed as an opportunity for competitive advantage (Benn et al., 2018)
	Embed sustainability in culture, and induce behavioural change (Benn et al., 2018; Jacobsen et al., 2020)
	Begin to integrate sustainability in strategy, comprehensive data collection; understanding of material impacts (Benn et al., 2018)
	Imposes sustainability criteria on suppliers (Jacobsen et al., 2020)
	Broader stakeholder engagement and cooperation (Benn et al., 2018; Jacobsen et al., 2020)
	Scope within value chain, close cooperation with stakeholders (Jacobsen et al., 2020)
Level 3: Ecosystem building	Environmental, economic and social sustainability are incorporated into firms' DNA (Benn et al., 2018; Jacobsen et al., 2020)
	Go beyond environmental guidelines and the organisation to transform society (Benn et al., 2018; Edwards, 2009; Jacobsen et al., 2020)
	Leading and pioneering on policy advocacy within industry and cooperate with government to change rules (Benn et al., 2018)
	Engage in knowledge transfer within the industry (Benn et al., 2018; Jacobsen et al., 2020)
	Deploying innovative circular business models (Jacobsen et al., 2020) and engaging in sustainable product design (Benn et al., 2018)
	Have a team assigned to address sustainability and focus on sustainability reporting (Pandey et al., 2019)
	Scope within the industry, strategic working to build a favourable environment and push for socio-cultural change (Jacobsen et al., 2020)

The first two sustainability levels described by Benn et al. (2018) and Edwards (2009) where organisations actively reject sustainability initiatives and do not comply with legal regulations are neglected in this analysis, because organisations at these levels would be operating outside the legal framework. Thus, the framework begins with the first relevant level: "understand and comply." This level is comparable to level three and four (compliance, compliant/efficiency, efficient) from Benn et al. (2018) and Edwards (2009) and to level one (inspire and conform) described by Jacobsen et al. (2020). Organisations at this level primarily focus on practices that are cost-saving, increase efficiency, and meet guidelines. At this level, organisations typically possess limited knowledge about how to integrate sustainability into the business or about their environmental impact, and aim to raise awareness about environmental issues. The study by Pandey et al. (2019) adds a lack of reporting and devotion to the topic of sustainability to this level, as they found that organisations that are considered laggards usually see sustainability as an add-on that someone has to address in addition to their regular tasks.

Similarly, the second level, “integrate and cooperate”, aligns with level three (co-create) from Jacobsen et al. (2020), level five (proactivity) from Benn et al. (2020) and level five (committed) from Edwards (2009). Here, organisations often focus on practices that lead to behavioural and cultural changes and create a competitive advantage. They begin to integrate sustainability into their strategy, have knowledge about their environmental impact, and operate within the supply chain. Furthermore, organisations seek broader stakeholder engagement and cooperate with external organisations.

Finally, the third level, “ecosystem building”, matches level four (system building) from Jacobsen et al. (2020), level six (sustaining corporation) from Benn et al. (2020) and level six and seven (sustaining, local and global) from Edwards (2009). This level is characterised by organisations that focus on practices that go beyond legal guidelines to completely incorporate social, environmental and economic sustainability into their business. Furthermore, their practices are aimed to go beyond the organisation and transform society by pioneering policy advocacy in industry coalitions, cooperating with the government to change rules, pushing for a socio-cultural change, and deploying innovative circular business models. Pandey et al. (2019) added that organisations perceived as leaders within their industry often have a team assigned to addressing sustainability, engage in sustainability reporting, and focus on internal and external progress.

3.1.3 Organisational Change Framework

The governance framework by Edwards (2009) provides great insight into governance of an organisation. However, it only serves to identify opportunities, challenges and the status quo of an organisation in terms of environmental sustainability. This information can then be put into context through the adapted developmental framework (Benn et al., 2018; Edwards, 2009; Jacobsen et al., 2020) and assign hospitals to different levels of sustainability. Identifying the current sustainability level of a hospital and assessing the status of hospitals' governance regarding sustainability are important for exploring how management can pursue a change in the level of sustainability (Benn et al., 2018; Edwards, 2009; Jacobsen et al., 2020).

To analyse how hospitals can advance from one environmental sustainability level to the next, the framework of organisational change by Zollo et al. (2013) is added. This research builds on developmental frameworks which focussed on motivational questions (why), internal and external pressures, and objects of change (what), to analyse the process of change towards sustainability within an organisation (how). To understand how an organisation is able to address and overcome sustainability issues, Zollo et al. (2013) suggest analysing their adaptive capacity, which determines how well an organisation is able to respond to changes and implement change initiatives to progress towards sustainability. It includes analysing how they can adjust their strategies and processes, and is supported by certain management capabilities and relational assets. Therefore, they suggest it can be examined by analysing change initiatives and the four dimensions shaping them: a) strategy making, b) organising processes, c) management capabilities, and d) relational assets. When broken down, these four dimensions (a–d) encompass Edwards' (2009) three aspects of governance (i–iii), but also contain additional characteristics to analyse governance and sustainability at a more comprehensive level. The four dimensions and their connection to Edwards' (2009) aspects of governance are described in more detail below.

Strategy making (a) and decision-making (i)

Strategy making (a) from Zollo et al.'s (2013) framework includes the process and structure of decision-making, determining sustainability practices and principles, and to what extent sustainability is taken into account in decision-making (i), as described by Edwards (2009). However, it also goes beyond that, as it includes the setting of strategic goals and the process of allocating resources to entail long-term success, without compromising the organisations' initial purpose (Zollo et al., 2013).

Organising processes (b) and monitoring (iii)

Organising processes (b) from the framework by Zollo et al. (2013) examines the structures and systems within an organisation that ensures monitoring (iii), as described by Edwards (2009). Furthermore, it also assesses the processes of coordination and controlling of implementations to track whether initiatives are being implemented as intended and whether they need adjustments (Zollo et al., 2013).

Management capabilities (c) and organisational culture (ii)

Management capabilities (c) from Zollo et al.'s (2013) framework includes some of Edwards' (2009) aspects of organisational culture (ii), such as the creation of value and shared beliefs, communication skills, and managements' attitude regarding sustainability. Furthermore, it also focuses on managements' capabilities to change operations and adapt to changes in the environment (Zollo et al., 2013).

Relational assets (d) and organisational culture (ii)

The remaining aspects of Edwards' (2009) organisational culture (ii), such as the quality of relationships with external and internal stakeholders, and communication with groups and individuals at different hierarchical levels are included in relational assets (d) from Zollo et al.'s (2013) framework. In addition, it investigates how communication facilitates changes in behaviour, and how these relationships with stakeholders, as well as the pressure exerted by them, affect the operations of organisations (Zollo et al., 2013).

3.2 Conceptual Framework

These multiple frameworks proposed by Benn et al. (2018), Edwards (2009), Jacobsen et al. (2020), and Zollo et al. (2013) view sustainability holistically, meaning they consider all three pillars: economic, social, and environmental sustainability. However, they address commercial businesses and are not specifically tailored to hospitals and include certain aspects not relevant for hospitals, such as competitive advantage and sustainable product design. Therefore, these frameworks have been adjusted and merged into one conceptual framework that focuses on environmental sustainability and better suit a hospital context (Figure 1).

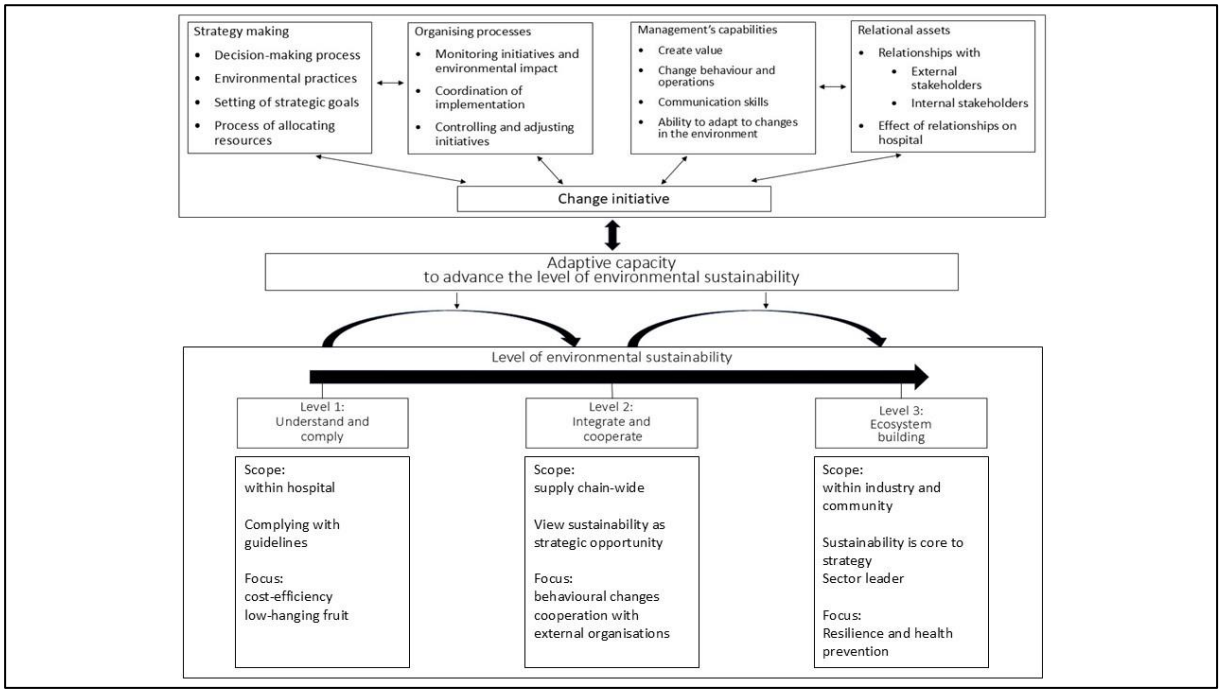


Figure 1

Conceptual Framework on how Hospitals can Advance the Level of Environmental Sustainability. Adapted from Benn et al. (2018), Edwards (2009), Jacobsen et al. (2020), and Zollo et al. (2013).

Figure 1 shows the four dimensions (strategy making, organising processes, management capabilities, and relational assets) and their influence on change initiatives. Zollo et al. (2013) suggest that strategy making and organising processes influence each other, as a strategic approach could facilitate the establishment of processes. In turn, having processes in place to monitor, control, and adjust initiatives may facilitate decision-making. They also suggest that management's capabilities and relational assets influence each other, as having management capabilities, such as communication skills, improves relationships between stakeholders and vice versa, and creating shared value (management capabilities) can lead to changes in behaviour (relational assets). Together, change initiatives and the four dimensions impact the adaptive capacity which is crucial to analysing how hospitals can advance their level of environmental sustainability. The three consecutive levels of environmental sustainability, adjusted to be a better fit for hospitals are also displayed in figure 1. To analyse how hospitals can advance in environmental sustainability, this framework suggests to first examine successful and unsuccessful change initiatives. Then, in order to better understand the reasons for successful and unsuccessful implementation, the four dimensions

influencing the implementation of the initiatives have to be investigated in more detail, thus drawing conclusions about their adaptive capacity.

This chapter has presented the framework for examining how hospitals advance in environmental sustainability. Given the constraints discussed in earlier chapters, including the lack of external drivers and significant internal barriers within hospitals, this framework is particularly well-suited to this study. It focuses on adaptive capacities and change initiatives, offering a fine-grained analysis of how hospitals can navigate these barriers and still drive meaningful change. Understanding how hospitals can adopt change despite these challenges is crucial for this research. The dimensions will be used to assess hospitals' change initiatives and adaptive capacities, with the aim of generating insights into how they can progress toward greater environmental sustainability. The next chapter outlines the methodology used for this analysis.

Chapter 4: Methodology

Building on the theoretical and conceptual frameworks established in the previous chapter, this chapter outlines the methodological design adopted for this research. It begins by explaining the research paradigm and justifying the qualitative, inductive approach. This is followed by a detailed description of the case study selection, data collection methods, and analysis procedures, which ensure the research aligns with the objectives of exploring how hospitals can enhance their environmental sustainability.

4.1 Overview of the Methodological Design

This research adopts a pragmatic research paradigm to address real-world sustainability challenges in hospitals, aiming to generate actionable knowledge for end users (Fàbregues & Molina-Azorín, 2016; Feilzer, 2010), more specifically for hospital- and sustainability managers. Pragmatic research is characterised by pluralistic realities, a flexible research approach, that allows either quantitative, qualitative or mixed methods research, where research quality is ultimately measured by the outcomes, practical impact and the achievement of the aim, which is to contribute to solving real-world problems (Davies & Fisher, 2018). Furthermore, high-quality research in the pragmatic research paradigm has a clear rationale, a research method that is well suited to answering the research question, and transparently justifies all decisions throughout the process (Bryman, 2014). Credibility of data collection and analysis, transferability to other cases, and the interrelation of experience, knowledge and action are also important criteria for best practice in this research paradigm (Kelly & Cordeiro, 2020). The following sections in chapter 4 will provide detailed information about the consideration and integration of these criteria, justify the selection of the research sample, and provide practical implications, all contributing to conducting research that is impactful and useful (Brough, 2018).

Based on the literature review findings, the need for a reduction of negative environmental impact for businesses and organisations is evident. So far, however, environmental management is mostly neglected within hospitals and little is known about specific practices that allow hospital management to advance the level of environmental sustainability. To gain a deeper understanding of the issue from which further knowledge can be generated, a more comprehensive exploration is required. Therefore, a qualitative, inductive research approach was adopted for this research (Forchuk & Roberts, 1993; Ryan et al., 2007; Silverman, 1998). To reflect the best-practice criteria of

rationale, transparency and credibility, all decisions and the research process will be justified and described thoroughly in the following sections of this chapter as suggested by Forchuk and Roberts (1993), Ryan et al. (2007), and Silverman (1998). To further increase transparency, participants were asked if they desired to read transcripts before commencing data analysis (Crowe et al., 2011). Only one participant (P1) wanted to undergo this process, the others declined. Because this research focuses on qualitative data, instead of using mixed methods, two criteria for best practice in the pragmatic research paradigm, integration of quantitative and qualitative data; and interrelation of experience, knowledge, and action, cannot be followed within the scope of this research. To include these criteria, follow-up studies with additional quantitative data and longitudinal studies to track actions could be beneficial.

To address the research questions of section 1.2, a multiple explanatory case study design was adopted. This design is a useful method when the aim is to generate broad knowledge of a particular issue (Crowe et al., 2011). It further allows for investigating certain phenomena in depth within its specific real-life context, answering questions of how, what and why (Crowe et al., 2011; Teegavarapu et al., 2008). The cases for this study were selected purposefully, as suggested by Crowe et al. (2011). Therefore, four German hospitals that are seen as positive role models in their industry when it comes to tackling environmental sustainability were included, as well as an overarching organisation which unites the German healthcare sector with environmental sustainability to provide industry-wide insights (German Alliance Climate Change and Health (Deutsche Allianz Klimawandel und Gesundheit e.V., KLUG)).

The intent is to compare and highlight the unique features of hospitals in their individual contexts that allow them to address environmental sustainability at a deeper level than other hospitals (Bell et al., 2022). To generate detailed knowledge of specific and individual experiences within a certain domain, individual interviews were considered to be most suitable, as opposed to focus groups (Baillie, 2019, Guest et al., 2017). Furthermore, individual interviews within case studies enable the generation of intensive and detailed examination of cases as well as asking individual follow-up questions leading to more in-depth understanding (Bell et al., 2022). Therefore, data were collected through semi-structured interviews with sustainability managers of four German hospitals that address environmental sustainability in their hospitals, and with the managing director of the overarching organisation.

4.2 Interview Schedule Development

Semi-structured interview templates were informed by the conceptual framework. They were developed with regards to the four dimensions (strategy making, organising processes, management capabilities, and relational assets) and the change initiatives they shape. To ensure that each dimension is specifically addressed, at least three questions were asked per dimension, and to target the change initiatives at least four questions were asked. This increases the likelihood of gathering sufficient data per dimension and for the initiatives. The interview questions and figure 2 (in Appendix A) were constructed in English by the author and discussed with the supervisors. Subsequently, the questions and the figure were translated into German by the author, who is a German native-speaker (see Appendix B).

The interview questions addressed the following key themes: change initiatives, strategy making, organisational processes, management capabilities and relational assets. Additional topics included prioritisation and monitoring of initiatives, coordination of implementation processes, value creation, changing behaviour, communication and stakeholder engagement. The interview template can be found in Appendix A. Prior to data collection, pilot interviews were conducted, in which questions and interview strategies were tested with individuals who were familiar with the topic. Subsequently, questions were adjusted accordingly before the official start of data collection.

4.3 Case Study Selection and Participant Recruitment

For the process of case selection, first, a google search was conducted to find hospitals in Germany that address environmental concerns. Inclusion criteria were German hospitals that address environmental concerns and are considered to have achieved more in that regard than other hospitals in Germany, and cases that ensure a mix of ownership and size of hospitals. Exclusion criteria were if hospital managers did not address environmental concerns, did not promote them on their website or were not mentioned as positive examples by other participating hospitals.

The first hospital (hospital 1) was identified quickly as one of the first hospitals in Germany that started integrating environmental sustainability. Their climate department was contacted via direct email, and their sustainability manager immediately agreed to participate in the study. Due to limited information available online, it was decided to rely on their expertise and knowledge within the sector to find additional participants via snowballing. In the first initial contact before the interview,

the sustainability manager of hospital 1 mentioned hospital 2, which is larger, has more resources to focus on sustainability concerns and is considered a forerunner on sustainability issues. Their department for sustainability was also contacted, and their sustainability manager agreed to participate immediately. In these two interviews, participants were asked whether they knew of additional hospitals in Germany that addressed environmental sustainability in more detail than others, and thus sustainability managers of seven additional hospitals were contacted via snowballing, of which one declined participation, four did not respond despite multiple attempts of contact, and two hospitals agreed to participate. These participants were also asked whether they knew of additional hospitals in Germany that addressed environmental sustainability in more detail than others, but their suggestions were consistent with those of the others. Thus, overall nine sustainability managers were contacted, of which four agreed to participate.

To get an overarching, sector-wide understanding of how hospitals can advance their environmental sustainability level in Germany, one of the managing directors of the overarching organisation KLUG was contacted via email, and they also agreed to participate. Before working at this organisation, they were the managing director of a hospital and therefore also had insight into that particular field.

These participants were identified as ideal, as they are considered as role models in their industry. They have already begun to implement environmental initiatives into their hospitals and therefore might have valuable insights into how this can be achieved. Therefore, it is expected that these cases are where the most knowledge can be generated. Going into the process of data collection, the aim was to include at least three hospitals that vary in size and ownership to maximise transferability and understanding of the topic (Braun & Clarke, 2022), which has been exceeded.

4.4 Case Descriptions and Participant Overview

This section provides basic information about the participating hospitals, including their size, ownership, and brief history of sustainability and environmental management efforts, to set the context for the study findings. To maintain confidentiality, some details of the participating hospitals and managers have been omitted or summarised.

4.4.1 Hospital 1, Participant 1

Hospital 1 (H1) is medium-sized with 200 beds, 350 employees and is owned by a denominational, non-profit organisation and is therefore a privately owned, not for-profit hospital. It was one of the first hospitals in Germany to start shifting their focus towards environmental sustainability. They started addressing this topic before any environmental guidelines or recommendations for German hospitals existed (Dettenkofer et al., 2000). With their environmental management, they showed a unique and innovative way of thinking and became a role model for other hospitals that followed in their footsteps. They created an executive department for sustainability and were able to integrate their environmental policies within their core business as one of the first hospitals in Germany (personal communication, May 8, 2024). The interview was conducted with their sustainability manager, who will be referred to as participant 1 (P1).

4.4.2 Hospital 2, Participant 2

Hospital 2 (H2) is a large university hospital with roughly 1700 beds, 15000 employees and is publicly owned by the federal state in which they are located. It was one of the first German university hospitals to build an executive department solely dedicated to sustainability and climate protection. They have been measuring and reporting their environmental impact transparently since 2020, even though there is no legal obligation for this, yet (personal communication, May 10, 2024). The interview was conducted with their sustainability manager, who is also the chairman of the executive department for sustainability and will be referred to as participant 2 (P2).

4.4.3 Hospital 3, Participant 3

Hospital 3 (H3) was mentioned in one of the interviews as an example of a hospital with excellent environmental management. It is a large hospital with roughly 600 beds and 2000 employees, and is publicly owned by the city. Although they do not explicitly have an executive department for sustainability, environmental management is integrated into an already existing department (personal communication, June 7, 2024). One interview was conducted with the manager of that department, who is in charge of environmental management and who will be referred to as participant 3 (P3).

4.4.4 Hospital 4, Participant 4

Hospital 4 (H4) was also approached via snowballing. It is a large university hospital, with roughly 1700 beds and 10000 employees, and is publicly owned by the city. They created an executive department for sustainability in 2023 (personal communication, July 5, 2024). The interview was conducted with their sustainability manager, who is the head of this department and who will be referred to as participant 4 (P4).

4.4.5 Informant of the Overarching Organisation: German Alliance Climate Change and Health (Deutsche Allianz Klimawandel und Gesundheit e.V., KLUG), Participant 5

To get an overarching sector-wide insight into environmental management in German hospitals, the organisation KLUG was included. They explicitly waived confidentiality. KLUG was founded in 2017 with the aim to raise awareness of the significant health impacts of the climate crisis and the importance of reducing the ecological footprint of the healthcare system. They advise the federal government, states, municipalities, and actors within the healthcare system on climate protection and adaptation to climate impacts. Further, they incorporate content into training and further education of health professions and connect actors of the community that have an interest in climate protection and the healthcare system with each other (*KLUG*, n.d.). One interview was conducted with one of the managers of this organisation, who will be referred to as participant 5 (P5).

Table 2

Characteristics of Participants

#	department/job	current position	experience in management	professional experience in sustainability	medical background
P1	50% nurse, 25% climate management	2019 - 5 years	None	None	Nurse
P2	Head of executive department for sustainability and climate management	2020 - 4 years	20 years managing director for the technical services	Touched on the topic of sustainability before current position	Had training as a nursing assistant for 2 years
P3	Hospital developer in charge of sustainability-related topics	2021 - 3 years	Completed a management trainee program	None	None
P4	Head of executive department for sustainability management	2024 - 2 months	Project manager in small agency	Master's degree in applied sustainability	None
P5	Former managing director of a hospital, current managing director of KLUG	1 year with KLUG, 15 years with Hospital	Managing position in hospital for 20 years	None	Medical doctor

4.5 Interview Procedure

Interviews were conducted online via Google Meet due to the different location of interviewer (New Zealand) and interviewees (Germany) and they were held in German, as the interviewer and interviewees are German native-speakers. After a short introduction, where interviewees had a chance to ask any remaining questions, interviewees were asked to answer multiple open-ended questions and if necessary follow-up questions to gain more insight into change initiatives, individual drivers, barriers, facilitators, strategies, processes and management practices. All interviews were audio recorded, orthographically transcribed in German and double-checked to ensure correct transcription. A total of five interviews were held online and recorded. They took place between May and July 2024 and lasted between 50 and 86 minutes.

Before starting analysis, the transcripts were translated into English by the author (researcher-translator) who is bilingual and speaks German and English. Furthermore, the author has a comprehensive understanding of both languages and the culture surrounding those languages, which Yunus et al. (2022) argue to be of great importance for the accuracy of the translation. An alternative

approach that was considered but decided against, was to analyse the interviews in German and then translate codes, categories, subthemes, themes and certain text excerpts to include in the thesis. Although this would have required less effort, it also would have meant that due to the language barrier, no discussion with supervisors could have taken place during the analysis (Yunus et al., 2022).

During the translation process, it is imperative to maintain the original meaning and subtext of the participants' words to prevent interference with understanding and interpretation. To ensure correct translation, multiple approaches exist (Behr & Braun, 2023; Yunus et al., 2022). Behr and Braun (2023) compared the process of back-translation with the team-approach. Back-translating means to first translate the transcript from German to English and then translate it back to German to compare both German versions with each other. In this way, mistakes can be found and corrected. However, Behr and Braun (2023) observed that this approach showed some inconsistencies, because often the exact wording was translated but meaning was lost along the way. This was also observed by Yunus et al. (2022) when they mentioned that a word-by-word translation, which occurs when taking the back-translation approach, increases the risk of loss of meaning. Another flaw Behr and Braun (2023) found was that sometimes both documents in the original language were identical, but the translated version still showed errors. The team-approach, on the other hand, in which a team of bilingual people translated the documents individually, compared them and discussed differences, had more accurate results (Behr & Braun, 2023). However, due to the lack of a bilingual research team, this approach was not feasible to this research.

The approach to translation that seemed most suitable for this thesis was consultation (Yunus et al., 2022). In this case, translation was conducted from German to English by the author. If there were any uncertainties regarding the translation, consultation with an English native-speaker was then sought, who has a deeper linguistic and cultural understanding of the English language and is familiar with the topic. In this case, the consultant was one of the supervisors. In this way, two main challenges with conducting bilingual research were addressed. First, divergent grammatical structures are an obstacle to translation. Yunus et al. (2022) found that sometimes the translated text was grammatically correct, but not how an actual native-speaker would say it, inducing a loss of meaning. Secondly, they argue that translating metaphors and slang words are difficult for someone who is not a native-speaker, causing a loss of understanding. Through consultation with an English native-speaker this was prevented (Yunus et al., 2022). After the translation and consultation, a thorough re-check was conducted to ensure correct translation.

4.6 Analysis

To generate a deep understanding of the issue and new insight into the topic, the chosen analysis was thematic analysis. Braun and Clarke (2006) suggest that thematic analysis is flexible, has potential to reflect reality, but also to go beyond that and unravel the reality. Therefore, it appeared suitable to identify and analyse the context-specific factors that allow managers to integrate environmental management into their hospitals. Additionally, thematic analysis summarises key features of data and can generate rich, detailed, and complex results. For the analysis, an inductive approach was sought. This ensured that data were coded without trying to fit to a pre-existing coding frame, and without taking the researcher's individual view of the topic or knowledge about it into account. Instead, codes were linked to the data themselves, and not to the questions asked, so that analysis was data-driven as opposed to being driven by the researcher (Braun & Clarke, 2006). To support the organisation and visualisation of research data, NVIVO14® was used (Tonin et al., 2023).

To ensure high quality thematic analysis, the step-by-step guide by Braun and Clarke (2006) was used as a guideline. Before starting the process of analysis, the author familiarised themselves with NVIVO14® through papers and online-tutorials. Furthermore, the author was familiarised with the collected data. Interviews were transcribed, double-checked, translated, read and re-read. During this process, first ideas and thoughts were written down. Analysis was performed at two levels: within each case and across the cases (Crowe et al., 2011). The first round of coding was conducted within each case, in which the author read the transcripts line by line to highlight interesting aspects and generate codes. In the first round of coding, 1184 codes were identified. Subsequently, the codes were compared, merged, categorised and reviewed in relation to the research questions, resulting in 38 categories with 546 codes. Then, a second round of coding was conducted, to ensure thoroughness of the research process. In this process, a few text passages were added to existing codes and two more codes were generated. At the second level, categories and codes were then compared across cases to find similarities and differences between each interview, to interpret data, and to identify repeating patterns. Further, themes and subthemes that could provide valuable insight for hospital managers and sustainability managers on how to successfully advance their level of environmental sustainability were defined, refined and named. In the end, eight themes were identified that reflect the change initiatives, the challenges in each of the dimensions influencing the implementation of the change initiatives, and enabling practices to overcome these challenges. These themes include 20 subthemes, with 27 categories and various codes. Themes were identified at an interpretative level. Therefore, analysis went beyond analysing the explicit meaning of the data, and also examined underlying ideas and assumptions. Subsequently, the themes were reviewed and

the relation between themes, subthemes, categories and codes was checked (Braun & Clarke, 2006). During this whole process, coding, re-coding, and identifying themes and subthemes were done by the author in close cooperation with the supervisors to ensure credibility of results (Derksen et al., 2012).

Before composing a written report, a prewriting phase and a composing phase have been conducted in accordance with Rockmann and Vough (2023). During the prewriting phase, the aim was to organise the data. First, to categorise the data, claim tables were developed in which data for individual claims were listed. Subsequently, these claims were brought into order to facilitate storytelling. During the composing phase, claims and quotes were linked to each other to form a broader story (Rockmann & Vough, 2023), so that finally extracts of the data set could be chosen to reflect the themes, and a written report and analysis were produced (Braun & Clarke, 2006).

4.7 Ethical Statement

Prior to data collection this study was evaluated by peer review and judged to be low risk (see Appendix E). Consequently, it has not been reviewed by one of Massey University's Human Ethics Committees. The author of this thesis is responsible for the ethical conduct of this research.

Each participant was informed that participation was voluntary and confidential if requested. Three of the participants requested confidentiality. All participants were also informed that they could withdraw from the study within one week after conducting the interview without having to give any reason. Participants were familiarised with the topic and aim of this study and received an information sheet. Subsequently, informed consent of participation was conducted. Copies can be found in Appendix C and D.

To guarantee confidentiality, the transcripts are not published in this thesis. All participants mentioned several unique features and initiatives they implemented, which would reveal their identity.

Chapter 5: Findings

This chapter presents the interview findings, with regard to the adaptive capacity of the hospitals. The intent is to address the three research questions stated in section 1.2. Eight themes were identified: change initiatives, strategy making, organising processes, management capabilities, relational assets, establishing structures, collaboration and knowledge sharing, and openness to alternative approaches. Several subthemes and categories were also identified and are discussed in the remainder of this chapter.

The eight themes are divided into three domains aligning with the research questions. The first domain (5.1) addresses sustainability actions that hospitals are actively taking to improve their environmental sustainability (RQ1) and encompasses theme 1 (change initiatives). The second domain (5.2–5.5) addresses the challenges hospitals face in implementing these actions (RQ2). It entails themes 2–5 (strategy making, organising processes, management capabilities, and relational assets), which correspond to the four dimensions shaping the change initiatives. The challenges prevent participants from achieving excellence across these four dimensions to drive change initiatives and advance the adaptive capacity towards environmental sustainability. The third domain (5.6–5.8) addresses enabling practices for hospitals to overcome these challenges and advance in environmental sustainability (RQ3). It encompasses themes 6–8 (establishing structures, collaboration and knowledge sharing, and openness to alternative approaches). Therefore, the first two domains with their five themes form the adaptive capacity (see section 3.1.3), and the last domain with the three remaining themes are practices that enable hospitals to improve the adaptive capacity and thus advance their environmental sustainability. An overview of the domains, themes, subthemes and categories can be found in table 3. Further tables which also include codes and quantity of references are presented with each theme individually.

Table 3

Overview of the Themes Table

Domain	Theme	Subtheme	Category
Sustainability actions	Change initiatives	Successful initiatives	Reducing environmental impact
			Changing the structure of the hospital
		Unsuccessful initiatives	Waste management
		Initiatives in progress	Reducing environmental impact
			Raising awareness
			Increasing resilience
			Assessing and reporting environmental impact
		Blocked initiatives	Building and renovations
Challenges in implementation	Strategy making	Strategic approach	Development of a sustainability strategy
			Setting of strategic goals
		Decision-making	Prioritisation of environmental sustainability
			Decision-making body
	Organising processes	Environmental management	Environmental impact assessment
			Evaluating and adjusting initiatives
			Sustainability reporting
		Implementing initiatives	Facilitators
			Coordination of implementation
Challenges in implementation	Management capabilities	Management's attitude and skills	Higher level managements' attitude
			Skills of sustainability managers
		Adaptive dedication	Opportunity of devotion to sustainability
			Openness to change
	Relational assets	Relationship with key stakeholders	External stakeholders
			Internal stakeholders
		Communication with key stakeholders	Communication with external stakeholders
			Communication with internal stakeholders
		Changing behaviour	Difficulties to change behaviour
			Raising awareness
Enabling practices	Establishing structures	Establishing an executive department	-
		Having appropriate management capabilities	-
		Creating a Green Team	-
		Appointing sustainability ambassadors	-
	Collaboration and knowledge sharing	Cooperation with external organisations and other hospitals	-
		Cooperation with external stakeholders	-
		Cooperation with internal stakeholders	-
	Openness to alternative approaches	-	-

5.1 Sustainability Actions: Theme 1—Change Initiatives

The first theme is change initiatives and reflects the change initiatives hospital management implemented or tried to implement. During the interviews, participants were asked to elaborate on some of the change initiatives they were able to implement successfully, change initiatives they were unable to implement, and change initiatives they are currently working on implementing. Follow-up questions aimed at challenges they were facing and ways to overcome them. Thus, four subthemes with various categories were identified: 5.1.1 successful initiatives, 5.1.2 unsuccessful initiatives, 5.1.3 initiatives in progress and 5.1.4 blocked initiatives (Table 4).

Table 4

Theme Table, Domain 1—Sustainability Actions, Theme 1—Change Initiatives

Domain	Theme	Subtheme	Category	Codes	# of cases	# of references
Sustainability actions	Change initiatives	Successful initiatives	Reducing environmental impact	Saving money	5	26
				Low-hanging fruits	5	34
				Complex and/or expensive	2	5
			Changing the structure of the hospital	-	3	3
		Unsuccessful initiatives	Waste management	Competition to other priorities (hygiene, money, time	5	33
				Lack of environmental supply	3	4
				Lack of knowledge	3	8
				Lack of political support	5	22
				Organisational complexity	5	9
		Initiatives in progress	Reducing environmental impact	Green hospital food	5	12
				Mobility	4	11
				Waste	2	3
			Raising awareness	-	5	12
			Increasing resilience	Heat protection	5	31
				Climate change related	2	3
			Assessing and reporting environmental impact	-	5	8
		Blocked initiatives	Building and renovations	Financial difficulties	4	7
				Organisational complexity	2	6

5.1.1 Successful Initiatives

The subtheme *successful initiatives* encompasses two categories: reducing environmental impact and changing the structure of the hospital.

Reducing environmental impact

With regard to reducing the environmental impact, most participants mentioned initiatives that were either motivated by saving money, low-hanging fruits, meaning initiatives that could be implemented quickly and easily, or invisible initiatives that did not require cooperation from others. P1 and P5 explained that initiatives that save money are important for convincing management to support measures, because financial profits are invariably well received. Most often, initiatives motivated by money aimed at saving energy. In these cases, the reduction of the environmental impact was often only a by-product, as P5 pointed out. They also mentioned that one advantage of energy related initiatives is their invisibility to the workforce, therefore requiring little to no cooperation or change in behaviour, which in turn inhibits resistance, thus facilitating implementation. Another advantage was mentioned to be the ability to initiate these changes, without having to discuss them endlessly (P1). Such invisible initiatives targeted at energy supply were implemented by all participating hospitals. At H1, for example, they converted their power plant to a more environmentally friendly one and at H4, they initiated a switch to green electricity. While the latter was not motivated by saving money, it was still an initiative that could be implemented easily, quickly, and did not require a change in behaviour. Furthermore, management was willing to pay a higher price to save emissions:

> A topic where we can actually pretty easily save emissions (...) is the switch to green electricity. Despite the whole Russia Ukraine problem, where of course energy prices have risen extremely. Nevertheless, we decided to do it because it constitutes an incredibly large part. We're talking about 20,000 tons of CO2 equivalents annually that are saved by switching to green electricity alone. (P4)

H1, H2 and H3 invested in building management technology. While these initiatives also do not require a change in behaviour, they do improve measuring and controlling of energy consumption, contributing to assessing the own environmental impact of a hospital.

Other successful initiatives aimed at changing printer management, pharmaceutical supply and waste management. Most of these initiatives were also implemented due to their simple and inexpensive

implementation. For example, P1 explained that changing the printer management to duplex printing, was a fairly easy and quickly implementable initiative, while being inexpensive and resulted in saving emissions and money. P3 mentioned an uncomplicated switch of a specific medication based on their environmental impact. For this, the head of pharmacy was contacted and instructed to only hand out the product with the lower environmental impact, unless specifically prescribed otherwise. This was initiated by an individual of the workforce and because of the structure of their hospital, they were able to coordinate and implement this initiative effortlessly. Successful initiatives that address waste management were initiatives that did not require a lot of effort or cooperation, such as switching the supply for coffee creamer from small one-portion packages to larger ones (P1), or donating food scraps to a biogas plant (P3). These initiatives that could be implemented quickly and easily might not have the largest effect on the environment. However, all participants perceived this to be an important first step to raise awareness and have quick results to present to further motivate people:

> It's important to just accomplish these low-hanging fruits, so that you quickly and easily have something to show for. I think that's important for the acceptance and also for motivation of the team. (P3)

One more complex initiative was the recycling of anaesthetic gases. P4 explained that they converted 80 anaesthesia delivery machines, so that they are able to recycle anaesthetic gases to save emissions. While they are currently unable to calculate the precise footprint, they mentioned it is said to be about ¼ to ⅓ of the emissions in a hospital that are actually caused by anaesthetic gases. Now, since the conversion, P4 explained that these gases cannot escape into the atmosphere through exhaust anymore, but are collected accordingly and recycled. Despite the higher level of effort that was required for implementing this initiative, they were able to accomplish this, primarily due to very supportive management committed to environmental sustainability.

Another initiative that P4 mentioned, unfortunately cannot be named here because it would breach confidentiality. This initiative involved coming up with new ways to generate energy. Due to the unique location of that hospital, it might not be feasible for other hospitals, but highlights their innovative approach to think outside the box and have the courage to try something new. This initiative was pushed along through individual initiative by the engineering department. P5 pointed out that this was the case for many other hospitals as well, especially for energy-related initiatives.

To measure the success of initiatives, H2 explained that they measure their environmental impact and prepare a sustainability report according to the structure of the German Sustainability Code. Of the participating hospitals, they are the only one that has been able to prepare a sustainability report so far. A reason for this is claimed to be early dedication to the topic and sufficient time to address all the aspects required for this.

Changing the structure of the hospital

A few hospitals have begun to implement changing initiatives regarding the structure of the hospital. H2 and H4 established an executive department for sustainability, a Green Team, and environmental ambassadors in every department of their hospitals and H3 created a Green Team. While the main objective of these changes is not directly to impact the environment, they believe this could set the framework to facilitate implementation of initiatives that impact the environment:

> I definitely see this (creating the structures) as a success, because it's the basis for us to be able to keep pursuing this with relatively small hurdles and we were able to establish these good connections both with the decision-making level and with our workforce. (P4)

Summing up, these examples highlight that most of the successful initiatives were money-related, small initiatives or low-hanging fruit, and environmental sustainability was often more of a by-product. However, some hospitals were able to implement initiatives that were directly related to environmental sustainability, despite them costing more money or requiring more effort. In these cases it was observed that individual initiatives, support from management, and a proper structure that facilitates coordination and communication are imperative. Sections 5.2–5.5 analyse the reasons and challenges for successful implementation of change initiatives in more detail.

5.1.2 Unsuccessful Initiatives

This subtheme encompasses one category: waste management.

Waste management

While a few initiatives regarding waste management were implemented successfully, the majority of the participating hospitals experienced unsuccessful implementation of waste management initiatives.

For some participants waste management seems to be a general problem. For example, P1 explained that they are struggling with waste management because the supply is not set out for sustainable waste management and plastic reduction. Furthermore, they observed that the product quality is getting worse, resulting in a higher demand for certain products:

> Plastic reduction and so on, that's really still a huge task to tackle. (...) and I notice that the materials from the manufacturers that are available, get worse and worse (…) when I compare what I used ten years ago and what I use today, for example regarding oral care sets, it's an ecological catastrophe as far as waste is concerned. It's not pure, it's not recyclable. (P1)

Other participants mentioned more specific waste initiatives they were unable to implement. H2, for instance, tried to recycle respirator masks. They conducted a trial run in which it was observed that the germ reduction during the recycling process was insufficient. Thus, they were unable to commit to this initiative. H3 wanted to engage in the recycling of anaesthetic gases, but claimed they underestimated the hurdles. Further, a lack of knowledge about the effectiveness of this initiative was mentioned as a barrier:

> It hasn't really been proven in the expert committees whether it's really that good. There are still canisters that are transported through Germany and are burned somewhere. (…) Also, you can't just put these filters on every anaesthesia machine because it's still a medical device. So those are hurdles that I underestimated a bit. (P3)

Another initiative they dispersed was recycling of staplers in the operating room. They had an offer from a firm who would collect and recycle them. However, this offer was linked to a purchase quantity. P3 stated that they were unable to find an offer for a purchase that just focuses on the environment, without being linked to any purchase quantity. Furthermore, they are part of a purchasing consortium that does not allow for these kinds of changes that easily and quickly.

Summing up, it was observed that reasons why initiatives had to be dispersed were a competition with hygiene, lack of knowledge and environmental supply, and organisational complexity. They will be analysed in more detail in sections 5.2–5.5.

5.1.3 Initiatives in Progress

This subtheme encompasses four categories: reducing environmental impact, raising awareness, increasing resilience and assessment, and reporting of environmental impact.

Reducing environmental impact

All participating hospitals are currently in the process of implementing change initiatives to reduce their environmental impact. Three main topics were revealed in the interviews: green hospital food, mobility, and waste management.

The switch to green hospital food is being carried out in all participating hospitals. Due to their line of work, P1 mentioned they feel obliged to offer healthy and sustainable nutrition. While the ultimate goal often is meatless catering, P2 explained why this is not yet an option:

> Currently, that ends where the hospital is trying to act as a controller because that's precisely what is perceived as intrusive by patients and employees. When we say we don't serve meat at all because it puts a greater burden on the world, then people will complain. Especially with the shortage of skilled workers that we have and with the need to satisfy patients, it would certainly be unwise to put the abstract common well-being of the world above the happiness of employees and patients when it comes to eating. (P2)

Thus, lack of behavioural change and understanding are perceived as the main challenge. As a result, all participating hospitals aim to successively reduce meat consumption and offer regional food. Implementation of these initiatives so far has been possible because of close cooperation and communication with the responsible departments.

Change initiatives regarding mobility often include promoting bike-to-work initiatives, as P5

observed. P1 confirmed that by explaining how every summer, they initiate a biking competition and the winner gets a prize. P2 also mentioned they encourage employees to use public transport or the bicycle for commuting to save emissions, as well as switching all of their vehicles to electromobility to contribute to their emissions savings. However, P2 also pointed out that often personal happiness takes precedence over environmental protection. P5 confirmed that by indicating that it does not matter how much hospitals promote initiatives such as bike-to-work. In the end, after the late shift, most employees still take their own car instead of the bicycle:

> There are very personal reasons why they don't go down the path of the best possible sustainability and protection of the world, but why they do other things that make them more happy personally or that are less exhausting. (P2)

P4 also mentioned the need of commuting via public transport or bicycle to save emissions and thought about how they could incentivise these options. Therefore, they built a parking lot for bicycles, but witnessed that it is not being used as much as they hoped. They are currently working on making this more appealing for the workforce by trying to offer company bike-leasing. Even though they have had several requests for this, they are still unable to offer this due to political barriers:

> We're not allowed to offer company bike-leasing (…). This has to do with the collective agreements. There are still some public servants at (our hospital) and because of the fixed terms of their employment agreement, it's practically impossible to carry out this salary sacrifice (drop in salary) that such a bike-leasing contract would entail. (P4)

While they stated that they are engaging in discussions with the Government to overcome this barrier, to this point they have not been able to accomplish this and do not experience sufficient political support in this regard.

Initiatives in progress regarding waste management often are limited to measuring the amount of waste, as P2 and P3 mentioned. Both mentioned the aim is to recycle as much as possible, but it presents itself to be challenging, because they are bound to the cooperation from everyone on the wards. This means they have to change their behaviour and start recycling, which often is difficult. They are working to resolve this in cooperation with their waste manager (P3) and promoting waste separation to facilitate recycling (P2). Another initiative H2 is currently working on improving, is the

recycling of breathing tubes. In this case, organisational complexity and logistics appeared to be the main barrier:

> The biggest problem is the collection in the multiple departments, so we also have to manage the in-house logistics. This is going well in the pilot phase, but going forward, we are asking ourselves how we can manage to ensure that it's collected separately in all departments, transported separately and then also disposed separately at the disposal yard. And that these separately collected hoses then don't go back into the normal waste. This requires a lot of organisational effort. (P2)

Raising awareness

Every participating hospital is also focussing on raising awareness within the workforce, because this is expected to lead to changes in behaviour. P5 generalised this by explaining that an increasing number of hospitals in Germany is beginning to take behaviour into account. At H1, they began climate training for employees three years ago, and now they are beginning to notice changes in behaviour which they attribute to a better understanding and awareness about the issue. P2 explained they do not solely offer training to the workforce, but also to people at management, to be able to address environmental sustainability from all directions.

P1, P2, P3 and P4 explained that one of their main tasks when raising awareness is communication. In addition to offering training, all participants explained how they communicate with employees at all hierarchy levels when implementing new initiatives. However, all participants also mentioned a communication gap that exists due to the unique working conditions of employees. P1 and P4 explained that clinical personnel are more difficult to reach than non-clinical personnel. P5 observed that generally doctors are most difficult to reach, while P3 pointed out that in their hospital the nurses are the ones that are most difficult to reach. These issues regarding communication make knowledge distribution challenging and result in a difficulty to raise awareness to change behaviour.

Increasing resilience

Every participating hospital mentioned initiatives to increase their resilience. Mostly, these initiatives focus on heat protection plans. All participants explained that they are currently conducting or have already come up with a heat protection concept that now needs to be implemented. According to P1 this is the main challenge, as it requires cooperation and behavioural changes from everyone in the hospital, including patients and visitors:

> The best example is always the heat protection concept. None of this works because the windows are constantly open. And I can't really intervene there. No, it's the service staff. It's the nurses, it's the doctors, it's the patients. It's the relatives who have to work on this. (P1)

P3 and P4 are currently testing cooling vests to help alleviate the burden of the heat. P2 is also considering future crises and aims to anticipate them to prepare accordingly. P3 addressed the issue of flooding. Due to their location, they are at risk of flooding, but currently they do not have sufficient measures in place if that were to happen. They stated that this is a topic they will have to address more intensively in the future.

Assessing and reporting environmental impact

While H2 already does and continues to work on assessing their environmental impact and reporting about it, H3 and H4 are currently in the process of preparing for it. This, however, appears to be a complex initiative for several reasons. Due to organisational complexity of hospitals, assessing their own environmental impact is challenging, as P4 explained. P3 mentioned they have a problem with data availability. While they are able to measure energy consumption, they are still lacking many other numbers and do not have enough knowledge about their own environmental impact, especially when it comes to CO2 emissions. P5 pointed out that generally, in Germany the lack of knowledge about the environmental impact of the supply chain is an even bigger issue:

> It just gets very complex with Scope 3, because so many players come in, where the individual healthcare facility naturally reaches its limits very quickly. Appropriate political regulations would be needed here, such as a mandatory database for pharmaceutical products, so that I can also find information about the CO2 footprint in addition to the price and availability. (…) But when I don't know the footprint, I can't base judgments on it. (P5)

All participants agreed that an important facilitator that is expected to push reporting initiatives along, is the new CSRD guideline, which will force hospitals to prepare a sustainability report in the future.

5.1.4 Blocked Initiatives

The subtheme blocked initiatives encompasses one category: building and renovations.

Building and renovations

A few initiatives have been mentioned as blocked initiatives which they would like to implement, but the conditions do not allow it, resulting in hospitals not even trying to implement them. Mainly, they revolve around buildings and renovations. P2, P3 and P4 explained that building a new building that takes sustainability issues into account would help save emissions. However, the funding situation and lack of political support prohibits this:

> If you want to build a new building, there are standards for this, but they do not yet include maximum sustainability and accordingly, the available funds are not sufficient. (...) There are no framework conditions for it and our legislation is not fully geared towards sustainability. (P2)

P3, P4 and P5 also observed that the funding situation often is a main challenge for addressing fundamental renovations, such as facade renovation, or improving constructions. They explained that insufficient resources exist and therefore these initiatives are often not feasible, even though they could have the potential to reduce their environmental impact, leading to missed opportunities:

> There are always things that are obvious, but can't be done for financial reasons. For example energy-efficient facade renovation. That could save an insane amount of energy, but it simply cannot be paid for. (P5)

In addition to lack of political support and lack of funding, organisational complexity also was addressed as a challenge to implement change initiatives. P5 explained that often "construction sins of earlier years" cannot be fixed because it would be too complex.

To further analyse the reasons for successful and unsuccessful implementation of these change initiatives, they first need to be investigated in relation to the four dimensions shaping the change initiatives. The following sections 5.2–5.5 (domain 2: challenges in implementation) unravel and analyse the four dimensions (strategy making, organising processes, management capabilities and relational assets), highlighting the challenges which impede implementation of these change initiatives, before turning to practices that enable successful implementation in sections 5.6–5.8.

5.2 Challenges in Implementation: Theme 2—Strategy Making

The first dimension that influences the implementation of change initiatives and therefore the second theme is strategy making. This theme explores the challenges of forming and refining sustainability strategies and reaching decisions to prioritise environmental sustainability in hospitals, impeding successful implementation of change initiatives. Two subthemes with each two categories were identified: 5.2.1 strategic approach, and 5.2.2 decision-making (Table 5).

Table 5

Theme Table, Domain 2—Challenges in Implementation, Theme 2—Strategy Making

Domain	Theme	Subtheme	Category	Codes	# of cases	# of references
Challenges in implementation	Strategy making	Strategic approach	Development of a sustainability strategy	-	5	32
			Setting of strategic goals	General goals	3	6
				Inability to set goals	2	2
				Specific goals to reduce impact	3	9
		Decision-making	Prioritisation of environmental sustainability	Competition with other aspects	5	53
				Lack of knowledge about impact	5	12
				Limited freedom in decision-making	5	9
				Limited funding	5	75
			Decision-making body	-	5	30

5.2.1 Strategic Approach

This subtheme encompasses two categories: development of a sustainability strategy and setting of strategic goals.

Development of a sustainability strategy

Based on the interviews, it became apparent that most hospitals do not have a strategy that incorporates or addresses sustainability issues. Participants mentioned lack of personnel (P2, P3, P4) and time (P1, P2, P4) as barriers to developing a strategy. P1 further pointed out that successful

implementation of change initiatives often rather depends on cooperation and motivation of employees, and not necessarily on a strategy. Consequently, they prioritise other aspects over developing a strategy, such as raising awareness to encourage behavioural changes. So far, only one of the participating hospitals has been able to develop a sustainability strategy. P2 explained that because of the establishment of their sustainability department, they were able to overcome these barriers, devote their time to this and construct a sustainability strategy in close cooperation with their hospital management. Having this strategy allows them to ensure prioritisation of environmental sustainability throughout the hospital when considering new change initiatives. P4 also perceives this to be imperative for further successful implementations of change initiatives addressing environmental sustainability and explained that they are currently in the process of developing such a strategy. P1 and P3, on the other hand, claimed they are currently lacking the resources (time and personnel) to develop a strategy.

Setting of strategic goals

When asked about their strategic goals, some participants pointed out that they have not been able to set specific strategic goals addressing sustainability. P1 reported that they are unable to focus on setting sustainability goals, because they do not have the resources (personnel and time) to address it accordingly. Furthermore, they are constantly fighting to maintain hospital operations, which is their main focus alongside quality patient care, while reducing their environmental impact as much as possible is only secondary. P3 reported their general goal is to keep their environmental footprint as small as possible, while not neglecting social governance. They further explained that the difficulty of setting goals is that without a strategy and without being able to measure the environmental impact, they cannot set specific goals as they would have no way of evaluating whether they have reached the goals. This highlights the close relation of strategy making to organising processes, where the issues of measuring and evaluating are priorities.

P2 and P4 have set more precise goals. P2 explained they have two main goals: reducing their environmental impact in alignment with the SDGs, and reducing CO2 emissions. They have anchored these goals in their sustainability strategy and broken them down into subsections, regarding material usage (using as little resources as possible and selecting resources according to impact), emissions (mobility, energy), and waste management (waste generation, recycling). P4 explained they have three visions: being a Green Hospital, which focuses on reducing their CO2 footprint, a Smart Hospital focusing on digitalisation of processes, and a Human Hospital, where humanity is addressed. Years ago they addressed the topics regarding the Smart hospital, and currently,

becoming a Green Hospital is their main focus. In addition to saving emissions to reduce their footprint, they also focus on establishing a functioning sustainability management system to bring about a change in organisational culture.

5.2.2 Decision Making

This subtheme encompasses two categories: prioritisation of environmental sustainability and decision-making body.

Prioritisation of environmental sustainability

The interviews revealed that the participating hospitals often are unable to reach decisions that prioritise environmental sustainability. The main reason for this was mentioned to be the competition of sustainability with other priorities, such as hygiene, patient safety, quality care and finances. Other barriers that were mentioned include the general funding situation for hospitals in Germany, limited executive freedom for hospital management in decision-making and limited knowledge about their environmental impact.

P1 mentioned that, just like many hospitals, they are struggling to maintain regular operations due to the general financial situation and do not have the capacity to address many environmental sustainability issues. Instead, they have to focus on saving money, subordinating environmental sustainability, which was also observed by P5:

> Especially in Germany, many are in survival mode (…). They are deep in the red anyway and now they are supposed to take on additional tasks and drive change. That's an unfortunate mix. (P5)

Therefore, change initiatives addressing environmental sustainability are often based on feasibility, simplicity of implementation, and often aim at saving energy to save money, as P5 explained.

P2 pointed out that sometimes they have to subordinate environmental sustainability due to hygiene regulations. The unsuccessful change initiative regarding recycling of respirator masks had to be dispersed because of a lack of germ reduction. Another issue P2 mentioned, where hygiene needs to be considered, was energy saving in the operating room. They explained that indoor air technology

must never be turned off, to ensure patient safety. However, they found it to be unreasonable in terms of energy and are trying to find common ground with the hygiene department to avoid risks for patients, but also save energy. P4 also highlighted the challenge of balancing costs with hygiene and environmental sustainability:

> (Sustainability) is certainly not always a decisive factor, especially if we have to decide between the topic of profitability or costs in general and all these hygiene requirements. (H4)

All participants agreed that in addition to balancing the costs, hygiene always needs to be considered and when in doubt also prioritised over environmental sustainability to ensure patient safety.

Lack of funding for sustainability initiatives was also mentioned to be a limiting factor for making decisions that prioritise environmental sustainability by all participants. As explained in section 2.2.3, hospitals are financed through a dual financing system and investments, e.g. new medical devices, but also buildings or renovations, are covered by their owner. However, funding providers usually view the price as the decisive factor without calculating follow-up costs or considering the environmental impact, resulting in hospitals not receiving enough financial support for initiatives that prioritise environmental sustainability:

> Publicly owned hospitals are forced to use the procurement rights of municipalities. And for that, there is usually only the price that's considered. And what comes afterwards doesn't really matter. So they often bought real energy guzzlers, simply because they were a bit cheaper and therefore got the subsidy. (P5)

While publicly owned hospitals are owned by the city, privately owned, not for-profit hospitals, as is H1, are not. In their case, they are owned by a church, who as stated in the interviews, was able to provide more financial resources. However, P1 stated that they still have difficulties getting sufficient funding for their investments. Furthermore, P3 mentioned that in Germany, several governmental funding opportunities for investments exist, for which all hospitals qualify. However, applying for these funds is exceedingly complicated as P1, P3, and P5 explained, and many hospitals do not have the resources (time, personnel, expertise) to follow up on the applications:

> Deadlines often can't even be met at all, because you basically must have planned a project from start to finish, and know what you need when, where and how. You have to have all the cost estimates before you can even apply for funding and by the time your application gets approved, sometimes the cost estimate has already expired. (P1)

Moreover, even if an application gets approved, only up to half of the investment actually can get subsidised and the remaining money still has to be raised somehow, as P2 and P3 explained. Therefore, many hospitals make no effort to apply for governmental funding for investments in the first place, as pointed out by P1, P3 and P5.

Another issue that emerged from the interviews is lack of hospitals' independence. Most participating hospitals are subordinated to a parent company. While hospital management has the executive power on certain decisions, the parent company is responsible for others. Therefore, there are issues on which hospital management cannot decide and therefore cannot prioritise environmental sustainability. P1 illustrated this by explaining that when they first wanted to switch to green hospital food, they were unable to do so because this topic was within the control of the parent company.

All participants explained that their aim is to consistently prioritise environmental sustainability, but because of these challenges it is not always feasible. It is, however, always at least discussed and considered, as P2, P3 and P4 reported. P2 explained that whenever hygiene regulations allow it, they prioritise environmental sustainability. For instance, they claimed that when selecting resources, they look for suppliers and manufacturers who operate environmentally sustainable. However, P5 pointed out that generally, these aims can only be achieved to a limited extent. Often suppliers and manufactures have no knowledge about their environmental impact themselves, making it impossible for hospitals to base judgments on it. This issue, alongside the difficulty for hospitals to assess their own environmental impact, is further addressed under the theme 5.3 organising processes.

Decision-making body

The interviews also revealed challenges regarding the decision-making body. Firstly, due to the structure of hospitals, many issues concern several departments, such as hygiene, engineering, purchasing as well as the medical departments. Therefore, various people have to be involved when reaching a decision, which leads to a complication of coordination. Secondly, P1 explained that an interest in sustainability of the people making the decisions is crucial. They said that when clinical personnel reach a decision about new medical care products, they often only consider applicability and comfort, and environmental sustainability is neglected. This highlights the need of an

appropriate decision-making body that is dedicated to considering sustainability. Lastly, P3 mentioned that individual departments have no budgets set aside, dedicated to environmental sustainability. Therefore, even the smallest initiative has to go through the entire decision making body and over several instances to reach a decision, which is time-consuming. All participants agreed that large decision-making bodies impede coordination and lengthen the time it takes to reach a decision.

These specific challenges often lead to hospitals not being able to develop a strategic approach and reach decisions in favour of environmental sustainability, which in turn impedes successful implementation of change initiatives.

5.3 Challenges in Implementation: Theme 3—Organising Processes

The second dimension shaping the implementation of change initiatives and the third theme is *organising processes*. This theme explores the challenges of hospitals in assessing and reporting their environmental impact, and evaluating and adjusting initiatives, as well as facilitators and coordination processes for implementation of change initiatives. Two subthemes were identified: 5.3.1 environmental management and 5.3.2 implementing initiatives. They encompass three and two categories (Table 6).

Table 6

Theme Table, Domain 2—Challenges in Implementation, Theme 3—Organising Processes

Domain	Theme	Subtheme	Category	Codes	# of cases	# of references
Challenges in implementation	Organising processes	Environmental management	Environmental impact assessment	Advantage of knowing impact	5	9
				Lack of knowledge	5	16
				Only rough overview	4	9
				Organisational complexity	5	18
			Evaluating and adjusting initiatives	Challenge to evaluate success	4	14
				Lack of knowledge about processes	1	1
				No structured process	4	11
				Structured process	1	5
			Sustainability reporting	EU's Sustainability Reporting Directive will give it a push	5	18
				Prepare for reporting	4	5
				Reporting	1	2
		Implementing initiatives	Facilitators	Higher level management	2	3
				Individuals	5	29
			Coordination of implementation	Challenge of coordination throughout hospital	4	7
				No structure for implementation	3	5

5.3.1 Environmental Management

This subtheme contains three categories: environmental impact assessment, evaluating and adjusting initiatives and sustainability reporting.

Environmental impact assessment

All participants agreed that assessing the environmental impact is imperative for convincing management of the necessity of environmental sustainability initiatives, for successfully deriving specific measures to reduce their environmental impact and to enable them to evaluate and adjust initiatives. However, the interviews revealed that most hospitals do not have structured processes in place to assess their environmental impact. Two main reasons for this were described in the interviews: organisational complexity and lack of knowledge.

Due to the complexity of the structure of the hospitals, participants mentioned they are often unable to assess their direct environmental impact, resulting in a lack of data availability. Especially, due to the neglect of the healthcare sector regarding environmental sustainability in the past, the technology that has been implemented so far often is not equipped to assess their environmental impact. This makes the process complex and resource intensive, as P1 and P4 explained.

> We still take the meter readings manually (...). We just have these complex data structures, where things are still running in the same way they have been for the last few decades and where we can't guarantee measurability as much as we'd like to. (P4)

At H1, they recently have installed building management technology to improve their ability to measure and control data to get a rough overview of their environmental impact. However, they are constantly facing more pressing challenges that cause the establishment of further processes to assess their environmental impact to be put aside. This leads to them only having sufficient resources to perform rough calculations instead of measuring their data precisely. They even described that because of lack of personnel, resources and knowledge, they often do not dwell on measurements, when there is a logical alternative.

In addition to the resulting lack of knowledge regarding their direct environmental impact, participants also mentioned the lack of knowledge regarding the supply chain as a main barrier to assessing their environmental impact. P5 explained that in Germany, most hospitals that address their environmental impact, still focus on assessing their Scope 1 and 2 emissions, while Scope 3 emissions often remain neglected. They reported an inability to assess emissions generated by the supply chain, because often suppliers have no knowledge about the impact of their products themselves and political guidelines do not exist that regulate the data availability of technical

devices, medical supply and pharmaceuticals. This was confirmed by the other participants. P1 and P3 mentioned that they measure energy consumption and waste generation, but that is where they reach their limits when assessing their impact due to a lack of knowledge and data availability. In addition to the issues regarding the supply chain, it was also mentioned by P3 to be difficult to assess travel-related emissions from employees, patients and their visitors.

P2 claimed they have a very precise overview of their environmental impact. They measure their direct emissions and when collaborating with external organisations and suppliers, they aim to choose those who also consider their own impact. However, this approach still reaches their limits when there is a lack of data availability on Scope 3 emissions.

Therefore, even if the participants aim to assess their environmental impact, they often lack the data availability and the processes to access information about their direct and indirect impact, often leading to an inability to prioritise environmental sustainability.

Evaluating and adjusting initiatives

Most hospitals reported that they are unable to officially evaluate and adjust their initiatives. This is partly because of the inability to assess their impact, but also due to lack of personnel, resources, and knowledge about these processes. Additionally, initiatives that address behavioural changes are challenging to assess, as P1, P2, P3 and P4 reported. P1 explained that with their professional background as a nurse, they are lacking understanding about processes such as the plan-do-check-act cycle (PDCA). Furthermore, as pointed out above, they have to prioritise other issues, leading to an inability to establish these structures:

> With this (evaluating, adjusting) we're back on the subject of the hospital sector, we're just not that highly professional. (…) Also, we're very busy fending off one crisis after another. (…) we would like to come up with these really nice processes (…), but we are busy pretty much just keeping the business running. (P1)

P3 and P4 also mentioned that they do not have processes in place to evaluate and adjust their initiatives. Although they explained that whenever they notice that something is not working properly, they aim to adjust it. P4 further explained that establishing these official processes is planned to be the next step after they conquered measuring their environmental impact.

Of the participating hospitals, P2 was the only one who mentioned they have adequate processes to evaluate and adjust their initiatives:

> Our entire hospital is controlled with the appropriate management systems: quality management system, energy management system and ultimately also (...) environmental management system. These are all systems that have these corresponding continuous improvement processes as a management system, so plan-do-check-act. (...) It's a continuous control loop to improve what we do. (P2)

Sustainability reporting

It was mentioned in the interviews that assessing the environmental impact to get an overview of the hospital's impact is important for preparing a sustainability report. As with assessment, evaluation and adjustment, most hospitals do not seem to have structured processes in place to prepare such a sustainability report. This stems from the inability to assess their impact, because without the data, P4 pointed out it is impossible to prepare a report. P3 and P4 are currently in the process of preparing for reporting. They are assessing which specific data they still need and are trying to find ways on how to collect the missing data. P2 mentioned they already have been preparing sustainability reports for a few years and are therefore further along than others.

5.3.2 Implementing Initiatives

This subtheme contains two categories: facilitators and coordination of implementation.

Facilitators

All participants agreed that main drivers that facilitate implementation were mostly individuals within the hospital, who felt intrinsically and personally motivated to take on the additional task, such as nurses, individuals from the engineering or hygiene department, or in a few cases doctors that pushed specific initiatives. This was also observed by P5 to be the case for most hospitals in Germany. At H1 and H3 the first projects were initially pushed by the in-house engineering department, who valued the topic of protecting the environment. However, their focus was mainly technological and as P5 explained, technological initiatives are usually invisible to other employees and do not require their cooperation. Whereas P1 reported that they now have to shift towards

initiatives that affect employees in the entire hospital, which require a different approach than they have been following for the technologically-driven initiatives.

Coordination of implementation

During the interviews it became clear that facilitators that induce implementation of environmental initiatives vary, depending on the individual initiative. In these cases, the establishment of structured and uniform processes to implement and coordinate initiatives are hindered. P1 and P3 reported that most often, an individual implementation process that is tailored to the respective initiative is being followed. P1 explained that they neither have a structured process determining which initiatives to implement, nor a uniform process that helps coordination of implementation. They usually brainstorm which ideas are feasible and then only inform those who need to be informed depending on the initiative, because otherwise, it may lead to endless, not goal-oriented discussions. Therefore, their process of implementation varies with every initiative.

P3 mentioned that in their hospital, the Green Team determines on which initiatives to focus. Depending on the initiative, it then needs to be approved by the managing director. The implementation, however, does not follow a structured process, yet. Their wish is to implement sustainability ambassadors in every department to facilitate the process, but so far, the process of coordinating the implementation of initiatives remains a challenge for them.

> Our idea is that we establish a sustainability ambassador in every department, who basically acts as a contact person for us, but also as a contact person for the individuals in that department (...) I think we'd actually achieve a very high level of penetration with them when we really address them individually. (P3)

P2 and P4 on the other hand, mentioned to be further along in this regard. They both explained that they have a structured process of seeking approval for implementation from the board. Further, they mentioned they implement and coordinate initiatives through their sustainability ambassadors. H2 additionally reported that they also have a structured process of determining on which initiative to focus, whereas P4 is mostly trying to implement anything that is feasible with the limited resources they are given. This highlights the difficulty to establish processes to coordinate implementation of initiatives, and that even though some have processes in place, external barriers still exist and hinder the process.

These challenges often result in hospitals not being able to establish processes to assess and report their environmental impact, and to evaluate, adjust, and coordinate implementation of change initiatives.

5.4 Challenges in Implementation: Theme 4—Management Capabilities

The third dimension shaping the implementation of change initiatives and therefore the fourth theme is *management capabilities*. This theme addresses the management capabilities that are needed to implement change initiatives which are often lacking in hospitals, thereby highlighting the challenges. Two subthemes with each two categories were identified: 5.4.1 management's attitude and skills, and 5.4.2 adaptive dedication (Table 7).

Table 7

Theme Table, Domain 2—Challenges in Implementation, Theme 4—Management Capabilities

Domain	Theme	Subtheme	Category	Codes	# of cases	# of references
Challenges in implementation	Management capabilities	Management's attitude and skills	Higher level managements' attitude	-	5	43
			Skills of sustainability managers	Knowledge about hospital structure	3	8
				Managerial skills	4	6
				Personal skills	5	22
		Adaptive dedication	Opportunity of devotion to sustainability	Not solely dedicated to sustainability	3	6
				Solely dedicated to sustainability	3	5
			Openness to change	Employee's willingness to support measures	2	3
				Look for alternatives	4	9
				Management's willingness to invest and support	3	6

5.4.1 Managements' Attitude and Skills

This subtheme contains two categories: higher level managements' attitude and skills of sustainability managers.

Higher level managements' attitude

All interviewees agreed that hospitals' higher level managements' attitude is vital for shifting towards environmental sustainability. Irrelevant of how dedicated the individuals are, if management does not confirm and support the changes, they agreed that nothing would change. Managements' perception of the role of hospitals regarding climate change seems to be of similar importance, according to the participants. They agreed that while hospitals contribute largely to climate change, they also have a special opportunity to turn things around because of their unique standing in society and their high credibility. Additionally, it was mentioned by P5 that climate protection is a prerequisite for good health, and therefore, addressing climate change as a hospital is often viewed as self-preservation. Thus, it became apparent that managements' attitude is imperative to implementing change. All interviewees reported having a supportive management, which was perceived as an advantage.

> It's always a matter of consideration. Do you do the sustainability project or do you do some other important thing, often because of financial resources? I believe that if you don't have management's support, you won't get very far. (P3)

Skills of sustainability managers

Further, it was reported that sustainability managers have to have management skills (P2, P5), be knowledgeable about structures in hospitals (P2, P4), and have personal skills, such as assertiveness and authority (P1, P2). However, it was reported that sustainability managers often lack certain skills. P2 pointed out that often sustainability managers have a management or sustainability background, but lack knowledge about structures in hospitals, which they perceive as problematic. P4 confirmed this, by explaining how they do have management skills, but no medical background and therefore lack knowledge about the hospital-specific challenges within individual departments:

> My colleague and I are not the experts for how things actually work, for example in the operating room, what are the processes that could perhaps be reconsidered there? These are such complex structures in hospitals, we can't think our way into everything or uncover all the issues. (P4)

P1, on the other hand, explained that with their medical background as a nurse, they understand the structure and processes in hospitals. They are aware of hospital-specific challenges, such as lack of time and personnel, and can relate to the constant stress clinical employees experience, even without the pressure of being more sustainable. However, P1 also reported that because of their standing in the hospital, they sometimes lack the authority to get employees in higher positions, such as doctors, to comply. Furthermore, due to their lack of managerial skills, they are often unable to manage certain processes aimed at project management.

Another skill that, according to the participants, is crucial but challenging for sustainability managers is the ability to motivate others to engage and change their behaviour. Success of implementing change initiatives often depends on the cooperation from everyone within the hospital. To encourage employees to cooperate, participants agreed that sustainability managers have to be able to communicate effectively, encourage participation and critical thinking, as well as raise awareness and distribute knowledge. P1 noticed that the more people understand the severity and necessity of sustainability initiatives, the more they are willing to support measures. Therefore, to achieve the change in behaviour, communication skills to distribute knowledge are a substantial part of the managerial skills sustainability managers must have:

> In the end, it always depends on the people in the company or hospital who have to change their behaviour. And you need someone who essentially brings in the understanding, the mindset, who explains why we're doing it in this way in simple terms. (P1)

5.4.2 Adaptive Dedication

This subtheme contains two categories: opportunity of devotion to sustainability and openness to change.

Opportunity of devotion to sustainability

The opportunity for sustainability managers to devote themselves to sustainability was also mentioned to be a challenge. In many hospitals, the position for sustainability management is merged with other positions, or only filled by someone who works part-time who also has to tend to other tasks. For instance, P1 also works as a nurse and only has eight hours per week dedicated to sustainability management. Hence, challenges were described to be lack of time to thoroughly

address issues and difficulty to separate the tasks of climate manager and nurse. P3 is officially working in hospital development, and therefore also has to address other tasks besides sustainability, mostly related to change management. Additionally, they also work part-time. They explained that they would profit from someone who only works on the topic of sustainability and who does this full-time. P2 and P4, on the other hand, both mentioned that their ability to completely dedicate their time to sustainability seems to be one of the reasons they progress faster than others:

> I'm the only one who is committed exclusively to the topic of sustainability or even who officially has working time for it (…) Often (other hospitals) don't have a sustainability management position so they can't or aren't allowed to devote themselves completely to this topic. (…) I notice that this is a really big advantage and why we can actually take appropriate steps faster. (P4)

Openness to change

The interviews revealed that management needs to be willing and ready to support change. P3 reported that without management's willingness to support, individual initiatives would simply be stopped. P1 explained that their management is even going further and is not only supporting change initiatives, but also investing in the right measures to pave the way for further changes. P2 agreed and claimed that there is always a competition with something else, and therefore hospital management has to be willing to engage to actively push sustainability along, instead of only desiring it. P1 further revealed that in the workforce, willingness to support change is mostly present, but they are often missing the willingness to actively change their own behaviour. However, sustainability affects every area of their hospital, and therefore they claimed that "everyone has to be ready for the most brutal change". This highlights the importance of getting everyone on board and motivating employees to participate and change their own behaviour, which remains to be a crucial challenge for sustainability managers.

Another challenge that was mentioned in the interviews was the ability to handle resistance. Often, initiatives were planned but could not be implemented for various reasons which is why participants constantly had to look for alternative approaches. For instance, P2 explained that when they tried to find solutions regarding the constantly running indoor air technology in the operating rooms, they were looking for alternative ways to be more environmentally friendly without harming patient safety. P1 explained that they encountered resistance when they wanted to switch to a meatless

patient food and therefore had to look for an alternative approach to change hospital food. They further reported it is imperative to know when to look for alternatives or when to just stop and shift efforts elsewhere:

> I don't dwell on something like that (hindrance, resistance), I know I won't get any further, so what's the point, (…). I can get upset about it for three hours. But I can also just continue working. (P1)

Analysing managements' capabilities show that they are imperative to successfully implementing change initiatives to advance environmental sustainability.

5.5 Challenges in Implementation: Theme 5—Relational Assets

The last dimension influencing the implementation of change initiatives and the fifth theme is *relational assets*. This theme addresses the challenges of dealing with various stakeholders and changing behaviour of employees which affect the implementation of change initiatives. Three subthemes with each two categories were identified: 5.5.1 relationship with key stakeholders, 5.5.2 communication with key stakeholders, and 5.5.3 changing behaviour (Table 8).

Table 8

Theme Table, Domain 2—Challenges in Implementation, Theme 5—Relational Assets

Domain	Theme	Subtheme	Category	Codes	# of cases	# of references
Challenges in implementation	Relational assets	Relationship with key stakeholders	External stakeholders	Lack of external support	5	16
				Limited external pressure	5	28
			Internal stakeholders	Clinical personnel	4	20
				Non-clinical personnel	5	42
		Communication with key stakeholders	Communication with external stakeholders	-	4	6
			Communication with internal stakeholders	bottom-up communication	4	15
				direct, verbal communication	4	14
				poor reachability of clinical personnel	3	14
				top-down communication	3	5
		Changing behaviour	Difficulties to change behaviour	-	5	64
			Raising awareness	-	5	97

5.5.1 Relationship with Key Stakeholders

This subtheme encompasses two categories: external stakeholders and internal stakeholders.

External stakeholders

Regarding the external stakeholders, the interviews confirmed what is already known and well described in the current literature (see section 2.2.1). They were mentioned to include the city, politics, media and patients and their exerted pressure and support of sustainability initiatives are scarce. Even though the political pressure is slowly growing, especially due to the CRSD reporting guidelines as all participants pointed out, most external stakeholders are still not overly interested in environmental sustainability in hospitals.

Internal stakeholders

Internal stakeholders that were addressed in the interviews can be divided into two categories: non-clinical and clinical personnel. Most participants experience non-clinical personnel to be more engaged, more supportive and easier to reach than clinical personnel (P1, P3, P5). P1 and P5 even reported an indifference of clinical personnel regarding environmental sustainability. They mentioned that especially doctors seem to be difficult to engage and they often act as a hindrance to implementing sustainability initiatives. However, convincing them of the importance of changes towards environmental sustainability is essential to success, because as P5 mentioned, due to their prescriptions and orders of examinations, doctors are highly responsible for the emissions of the hospital. Additionally, P1 mentioned they have a high signalling effect and could influence others as well. So, while the relationship with external stakeholders is almost non-existent, a relationship with internal stakeholders exists, but needs to be improved, especially with clinical personnel. Additionally, P1 observed that clinical staff often prefer other values, such as patient care, over environmental sustainability. Furthermore, P1 and P3 explained that clinical personnel are often understaffed, which results in them being unable to dedicate time and effort to consider environmental sustainability during their regular work day.

5.5.2 Communication with Key Stakeholders

This subtheme contains two categories: communication with external stakeholders and communication with internal stakeholders.

Communication with external stakeholders

Some participants mentioned they communicated with external stakeholders. P4 explained they are constantly engaging in discussion with their Government to facilitate initiatives, such as offering company bike-leasing. P2 and P1 also reported regular exchange with politicians to find solutions for certain issues. For example P1 tries to cooperate with them to overcome the difficulties for governmental funding applications. P5 explained that as an NGO, they aim to influence politicians and to shape legislation in the direction of environmental sustainability. They further highlighted the importance of cooperating with politics and the city to move the entire healthcare sector along, because as they explained, no one can solve this issue on their own and without external support.

Communication with internal stakeholders

During the interviews it became clear that communication with internal stakeholders is a central and challenging task for sustainability managers. When analysing the way of communication, it stood out that the participating hospitals have different approaches of communication. One hospital, H1, follows a top-down approach, where management orders employees to accept changes. However, they also explained difficulties regarding this approach, as did P4. P1 claimed that if people are ordered to simply accept certain things, this leads to resistance from employees, and P4 explained that environmental sustainability is a topic that rather thrives on participation. P3 explained that they follow a bottom-up approach. In their case, management is supportive but does not take initiative themselves. Instead, the workforce pushes management to engage in changes. However, P3 also mentioned that they wished for more of a top-down approach, as a push from management would be expected to advance their sustainability strategy. Furthermore, P3 reported that it requires effort, time and perseverance when individuals have to constantly fight for management's acceptance of new initiatives. P2 and P4 claimed they pursue communication both ways, bottom-up and top-down. This way, management and employees push for change initiatives and also support them, which was perceived to be the most effective way to communicate, and is the desired approach of communication of all participating hospitals.

Ineffective communication was also mentioned as a challenge for sustainability managers. It was noticed to be the main reason why clinical personnel are so challenging to engage. This was attributed to their way of working. P1 explained that hospitals operate 24 hours a day and clinical personnel work in shifts, which makes it impossible to communicate to all clinical personnel simultaneously. Additionally, they often do not have access to their personal email-account. They either hardly work with computers, or share computers with others, which impedes online communication, leading to a communication gap, as stated by P1, P3 and P4. Therefore, they mentioned that the most effective way to communicate with clinical personnel was still individual, verbal and direct communication, which is very time intensive and requires a lot of effort. To reduce the communication gap, P1 for example reported that they still go on the individual wards to inform people about new initiatives and hang up notices on bulletin boards, which is very time-consuming. P2 and P4 mentioned that they reduce the communication gap by communicating through the sustainability ambassadors they have in every department. Non-clinical employees, on the other hand, are easier to reach, because they have regular working hours and usually have a working space with their own computer, as P3 and P4 explained.

These insights show that pursuing and initiating an effective way of communication is also a significant challenge and effective communication that reaches everyone needs to be improved.

5.5.3 Changing Behaviour

This subtheme encompasses two categories: difficulties to change behaviour and raising awareness.

Difficulties to change behaviour

As already mentioned, another substantial challenge is changing behaviour. In the interviews, it was considered to be a "mammoth task" (P1, P3, P5) which requires a lot of time and effort. One factor that seems especially relevant is that changing one's own behaviour is an individual decision made by each employee themselves. P2 further explained that they are not able to control or change personal decisions to not behave sustainably. Even if they explain the importance of sustainable behaviour, if people take the inner freedom not to do so and still take the car after a late shift or take the elevator instead of the stairs, there is nothing they can do about it. Other reasons for employee's low motivation towards sustainable initiatives were mentioned to be the priority of patient care over sustainability and a lack of time to consider sustainability in everyday life (P3).

Another difficulty was mentioned to be the lack of understanding about the severity of sustainability. P1 observed that employees are more willing to engage in changes as soon as they understand why these change initiatives are important to conduct. Therefore, it has been noticed by all participants that it is imperative to raise awareness to encourage behavioural changes.

Raising awareness

All participants have mentioned the importance of raising awareness about environmental sustainability to increase internal motivation and induce behavioural changes to facilitate implementation of change initiatives. This was suggested to be facilitated through knowledge distribution and explaining the importance of sustainable behaviour. They all have similar approaches. P1, P2 and P4 conduct training to employees to inform them about the severity of the situation and why it is important for hospitals to address environmental sustainability. P2 additionally holds training for higher level management to address this topic from all possible directions. P3 does

not hold trainings, but informs employees during ‘welcoming days’ and work meetings. Additionally, every hospital engages in online communication, such as sending out newsletters or digital flyers to inform employees of changes and new projects and their progress. Most sustainability managers, however, are only starting to witness small changes in behaviour and several challenges have been mentioned. As already described, online communication is often perceived to be an ineffective way of communication. Furthermore, P1 explained that they started conducting training three years ago, and still not everyone has been able to take part. Additionally, P1 and P2 mentioned that even though they can ensure that employees take part in these trainings, employees still can choose to be inattentive.

The analysis of the change initiatives (domain 1: sustainability actions) and the challenges which emerge in the four dimensions and influence the implementation of change initiatives (domain 2: challenges in implementation), highlights the need for improvement. While some challenges are of external nature and therefore difficult for the participants to address, numerous challenges are internal challenges that can be addressed more easily and directly. The following sections 5.6–5.8 present enabling practices that may assist in overcoming these challenges to advance in environmental sustainability. In that domain (domain 3: enabling practices), three themes were identified: establishing structures, collaboration and knowledge sharing and openness to alternative approaches.

5.6 Enabling Practices: Theme 6—Establishing Structures

In the interviews, it became apparent that the majority of the mentioned challenges can be overcome by establishing certain structures within hospitals. P2 and P4 explained that creating these structures can help incorporate sustainability into the strategy (strategy making) and facilitate coordination and implementation of initiatives. P4 and P5 mentioned that it could also facilitate the establishment of processes to assess their environmental impact and to evaluate and adjust initiatives (organising processes). It was further reported to help enforce communication throughout the hospital and increase awareness to change behaviour (relational assets) by P2, P3 and P4, as well as overcome the challenges regarding lack of skills and devotion to the topic of sustainability (management capabilities) by all participants. Four subthemes were identified: 5.6.1 establishing an executive department, 5.6.2 having appropriate management capabilities, 5.6.3 creating a Green Team and 5.6.4 appointing sustainability ambassadors. (Table 9).

Table 9

Theme Table, Domain 3—Enabling Practices, Theme 6—Establishing Structures

Domain	Theme	Subtheme	Category	Codes	# of cases	# of references
Enabling practices	Establishing structures	Establishing an executive department	-	-	5	22
		Having appropriate management capabilities	-	-	5	10
		Creating a Green Team	-	-	5	45
		Appointing sustainability ambassadors	-	-	5	18

5.6.1 Establishing an Executive Department

P2, P3 and P4 mentioned that establishing an executive department for sustainability leads to having dedicated working time for sustainability, which could help overcome challenges regarding strategy making and organising processes.

P2 and P4 explained that they have established structures at their hospitals which include an executive department with a sustainability manager that is entirely devoted to sustainability and climate protection. This way, P2 mentioned that they have been able to dedicate more time and effort to formulate a sustainability strategy. Over the years, this has been finalised due to their continuous dedication and they have formulated sub-strategies for every department. Having environmental sustainability incorporated into their strategy and sub-strategies was mentioned to ensure its prioritisation in every department and to increase their ability to dedicate resources to it, including financial ones. However, they still mention some external barriers, such as legislation and to some extent also insufficient funding for bigger investments which cannot be completely conquered, showing that even after thorough dedication, environmental sustainability still often is in conflict with other aspects.

P4 reported that before the executive department was founded, several things had already been implemented, but less with a clear strategic thought or an orientation behind it. Now, since the establishment, they are the only one in the hospital to have dedicated working time for addressing sustainability, and are planning to approach sustainability more strategically and to also include sustainability in their strategy to ensure adequate prioritisation of environmental sustainability throughout every department.

P4 also explained that the establishment of the executive department is crucial for improving their organising processes. Because of their executive power and dedication to sustainability they are able to address the process of data collection in a more structured way, which enables them to assess their environmental impact, evaluate and adjust initiatives, and prepare for reporting. H2 explained that they precisely define every step of their environmental management in their strategy, which ensures that these organising processes run smoothly in every department.

P1 mentioned that they also have an executive department for sustainability, but no sustainability manager who is completely devoted to environmental sustainability, as they only have a part-time job. This results in them having limited time to address strategic and process-oriented structures, and rather focus on more feasible and quickly implementable initiatives.

P3, on the other hand, reported that they do not have an executive department, nor a sustainability manager that is completely devoted to environmental sustainability. This means that they have additional tasks beyond sustainability, also resulting in limited time to address strategy and processes properly. Further, they mentioned that they are in need of an executive department to have someone who coordinates organising processes and where the threads all come together to faster progress towards sustainability.

P5 who has a sector-wide insight into the factors that distinguish hospitals that are further along in the process of integrating environmental sustainability than others, observed that more advanced hospitals have established structures where people are solely dedicated to sustainability:

> The good ones (hospitals) usually have this anchored in their strategy, at least for themselves, and in their corporate goals. They've also created appropriate structures, by deciding that there are fixed committees in which these topics are dealt with, perhaps also by

> specialists, sustainability managers, where this is their official job as an executive department, just like there is also controlling or quality management. Or there are Green Teams or other cross-departmental structures, where this topic simply has its place. (P5)

5.6.2 Having Appropriate Management Capabilities

Further advantages of establishing these structures appear when sustainability managers have appropriate management capabilities, as P2 explained, because this could help overcome certain challenges emerging from inadequate management capabilities.

The interviews revealed that sustainability managers' tasks include creating acceptance and willingness for changes, pushing for changes, raising awareness, collecting and generating ideas, task distribution, and implementation and coordination of processes and initiatives. Therefore, P1, P2, P4 and P5 mentioned that it is beneficial if sustainability managers have a wide range of skills. However, one of the challenges is that in hospitals, sustainability managers often lack important management skills. This stems from the fact that the position is often filled internally by one of the staff members who has no professional background in management – let alone environmental management. P1, for example, is trained to be a nurse and took on the position of sustainability manager as an additional task. They explained their struggles with actual management tasks. According to them, they are not trained to implement managerial processes to assess, evaluate and adjust initiatives. Furthermore, they lack certain personal skills, such as authority and assertiveness, which is a hindrance when implementing changes, especially when people in higher positions are asked to comply. Therefore, sometimes initiatives cannot be implemented as planned, leading to missed opportunities:

> (When they don't comply), I'm neither in the position that I can say anything about it, nor that anyone listens to me. (P1)

However, P1 also reported to have extensive knowledge of medical processes in hospitals. They understand the motives of clinical staff when they are unwilling to support measures, as well as their pressures and stressors. According to P1, this leads to them being more accepted by clinical staff, which helps them present environmental sustainability in an impactful way and facilitates engaging and motivating the workforce.

In contrast, P3 and P4 explained that they have vast managerial skills and knowledge about

environmental management. Therefore, they can address sustainability more professionally and establish processes to improve implementation and coordination of initiatives. However, P3 only has some experience in hospital management and no medical background, while P4 has neither. Therefore, they lack knowledge about hospital structures and have difficulty empathising with clinical personnel. Furthermore, P4 explained that they lack the ability to estimate which medical processes have the potential to be adapted to be more sustainable and in which way.

P2 is the only participant with professional experience in management and a medical background, and attributes many of their accomplishments to this. They believe that being someone who knows both sides and is accepted throughout the entire hospital is key to addressing sustainability:

> It's certainly also a question of staffing the executive department. So, I've now noticed this in other university hospitals, where really top-class graduates have joined who have even studied sustainability and have a very high level of education. But since they don't know the structures and operations in a university hospital, (…) and simply don't know the processes sufficiently in all areas, from nursing to research, they remain abstract and no matter how good they are, they are not heard. (P2)

5.6.3 Creating a Green Team

P2, P3 and P4 reported that at their hospital, they have created a Green Team, which is a working group dedicated to sustainability to facilitate decision-making and prioritisation of sustainability (strategy making). These Green Teams include the most important department heads of each hospital who also have executive power to some extent. In these cases, it was shown that decision-making was shortened and the consideration of environmental sustainability was provided, even if not incorporated into their strategy.

For instance, P3 explained that the Green Team itself is not directly included in decision-making. However, since the department heads who are in charge of making a decision are already part of the Green Team, sustainability is automatically considered:

> We just bought a new dishwasher for the kitchen. And for this, the kitchen manager, the purchasing manager, and the engineering manager, who are all part of our team, were involved. And then the decision was pretty obvious (…) I don't think anyone would think "oh, let's first ask the Green Team if they agree". But the people who are responsible for that

> certain area are asked, and they happen to also be part of the Green Team. So we have good basic conditions for these topics to be taken into account. (P3)

P4 also explained that creating the Green Team led to the ability to ensure that sustainability is always taken into account and if possible, also prioritised:

> It's not like, especially if for example a CT is purchased now, that I personally will be involved in the decision-making process. But I believe that structures are established in a way that sustainability is always considered, and that the people from sustainability management don't have to get involved every time, but that these criteria are already included in the process. (P4)

P1, on the other hand, intentionally have not created a Green Team because they fear it might lead to overly discussing every topic and prolong reaching a decision. Instead, they analyse the specific stakeholders who need to be included regarding the respective initiative and approach them individually. They claim that these loose structures are a facilitator to reach quick decisions, because decisions often can be made after a quick and rather informal talk with management without having to include multiple stakeholders. This advantage was also mentioned by P4. While this certainly guarantees that only the relevant stakeholders for the specific decision are included, it poses the risk of requiring too much time and effort to identify and address each individual each time. P1 explained that in order to improve this approach, department heads would have to consider sustainability on their own and without having to be constantly reminded, which ultimately is their goal, but not the case, yet.

5.6.4 Appointing Sustainability Ambassadors

Appointing sustainability ambassadors in every department was mentioned to improve communication, reachability of employees and knowledge distribution (relational assets), as well as coordination and implementation of initiatives (organising processes).

While P1 and P3 reported that they have not yet appointed sustainability ambassadors, but aim to do so, P2 and P4 have sustainability ambassadors in every department throughout the entire hospital. They observed this to simplify communication, knowledge distribution and coordination of

implementation processes, because it allows for a combination of bottom-up and top-down communication.

All participants have observed a communication gap, resulting from the complex structures of hospitals. Part of these structures of hospitals is that not all employees have access to computers and an email account. To close this communication gap, as mentioned in section 5.1.4, verbal, direct communication with the individuals is practiced most frequently, especially mentioned by P1 and P3. This however, requires time and effort. P2 and P4 explained that having sustainability ambassadors stationed throughout the hospital, minimises this communication gap. When they plan a new initiative, they approach these ambassadors, who then distribute the information within their department. This was observed to lead to better reachability of individuals and coordination of implementation processes. In addition to being a contact person for sustainability managers, they also function as a contact person for employees. They can collect their feedback and ideas for initiatives and present them to the sustainability managers in a coordinated way, thereby functioning as idea givers. P4 mentioned this to be crucial to overcome challenges resulting from the lack of knowledge about hospital structures and medical processes.

5.7 Enabling Practices: Theme 7— Collaboration and Knowledge Sharing

It was further mentioned that several hospital-specific challenges can be overcome by cooperating with external organisations, other hospitals, and external and internal stakeholders. P1, P2 and P3 mentioned that it could help assess the environmental impact (organising processes) or enable funding to eliminate the need to consider this competing aspect when prioritising environmental sustainability (strategy making). P3 and P4 explained that exchanging best practice examples with other hospitals could overcome the issues arising from lack of knowledge and management capabilities. Three subthemes were identified: 5.7.1 cooperation with external organisations and other hospitals, 5.7.2 cooperation with external stakeholders and 5.7.3 cooperation with internal stakeholders. (Table 10).

Table 10

Theme Table, Domain 3—Enabling Practices, Theme 7—Collaboration and Knowledge Sharing

Domain	Theme	Subtheme	Category	Codes	# of cases	# of references
Enabling practices	Collaboration and knowledge sharing	Cooperation with external organisations and other hospitals	-	-	5	38
		Cooperation with external stakeholders	-	-	4	9
		Cooperation with internal stakeholders	-	-	5	26

5.7.1 Cooperation with External Organisations and Other Hospitals

All participating hospitals have been cooperating with external organisations and other hospitals to overcome lack of knowledge regarding their own environmental impact, regarding processes of implementation of initiatives (organising processes), lack of funding (strategy making), or lack of skills and devotion to sustainability (management capabilities).

P2 explained that in the past, they have cooperated with external organisations outside the healthcare sector which offer assistance in assessing their environmental impact, which also enabled their ability to evaluate the success of initiatives. Therefore, they claimed to be further along than most hospitals, because they already know their environmental impact and what their largest areas of action are. They also distribute this knowledge to other hospitals to increase the leverage for sustainability in the healthcare system. Furthermore, they have founded a working group connecting hospitals in Germany that aim to integrate environmental sustainability where best practice examples can be exchanged.

P1 explained that they are currently in the process of engaging with several organisations to assess their amount of waste generated and their Scope 3 emissions, to compensate for their lack of skills and time to assess them by themselves. P4 reported that they are cooperating with an organisation to help them calculate the CO2 footprint of their menus, and P3 mentioned that they drew on the knowledge of KLUG and other hospitals to compensate for their inability to measure their own

environmental impact. This allowed them to have a rough idea of where their biggest areas of action lie, without having to know their exact impact.

Cooperation with external organisations was also mentioned to help overcome the challenging financial situation. As previously described, the owner's willingness to fund environmental investments often is low, leaving hospitals in the position to drive change with no financial resources. At H1, they were able to address this challenge through cooperating with an external contracting organisation. This organisation advanced the necessary money for an investment which was related to energy-saving. The money that was saved as a result, was then used to pay back the organisation. Because this worked well, the contracting organisation ended up financing other investments as well, allowing the hospital to advance technology and energy saving initiatives without being dependent on the owner's investments.

Furthermore, P4 showed that cooperating with other hospitals could fasten the process of implementing initiatives and overcome the issues resulting from having small sustainability teams, where only a few people are entrusted with sustainability, often in addition to other tasks:

> Many hospitals have areas in which they are trying certain things (…) and we can definitely learn a lot from each other. I think in a different context it's called leapfrogging, so that you can basically skip these different stages in the development process, because others have already tried it. (...) We don't have a 30-person sustainability team here, it's often just a few people who somehow have to handle it (...), so that definitely helps to develop further. (P4)

5.7.2 Cooperation with External Stakeholders

Cooperating with external stakeholders to raise awareness about the challenges and to broaden the knowledge base can also be an advantage. It was mentioned to possibly increase the leverage for environmental sustainability in the healthcare sector, pressure politicians to consider addressing environmental sustainability in healthcare, offer support and even create or change guidelines and legislations.

P5 explained that this is not the main focus for most hospitals. However, as an NGO themselves, they are working with politicians to include regulations and change guidelines, because so far, the entire healthcare sector has been excluded from the climate targets. Furthermore, no politically formulated

climate protection goals exist for the healthcare sector. P2 and P4 also mentioned close cooperation with politics and the city to overcome certain challenges. P4, for instance, explained that they are in constant discourse with the state Government to find solutions for the issue regarding the political barrier which hinders the bike-leasing initiative. However, no agreement has been reached so far.

5.7.3 Cooperation with Internal Stakeholders

Cooperation with internal stakeholders can facilitate finding alternative solutions to prioritise environmental sustainability when it is otherwise subordinated to competing aspects such as hygiene, patient safety and finances (strategy making). Furthermore, it was mentioned to lead to higher engagement of the workforce, which could facilitate implementation of initiatives (organising processes), changing their behaviour and communication (relational assets).

P3 and P4 explained that they aim to create an atmosphere that enables cooperation, where internal stakeholders have the opportunity to engage and be heard. This allows them to be included in processes, which facilitates implementation of initiatives. Furthermore, this increases their motivation to engage and offer feedback, thereby improving communication.

P4 explained that through cooperation with the gastronomy department, they found ways to overcome the challenge of offering nutritious, appetising and sustainable food for only 5.32€, which is the externally fixed amount of money for food supply per patient, per day. Together, they were able to develop a new menu that offers various meals that are appealing to patients and still fit the description above. P2 further demonstrated how important close cooperation with the hygiene department is, when elaborating how they addressed the issues regarding the indoor air technology in the operating rooms. Through close cooperation, they were able to avoid risks for patients and still reduce energy. Therefore, it became evident that cooperating with internal stakeholders is imperative for management to be able to maintain or even improve operations while also considering environmental sustainability.

Furthermore, as mentioned in 5.5.3 is important to engage in knowledge sharing and training with internal stakeholders, to inform them about the severity of environmental sustainability and the implementation of initiatives. All participants agreed that this is an essential part of motivating the workforce to change their behaviour.

All participants agreed that shifting towards environmental sustainability is an issue that cannot be conquered alone. Therefore, cooperating and knowledge sharing with external organisations, other hospitals, and external and internal stakeholders is crucial to overcome challenges with strategy making, organising processes, management capabilities and relational assets.

5.8 Enabling Practices: Theme 8—Openness to Alternative Approaches

Being open to alternative approaches can assist in overcoming challenges regarding decision-making in favour of environmental sustainability, especially despite the lack of independence of hospitals (strategy making). (Table 11).

Table 11

Theme Table, Domain 3—Enabling Practices, Theme 8—Openness to Alternative Approaches

Domain	Theme	Subtheme	Category	Codes	# of cases	# of references
Enabling practices	Openness to alternative approaches	-	-	-	5	26

As mentioned in section 5.2.2, hospitals are often dependent on their parent company and do not have executive power in every area. P1 mentioned this as one of the main barriers when they tried switching the patient food to a sustainable diet. Therefore, ways had to be found to still enable changes within their scope of decision-making. They realised that the only change they could enable, was a switch of the internal catering for employees. They explained that they have two catering services: one for patients, which is managed by the parent company, and the internal catering for special occasions within the workforce, which is managed by the managing director of the hospital:

> (…) But what we could change was the food the hospital pays for itself (internal catering). And that was actually something we could implement really quickly, because the managing director himself decides what he pays for and what he doesn't. (P1)

This seemingly incremental change increased awareness within the entire hospital and parent

company, and after multiple discussions and reminders of the importance of this initiative, it eventually led to a switch of patients' food within the entire parent company.

A similar situation occurred after the switch to duplex printing in the same hospital. This small initiative also triggered cascades within other departments and the company, and led to rethinking of processes, so that after a while the entire company not only also switched to duplex printing, but also switched to recycled paper. Thus, P1 explained that they often lack the ability or authority to decide on certain initiatives. However, they can look for alternatives they can influence within the bigger problem and start with small steps. These can trigger further cascades and in the end, set further actions in motion and lead to bigger accomplishments. This shows that, even if this was not within their scope of decision-making, they still had influence and were able to achieve the planned goal with smaller steps.

Being open to alternative approaches could also facilitate implementation of smaller initiatives independently of management. P3 explained that, for instance, a doctor of their hospital collaborated with the pharmaceutical department to switch the provision of asthma sprays to a more environmentally friendly version. This initiative did not have to be signed off by management, because it did not require special funding or other resources. Instead, it only required two people who were willing to address this topic individually and an atmosphere, where broader and alternative approaches are encouraged. Therefore, allowing smaller decisions to be made individually can trigger further decisions, and fasten decision-making and implementation.

Especially in the beginning, all participants explained that they had to prioritise feasibility over environmental impact. Meaning step-by-step, they first implemented everything that was possible with the resources they had. In the beginning, for most hospitals this meant implementing low-hanging fruits that were cost efficient and did not require elaborate decision-making. However, as P1, P3 and P5 explained, the initial push for sustainability often came from individuals within the workforce, and they often experienced resistance or indifference from management. This was a hindrance, but the individuals prevailed and convinced management of the importance of alternative approaches. Over time, P1, P2, P4 and P5 observed that management became more open to alternatives and started demanding changes themselves. Therefore, to become ready for changes, a certain openness to alternatives and to taking small steps is claimed to be helpful.

5.9 Summary of Findings

Based on the interview findings outlined in this chapter, several actions (change initiatives) that hospitals are taking to improve their environmental sustainability were identified. Especially in the early stages, hospitals focus on feasibility, cost-efficiency and quick, easy results. In addition, many are currently focusing on changing the structure within hospitals, raising awareness, increasing resilience, and assessing their environmental impact. Initiatives that could not be implemented often revolve around waste management and renovating buildings.

Subsequently, to identify the challenges in implementing these initiatives and reasons for unsuccessful implementation, the four dimensions shaping change initiatives (strategy making, organising processes, management capabilities, relations assets) were analysed. Hindering factors for successful implementation are the inability to prioritise environmental sustainability and develop a sustainability strategy, lack of organising processes and management capabilities and complicated relational assets. Specific challenges include lack of external pressure and support, lack of knowledge, time and personnel, organisational complexity, lack of funding, difficulty to change behaviour, and the competition of environmental sustainability with hygiene and patient safety.

Finally, enabling practices to overcome these challenges, thereby improving implementation of change initiatives and advancing their environmental sustainability were identified. They include establishing structures, engaging in collaboration and knowledge sharing and being open to alternative approaches. These practices were identified to facilitate decision-making, coordination and implementation of initiatives, assessing the environmental impact, increase communication and awareness to change behaviour, overcome the challenges regarding lack of skills and devotion to sustainability, and enable funding.

Chapter 6: Discussion

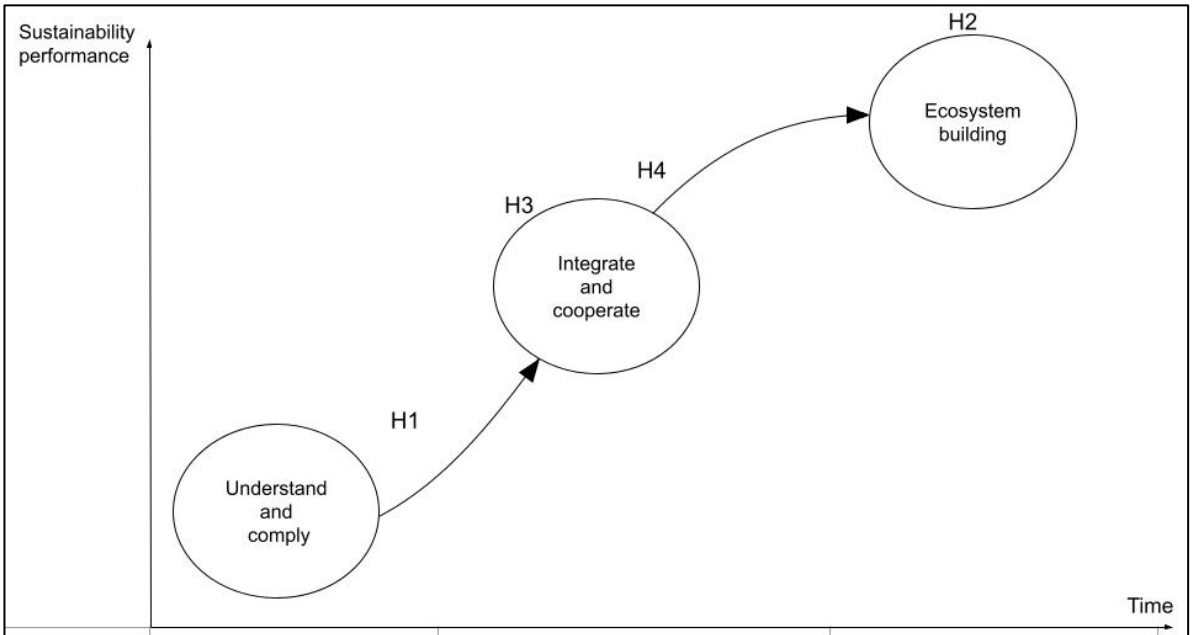
This study investigates the actions hospitals take to improve their environmental sustainability, the challenges they face in implementing these actions and how hospitals can overcome these challenges to advance in environmental sustainability. Four German hospitals and one overarching organisation which combines the German healthcare sector with environmental sustainability were included in the study. Based on the frameworks which informed this study (Benn et al., 2018; Edwards, 2009; Jacobsen et al., 2020; Zollo et al., 2013), three levels of environmental sustainability were identified (understand and comply, integrate and cooperate, ecosystem building). To analyse how to advance their level of sustainability, Zollo et al. (2013) suggest analysing the adaptive capacity towards change, which is reflected by the change initiatives and the four dimensions shaping the initiatives (strategy making, organising processes, management capabilities, and relational assets). Therefore, they were analysed individually, highlighting challenges hospitals face in each dimension and which impede successful implementation of the change initiatives. Then, enabling practices to overcome these challenges were analysed.

This chapter is structured around the three research questions: *What actions are hospitals taking to improve their environmental sustainability? What challenges do hospitals face in implementing these actions? What practices enable hospitals to overcome these challenges and advance in environmental sustainability?* Findings are discussed in light of these research questions and the conceptual framework, and are compared and contrasted with the existing literature. To answer the research questions, first, the individual environmental sustainability levels of each hospital are discussed. This provides a foundation to assess the specific challenges that occur at each level and the quality of their individual approaches to overcome them, so that subsequently, recommendations on how hospitals can advance their level of sustainability are provided. Then, challenges with using the conceptual framework are presented and suggestions on how to further improve it for future research are provided. Lastly, practical contributions, recommendations and limitations of this study are presented.

6.1. Individual Levels of Sustainability

Before discussing enabling practices for overcoming challenges and how to advance in environmental sustainability, it is important to first assess the status quo of each hospital (Benn et al., 2018; Burnes, 2020; Griffin et al., 2015; Jacobsen et al., 2020). Figure 4 shows the three consecutive levels of

sustainability according to table 1 and a simplified summary of what constitutes them. Based on the findings, hospitals can be assigned to the respective levels as portrayed in the figure.



Scope	Peripheral within hospital	Hospital and supply-chain wide	Industry and community-wide
Narrative	Cost-efficiency Low hanging fruit Compliance	Sustainability as strategic opportunity Cultural and behavioural shifts Cooperation with external organisations	Sustainability core to strategy Disaster resilience & community health prevention Sector leader

Figure 4

Hospitals 1-4 aligned to the sustainability levels

6.1.1 Hospital 1

At H1, they have integrated sustainability into their corporate goals but still often have to prioritise money over environmental sustainability, which is why their focus often still is on cost-efficiency. In addition, they have been addressing low-hanging fruit, are very active with the community, and address resilience and health prevention. However, they seem to be struggling with implementing initiatives within the hospital, as well as monitoring them, and motivating their employees to partake in environmental changes. Therefore, their main focus is raising awareness within the hospital to lay the groundwork for behavioural changes. These are not yet visible in the sense that employees take initiative themselves, but they appear to be willing to support change initiatives. Therefore, overall they seem to be at level 1: understand and comply, preparing for level 2: integrate and cooperate.

6.1.2 Hospital 2

At H2, they are past implementing low-hanging fruits and focusing on cost-efficiency. They have integrated sustainability into their strategy, ensuring it is always considered when reaching decisions. They also address resilience and health prevention, and distribute their knowledge within the entire healthcare sector and community. Furthermore, they have established processes to monitor, evaluate and adjust initiatives and they perceive themselves to be a leader of the industry. They have also established an organisational culture that values environmental sustainability and created structures that encourage communication throughout all hierarchy levels. However, behavioural changes are difficult to assess, and sometimes employees still have not completely integrated sustainability into their daily routines. Therefore, this seems to be an issue that is still present and is not completely conquered. Nevertheless, overall they seem to be at level 3: ecosystem building.

6.1.3 Hospital 3

At H3, they had been working on low-hanging fruits and often had to prioritise money over environmental sustainability, but recently, have started considering environmental sustainability along with financial sustainability more frequently. Furthermore, they also address resilience and health prevention. Their ultimate aim is to incorporate sustainability into their strategy, but so far their main focus is changing their organisational culture. Smaller behavioural changes are already visible, although not at a level that they view as sufficient. Another focus lies on assessing their environmental impact and establishing further processes for monitoring and evaluating initiatives, which currently only exist to a limited extent. To help assess their environmental impact, they have been cooperating with external organisations. Overall, they appear to be at the beginning of level 2: integrate and cooperate.

6.1.4 Hospital 4

At H4, they are past addressing low-hanging fruit and focusing on cost-efficiency. Their main goal is to integrate environmental sustainability into the strategy to ensure prioritisation of environmental sustainability. So far, they have set up structures ensuring that it is at least always considered. They have also begun addressing changing the organisational culture, and behavioural changes are already

visible. Topics regarding resilience and health prevention are also being addressed. Furthermore, they cooperate with external organisations to exchange best practice examples and learn from each other. They have not yet been able to successfully establish processes to monitor and evaluate all of their change initiatives. Some processes are already in place, but they are currently working on improving them further. Therefore, they seem to be at the end of level 2: integration and cooperation, preparing for level 3: ecosystem building.

6.2 Actions for Environmental Sustainability

This section addresses RQ1 and discusses the actions hospitals are taking to improve their environmental sustainability and draws on the findings from theme 1—change initiatives.

Successful initiatives implemented by the participating hospitals were mostly low-hanging fruit, cost efficient and feasible. While only limited studies exist that focus on sustainability actions in healthcare, it has been found that commercial businesses also address these aspects, especially at the beginning (Benn et al., 2018; Edwards, 2009; Jacobsen et al., 2020; Pandey et al., 2019). As shown in Table 1 in section 3.1.2 this aligns with sustainability actions of level 1, based on their findings. Often, these initiatives include reduction of energy usage, which has also been observed by Guetter at al. (2018). They conducted a literature review of 37 papers about greening the operating room and found that actions often address turning off equipment and light when not in use, limit disposable items, reduce waste generation, and recycling of anaesthetic gases. However, they also argue that patient safety and hygiene always have to be prioritised and often hinder implementation of these actions. This aligns with the findings of this study.

Furthermore, this study found that many hospitals are focusing on raising awareness and changing employees' behaviour. Many participants observed that this is crucial for improving environmental sustainability, which has also been found by Zollo et al. (2013).

Due to external barriers, participants were unable to implement several initiatives, such as assessing their environmental impact and renovating buildings. Barriers were mentioned to be lack of knowledge, political support and funding, and will be discussed and compared to the literature in the following section 6.3.

6.3 Challenges in Implementing Environmental Sustainability

This section addresses RQ2 and discusses the challenges hospitals face in implementing the aforementioned actions. After categorising the hospitals into their respective levels, the challenges each hospital is facing can be assigned to the corresponding levels. Jacobsen et al. (2020) have observed that challenges vary depending on the level of sustainability. They argue that at the first level, internal challenges are prevalent and revolve around integrating sustainability into daily life. At more progressive levels, they observed that internal challenges become less dominant. Instead, external barriers are becoming more present. While findings of this study agree that challenges vary depending on their sustainability level, it was found that internal challenges occur at every level and external barriers decrease at the third level. The following sections 6.3.1 and 6.3.2 discuss the specific challenges in more detail.

6.3.1 Internal Challenges

Literature often focuses on employees' motivation and attitude, hierarchical structures and lack of competencies as internal barriers (see 2.2.4). While findings of this study agree with them, it was also found that more internal challenges exist.

This study shows that often employees lack motivation to change their behaviour. Reasons for this were found to be lack of understanding of the severity, agreeing with findings by Seifert (2018) and Waxin et al. (2023), prioritisation of other aspects such as patient care which is in line with findings by Guetter et al. (2018), Pinzone et al. (2015) and Seifert (2018), and lack of time to address these issues. Dettenkofer et al. (2000), Seifert (2018), Seifert & Guenther (2020) and Waxin et al. (2023) agree that employees' lack of time is the main reason for low motivation to address environmental changes. However, this study shows that the issue of lack of time does not only apply to employees, but also for management, as it hinders them to develop a sustainability strategy. Regarding the complexity of hospital structure, current literature focuses on hierarchical structure and the difficulty to distribute knowledge across all hierarchical levels (Battilana, 2011; Pinzone et al., 2015; Seifert, 2018). While this study agrees that this is an important challenge to address, the general organisational complexity cannot be neglected. This includes the difficulty to assess the own environmental impact, resulting in the inability to report, the limited executive freedom in decision-making and having large decision-making bodies across multiple departments that impede decision-making. Furthermore, the organisational complexity is the reason why implementation of initiatives

vary depending on the initiatives. Therefore, it was found to hinder the establishment of processes for coordination and implementation of initiatives.

Similar to findings by Seifert & Guenther (2020) and Trisolini (2002), this study shows that lack of management skills, especially environmental management, and clinical experience are challenges to addressing environmental issues. Lack of knowledge about processes, and hospital structures was found to further hinder successful implementation of initiatives and processes to assess impact, and evaluate and adjust initiatives. While Waxin et al. (2023) found that lack of communication skills are the main reason for ineffective communication, this study shows that the organisational complexity is a larger issue. The complexity of the working situation was found to lead to a communication gap, resulting in ineffective communication and difficult implementation of initiatives.

To link the challenges to the individual sustainability levels based on Table 1 (section 3.1.2), this study found that at level 1, main challenges are the difficulty to coordinate initiatives within the hospital and lack of knowledge about their direct environmental impact. They were described to hinder the prioritisation of environmental aspects and the integration of sustainability into daily life. This is in line with findings from Jacobsen et al. (2020). However, Jacobsen et al. (2020) also found that internal barriers are less relevant at more advanced sustainability levels, which contradicts findings from this study. Internal challenges at level 2 and 3 were mainly found to revolve around management capabilities and relational assets. At level 2, they include the difficulty to motivate employees to change their behaviour and maintain communication throughout the hospital. At level 3, the main challenge appears to be the difficulty to develop a sustainability strategy, which derives from internal barriers, such as lack of knowledge about hospital structures, lack of management skills and their inability to dedicate sufficient time to it.

6.3.2 External Barriers

External barriers are often described as lack of regulatory drivers, stakeholder pressure and pressure to develop an environmental strategy, and limited organisational efficiency and financial means (see 2.2.1). Findings of this study agree with this. For instance, it was found that most hospitals have not been able to establish a structure to completely guarantee prioritisation of environmental sustainability. While this can partly be attributed to internal challenges, such as lack of time and knowledge, a link to the nature of the hospital industry was also found. External stakeholder

pressures for environmental sustainability have been limited, while competing aspects prevail, such as maintaining operations, minimising the need to establish such a strategy. This was also addressed by Seifert and Guenther (2020). Findings also show a lack of political support, guidelines and financial means to address environmental sustainability in hospitals, aligning with findings from several studies (Seifert, 2018; Seifert & Guenther, 2020; Seifert et al., 2020).

However, in addition to the findings from current literature, it was also found that organisational complexity of the entire healthcare sector is a barrier. In particular, the complexity of the supply chain was mentioned as a main barrier, which is in line with findings from Kallio et al. (2018). Their study and this study both found that this limits the ability to assess their environmental impact and to receive a sustainable supply of materials.

This study found that external barriers mostly exist at level 1 and 2, contrasting findings by Jacobsen et al. (2020), where it was found that external barriers increase with the level of sustainability. At level 1, participants described limited funding and lack of external support and pressure to dedicate any resources to environmental sustainability. Hospitals in Germany are constantly threatened in their existence and struggling financially (Beerheide, 2024; Kurz & Beerheide, 2024), which was found to hinder them in engaging in adequate strategy making. When reaching a decision, they are forced to prioritise money, leading them to focus on cost-efficiency. At level 2, the inability to assess the indirect environmental impact was found to be the main challenge. Due to the lack of knowledge and political pressure for suppliers, there often are no data available to assess the impact along the supply chain. At level 3, the barrier regarding the supply chain and limited political support are still present, but internal challenges prevail.

6.4 Enabling Practices to Overcome Challenges

The sections in 6.4 address RQ3 and discuss the practices from section 5.2 that enable hospitals to overcome the aforementioned challenges and advance their level of environmental sustainability (establishing structures, collaboration and knowledge sharing, and openness to alternative approaches).

While the literature only offers limited advice on how to advance the levels of sustainability, they do mention certain aspects that may be advantageous. For example, Benn et al. (2018) compared

incremental and transformational approaches to advance the levels, but more from an organisational standpoint. However, they also found that it is important to appoint a change leader, to raise awareness about the need for change, to communicate and adjust initiatives constantly, aligning with findings from this study. Zollo et al. (2013) offers generic advice on how to improve sustainability. They found that it is important to change shared values, beliefs, and motivation of employees, as well as adapt governance mechanisms, such as the composition and role of management, and structural arrangements in all departments of the organisation. This is also in line with findings from this study. However, findings also show more detailed information on how to advance in environmental sustainability and are discussed in the following sections 6.4.1–6.4.3.

6.4.1 Establishing Structures

Establishing structures within hospitals appears to be a promising practice to overcome challenges regarding developing a sustainability strategy and decision-making (strategy making), coordinating implementation within hospitals (organising processes), improper communication, lack of behavioural changes and engagement of employees (relational assets), and lack of knowledge about hospital structures and managerial skills (management capabilities).

Establishing an executive department, devotion to the topic and having appropriate management capabilities

H1, H2 and H4 have established an executive department for sustainability run by a sustainability manager. However, only H2 and H4 have sustainability managers who can only devote all of their working time to environmental sustainability. The findings suggest that this is of great importance for developing a sustainability strategy, as this requires time and dedication. Having a strategy in turn, was found to facilitate prioritisation and decision-making in favour of environmental sustainability. Furthermore, it was found to facilitate data collection to assess the environmental impact in a more structured way. Strand (2014) agrees that having a department where the topics of sustainability are addressed, facilitates the strategic approach. H1 and H3 do not have positions solely dedicated to environmental sustainability. This study found this to impede the development of a strategy and establishment of organising processes, because it results in having limited time to address these issues, while in hospitals other aspects often are more pressing to address, such as maintaining operations and raising awareness to induce behavioural changes.

Findings further suggest that management capabilities, such as knowledge about hospital structures, management skills, and personal skills are essential for sustainability managers, as this could facilitate establishing processes, developing a sustainability strategy and increase motivation of employees (strategy making, organising processes, and relational assets). This was also found by Bare et al. (2023) and Wiengarten et al. (2017). Bare et al. (2023) performed a literature review regarding the structuring of healthcare facilities that aim to address environmental sustainability and confirmed the importance of a wide range of skills and the lack of them in hospital management when addressing environmental issues. Wiengarten et al. (2017) conducted a longitudinal study, investigating how certain management characteristics influence the performance of companies in the United States. While they did not investigate hospitals, they still found that personal characteristics, knowledge and professional background are important and affect decision-making and performance outcomes. Ryan-Fogarty et al. (2016) further found that explicit knowledge about hospital structures and patients' needs is just as important as knowledge about environmental management. Expanding on this, the current research found that extensive knowledge about hospital structures and management experience could bring professional insight into both sides and lead to acceptance throughout the entire hospital, facilitating knowledge distribution and leading to a change in behaviour.

Creating a Green Team

Creating a Green Team that includes various department heads was found to fasten decision-making and ensure prioritisation of environmental sustainability, as it integrates the prioritisation into the structure of the hospitals. Only one hospital (H1) consciously decided against creating a Green Team, as they said it would prolong decision-making. They rather only involve relevant stakeholders which is in line with recommendations by Zollo et al. (2013). However, multiple studies found that establishing some sort of Green Team may improve decision-making (Kallio et al., 2018; Kangasniemi et al., 2014; Mejia & Sattler, 2009; Ryan-Fogarty et al., 2016). Based on the literature, and viewing the findings of this study in relation to the sustainability levels of each hospital, it seems that creating a Green Team is more promising and facilitates the decision-making process more effectively than not creating one. Especially, due to the financial constraints and complex organisational settings, such a less formal approach for decision-making may be beneficial for some hospitals.

Appointing sustainability ambassadors

Appointing sustainability ambassadors in every department at every hierarchy level was found to help improve communication, coordination and motivation of employees. The ambassadors' can also help overcome the knowledge gap regarding hospital structures, as they function as idea givers, and impact knowledge distribution. They can lead to better reachability of employees and raise awareness, which was found to be essential for changing behaviour. This is in line with findings from Kallio et al. (2018). Furthermore, it was found to be beneficial if sustainability ambassadors are not appointed by management, but who are voluntarily taking on this additional task, because it is a position that profits from intrinsic motivation. Intrinsic motivation is especially important in the context of hospitals, where they experience a lack of external pressure and guidelines to address and improve environmental sustainability.

6.4.2 Collaboration and Knowledge Sharing

This study's findings show that collaboration and knowledge sharing can be used to facilitate prioritisation of environmental sustainability, get funding (strategy making), assessing the environmental impact (organising processes), and communication and changing behaviour of employees (relational assets). It furthermore was also found to overcome challenges regarding lack of knowledge about hospital structures and environmental management (management capabilities).

Cooperating with external organisations, other hospitals and external stakeholders

Findings suggest that cooperating with external organisations and other hospitals can overcome the lack of funding and lack of knowledge about environmental impact.

To circumvent the financial challenges, many hospitals first implement initiatives that save money and only have the side effect of protecting the environment. However, to actually overcome these challenges, findings indicate that collaborations with external contracting organisations to enable funding may be helpful. Finding external funding opportunities for investments is immensely important for hospitals, as they are constantly struggling financially and providers often do not accredit any priority to environmental sustainability and therefore only offer limited funding.

Part of the inability to prioritise environmental sustainability and to establish processes to evaluate and adjust initiatives stems from the inability to assess their direct and indirect environmental impact, because of the complexity of hospital structures and the supply chain. To overcome these limitations, collaborations with other hospitals and external organisations were found to be helpful. External organisations could assist in establishing organising processes assessing the direct impact, and other hospitals could circumvent the lacking management capabilities by engaging in knowledge sharing of their largest areas of action. Previous studies do not explicitly address collaborations to facilitate assessing the direct or indirect environmental impact, but they were mentioned to be imperative for advancing in environmental sustainability. Kallio et al. (2018) and Kangasniemi et al. (2014) indicate that consulting experts from external organisations and engaging in knowledge sharing are crucial to successfully plan and implement initiatives. This is in line with findings of this study, where it was also found that collaborations and knowledge sharing may facilitate processes of implementation through leapfrogging initial steps, thus overcoming the lack of knowledge about these processes and initiatives.

Regarding the indirect impact along the supply chain, findings suggest that there will most likely still be a knowledge gap, because suppliers often lack knowledge about their impact, which was also described by Kallio et al. (2018). Therefore, certain data remain unavailable and it was found that this could not be completely conquered by collaborating with external organisations and other hospitals. This is one of the reasons the participants engage in knowledge sharing with external stakeholders. By exerting pressure on politicians to establish guidelines and regulations, and continuously demanding information from the suppliers, they hope to overcome external barriers to assessing the impact and implementing initiatives. Again, previous studies do not focus on collaborations to assess the environmental impact, but it was found that collaborations with the Government and designing programmes with them could assist in more successful implementation of initiatives (Kallio et al., 2018).

Cooperating with internal stakeholders

Cooperating with internal stakeholders was found to help prioritising environmental sustainability over other aspects, increase engagement of employees which could improve implementation of initiatives and lead to behavioural changes.

To facilitate prioritising environmental sustainability, all participants mentioned that cooperating with relevant departments is key, so that environmental sustainability can be taken into account while not neglecting other crucial aspects, such as hygiene and patient safety. This is in line with findings from Kallio et al. (2018) and Kangasniemi et al. (2014), where they found that multi-professional collaborations within hospitals are essential for successful implementation of environmental change initiatives.

Burnes (2020) and Zollo et al. (2013) found that engaging employees has a positive outcome on implementing change. This is mirrored by the findings in this study. All participants agreed that this is key for successful implementation and can be facilitated by appointing sustainability ambassadors, which was also found by Kallio et al. (2018) and Ryan-Fogarty et al. (2016). Furthermore, this study found that training and knowledge-sharing events every participant is holding further accelerate employees' engagement and lead to motivation and behavioural changes, which was also indicated by previous studies (Kallio et al., 2018; Kangasniemi et al., 2014; Ryan-Fogarty et al., 2016).

Generally, collaborations and knowledge sharing seem to be particularly critical for hospitals compared to other businesses, because they could help overcome the lack of external support and pressure to address environmental sustainability, as well as lack of knowledge and expertise about environmental management and hospital structures.

6.4.3 Openness to Alternative Approaches

Openness to alternative approaches was found to help in prioritising environmental sustainability (strategy making) and to raise awareness about larger-scale issues (relational assets).

Findings show that being open to alternatives when facing decisions can help prioritising environmental sustainability, even when the solution at first does not seem obvious. This was mentioned to be facilitated by collaborations and knowledge sharing as they can function as platforms to exchange ideas and brainstorm initiatives that can be implemented within their scope of decision-making, which is in line with findings from Kallio et al. (2018).

Benn et al. (2018) indicate that whether incremental or transformational change is necessary

depends on the organisation itself, but to thoroughly move through the levels, incremental change is necessary. However, they also mention that some might say that incremental changes are just maintaining the status quo, and that the only way to conduct change is by transformational changes. Findings from this study, however, show that implementing small initiatives that could eventually trigger further cascades, have the potential to raise awareness and set bigger actions in motion within the entire hospital. This is particularly important due to the complex structures within hospitals that do not always allow for transformational changes, such as the lack of independence of hospitals in decision-making, and lack of motivation of employees.

Viewing these practices (Table 12) in their entirety and comparing the different approaches in relation to their sustainability level (Figure 4), it is reasonable to infer that they impact challenges in each dimension and therefore could enhance strategy making, organising processes, management capabilities and relational assets. This in turn could enable hospitals to implement more initiatives successfully, increasing their adaptive capacity and enhancing their environmental sustainability. Furthermore, the findings indicate that because different challenges prevail at different levels of sustainability, individual practices can also be more beneficial at some levels than others.

Table 12

Practices Applied by Each Hospital

Practices	H1	H2	H3	H4
Executive department for sustainability	yes	yes	no	yes
Sustainability manager only dedicated to sustainability	no	yes	no	yes
Green Team	no	yes	yes	yes
Sustainability ambassadors	no	yes	no	yes
Cooperating with internal stakeholders	yes	yes	yes	yes
Cooperating with external organisations	yes	yes	yes	yes
Openness to alternative approaches	yes	yes	yes	yes

6.5 Reflection on the Conceptual Framework for Assessing Sustainability Levels in the Healthcare Sector

This section reflects on the framework's fit for hospitals. Even though the conceptual framework was adapted to fit hospitals, the findings revealed that some limitations still exist. They are discussed in this section and possible adjustments are presented.

First, while Benn et al. (2018), Edwards (2009) and Jacobsen et al. (2020) argue that at the highest level, organisations should have a precise overview of their environmental impact, the interviews showed that this is not entirely possible. Because the entire healthcare seems to be lagging behind and limited pressure exists, organisations within the supply chain often do not focus on environmental sustainability and are unable to offer information about the environmental impact of their products, therefore impeding hospitals' ability to assess the entire impact.

Second, Benn et al. (2018), Edwards (2009) and Jacobsen et al. (2020) mention that mostly organisations at the highest level engage in knowledge transfer with others in the industry. This was also refuted by the interviews. Again, because the entire sector seems to be lagging behind, they stated that they have to engage in knowledge transfer as early as possible. Due to limited political support, lack of guidelines and inability to assess the environmental impact, hospitals are bound to cooperate with each other and with external organisations within the healthcare sector to get started and exchange ideas about possible initiatives and the largest impact on the environment.

Third, resilience and health prevention in the community are key foci for hospitals. Every hospital focuses on improving their resilience, and due to the nature of their work, also works with the community, not only at the highest level and it does not seem to have an influence on their overall environmental sustainability level.

Fourth, behavioural changes appear to be a perpetual challenge, which requires continuous commitment, even at level 3, while Benn et al. (2018) and Jacobsen et al. (2020) suggest that this is characteristic for level 2. Additionally, behavioural changes are not only applying to employees, but patients have to change their behaviour as well. Therefore, it was found that it is often easier to work within the industry and community (level 3), than address issues within the hospital (level 1).

Therefore, it seems that comparing hospitals to the same standards as other businesses to determine the level of sustainability is not ideal. Alternatives could be to exclude resilience, and address knowledge transfer at level 1. Furthermore, regarding the overview of their environmental impact, the focus could potentially rather be on the initiatives they take to overcome the barriers with measuring their impact. For instance, "not taking initiative and accepting not knowing the impact" at level 1, "cooperating with others to assess the impact to the greatest extent possible" at level 2, and "engaging in discourse with the supply chain and politicians and pressuring them to assess impact and to change legislations" at level 3.

Additionally, behavioural changes could also be mentioned at all levels. For example, "not focusing on behavioural changes" at level 1, "working on raising awareness" at level 2, and "ensuring that all employees have comprehensive information about the importance of environmental sustainability" at level 3. Benn et al., (2018) noted that this is the maximum one can do, because ultimately it is the individual's decision to change their behaviour, which is in line with findings from this study.

6.6 Contributions

Findings from this study may add value to the research on advancing environmental sustainability in hospitals. This research broadens the understanding of the challenges in implementing sustainability initiatives in hospitals and how to advance in environmental sustainability. This section presents theoretical and practical contributions of this study to the field of environmental sustainability in hospitals.

6.6.1 Theoretical Contributions

For this study, a conceptual framework to analyse sustainability actions, challenges in implementing them and practices to overcome these challenges to advance in environmental sustainability has been synergised (section 3.2, figure 1). For this, three theoretical frameworks focusing on governance, development in sustainability actions and organisational change have been used. Subsequently, this synergised framework has been applied to a novel context, the German healthcare sector. While limitations of the framework exist, especially regarding determining the sustainability level of hospitals (see 6.5), it proved to be suitable for analysing change initiatives,

challenges in implementation and how hospital management could overcome the challenges to advance in environmental sustainability.

6.6.2 Practical Contributions

This study investigates and identifies sustainability actions, challenges in implementing them and practices to overcome the challenges to advance in environmental sustainability. Sustainability actions and most of the challenges do not differ largely from findings from previous studies. However, this study identified additional hospital-specific challenges and practices that could help overcome the challenges. Furthermore, it was found that the challenges occur at different levels (Table 13), and therefore the practices can be matched to the individual sustainability levels. Thus, they can assist hospitals in advancing in environmental sustainability, depending on their individual level.

Table 13

Challenges and Practices at Each Sustainability Level Based on Findings of This Study

	Level 1: Understand and comply	Level 2: Integrate and cooperate	Level 3: Ecosystem building
Challenges	Limited funding Lack of external pressure Prioritisation of environmental sustainability Coordinate initiatives within hospital Lack of knowledge of direct impact	Difficulty to change behaviour of employees Maintaining communication throughout the hospital Inability to assess indirect impact	Difficulty to build a strategy Lack of management skills Lack of knowledge about hospital structures
Practices	Invisible initiatives that save money (protecting environment is a by-product) Networking to get funding, contracting Collaboration and knowledge sharing with external organisations and other hospitals to assess Scope 1 and 2 emissions Alternative and incremental approaches Small steps can trigger cascades in entire organisation Creating a Green Team	Sustainability ambassadors to improve communication and to raise awareness collaboration and knowledge sharing with internal stakeholders collaboration with external organisations to assess Scope 3 emissions Increase pressure on supply chain to assess their impact	Executive department and sustainability managers who has time and knowledge

At level 1, it was found to be beneficial to implement initiatives that are invisible to the workforce so that they do not require their cooperation, and that save money. Often these initiatives were facilitated by being open to alternatives and taking small steps. Therefore, it was found that this approach could also be particularly advantageous at level 1. Furthermore, it was found that collaborating with external organisations can help overcome financial challenges (contracting) and assess their impact. Knowledge sharing with other hospitals can assist in exchanging best practice examples and the largest area of impact, to also overcome challenges regarding the difficulty to

assess their impact. Creating a Green Team that includes department heads with decision-making power also appears to be most beneficial at level 1, to overcome challenges regarding the prioritisation of environmental sustainability, because this way everyone that has decision-making power is included and reminded to aim to prioritise environmental sustainability.

At level 2, it was found that appointing sustainability ambassadors in every department at every hierarchy level can help raise awareness that could lead to behavioural changes of employees and improve communication throughout the hospital. This can also be facilitated by collaboration and knowledge sharing with internal stakeholders. Furthermore, collaborations with external organisations may also be supportive at level 2, when they help assess Scope 3 emissions. Additionally, collaborations with organisations along the supply chain directly can increase pressure to assess their impact and help hospitals overcome challenges regarding the inability to assess their indirect impact.

At level 3, findings show that it is most beneficial to establish an executive department for sustainability and ensure sustainability managers have appropriate management skills and sufficient time to devote themselves to sustainability. This can overcome challenges that impede the development of a sustainability strategy. However, establishing an executive department for sustainability can most likely also assist at level 1 to enhance decision-making and at level 2 to motivate employees.

When viewing the individual approaches in relation to the sustainability level of each hospital, it seems most promising to implement every practice presented. However, implementing all of them at the same time is challenging and might not be feasible (Benn et al., 2018). The individual steps presented here provide a rough guide as to how to proceed at which level, but can also be implemented simultaneously.

6.7 Limitations and Future Research

This section describes the main limitations identified throughout the course of this study. First, this study only includes the views of the managers who were interviewed. Generally, no employees who actually execute the plans were included in the study. However, one sustainability manager additionally works as a nurse, who was able to provide a different perspective. Second, only four

German hospitals are included in this study, two publicly owned university-hospitals, one smaller, private, not for-profit hospital, which is owned by a denominational organisation and one medium-sized, publicly owned hospital. Hospitals that are privately owned and for-profit have not been included in this study. They have been contacted, but they declined or did not respond. To maximise transferability for the hospitals in Germany, follow-up studies that investigate a wider range of hospitals and include privately owned, for-profit hospitals could be beneficial. Third, only qualitative data from semi-structured interviews are used, instead of mixed methods or data triangulation. Therefore, not all best practice criteria for the pragmatic research paradigm can be fulfilled within the scope of this study. The fourth limitation is that these data have been collected by self-reported descriptions by the interviewees, which do not capture any deviations between intent and realised impact. The fifth limitation is that interviews are conducted in German and are then translated into English. During this process, despite thoroughness and correct techniques, a slight risk of loss of meaning that occurs during translation always exists (Yunus et al., 2022). Lastly, the sixth limitation is that this study only includes hospitals which already address environmental sustainability. Hospitals that do not prioritise environmental sustainability or tried and failed are not included in this study.

To holistically understand how management can integrate environmental sustainability into hospitals, it could be of interest for future research to conduct international studies that include additional hospitals that do not address sustainability, multiple stakeholders and if possible, also privately owned for-profit hospitals. Furthermore, the conceptual framework synergised for this study could be further tested in a broader setting. To include the missing criteria that make for best practice (integration of quantitative and qualitative data and interrelation of experience, knowledge and action), follow-up studies with additional quantitative data and longitudinal studies to track actions could be beneficial.

Chapter 7: Conclusion

This thesis examined challenges and practices in advancing environmental sustainability in German hospitals and addressed three research questions: *What actions are hospitals taking to improve their environmental sustainability? What challenges do hospitals face in implementing these actions? What practices enable hospitals to overcome these challenges and advance in environmental sustainability?*

To answer these questions, four German hospitals that address environmental sustainability and one overarching organisation linking the healthcare sector with environmental sustainability were included in this study. Data were collected via semi-structured interviews with the responsible people tasked with addressing environmental sustainability. This study drew on frameworks regarding governance, development and organisational change. Before commencing data collection, the frameworks were merged and adjusted to fit the specific context of hospitals. To analyse how hospitals can advance in environmental sustainability, the framework suggested examining the adaptive capacity of the hospitals, which determines how well they are able to respond to changes and implement change initiatives to progress towards sustainability. Therefore, the change initiatives of hospitals were examined, which represent the actions hospitals are taking to improve their environmental sustainability (RQ1). Subsequently, challenges in implementation of these initiatives were analysed (RQ2). The framework suggests that the successful implementation of change initiatives is influenced by four dimensions (strategy making, organising processes, management capabilities, and relational assets). Thus, they were analysed individually, highlighting the challenges of implementing change initiatives in each dimension. Finally, enabling practices to overcome the identified challenges in each dimension to improve implementation of change initiatives and thereby, advancing in environmental sustainability (RQ3) were identified.

RQ1: What actions are hospitals taking to improve their environmental sustainability?

This study found that the actions that hospitals are taking to improve their environmental sustainability include initiatives to reduce their environmental impact, change the structure within hospitals, raise awareness, increase resilience and assess their environmental impact. At early stages, hospitals often have to focus on feasibility and cost-efficiency when reducing their environmental impact, while at more advanced stages, they can focus on changing behaviour through raising awareness and assessing their environmental impact. Initiatives that could not be implemented yet often revolve around waste management and renovating buildings.

RQ2: What challenges do hospitals face in implementing these actions?

Regarding the challenges, several internal and external challenges were found. Internal challenges include lack of behavioural change, lack of knowledge, impracticability due to other priorities, organisational complexity, and poor communication and cooperation. External challenges were found to be lack of environmental friendly supply, lack of external pressure, limited financial means and limited political support. These challenges impact the implementation of change initiatives, because they interact with the four dimensions that influence the outcome of change initiatives: they impede strategy making and the establishment of organising processes, and are reinforced by lack of management capabilities and relational assets.

RQ3: What practices enable hospitals to overcome these challenges and advance in environmental sustainability?

Three practices were found that enable management to overcome these challenges and advance in environmental sustainability:

1. Establishment of appropriate structures, such as an executive department with a sustainability manager, Green Team and sustainability ambassadors in every department throughout the hospital.
2. Collaboration and knowledge sharing with external organisations, other hospitals, and external and internal stakeholders.
3. Openness to alternative approaches and taking incremental steps that could ultimately lead to bigger changes.

These practices were found to address challenges in the four dimensions (strategy making, organising princesses, management capabilities and relational assets), thereby improving the implementation of change initiatives. This may altogether impact the adaptive capacity of a hospital, thereby improving their ability to respond to changes and implement change initiatives to progress towards sustainability. Thus, employing these practices is likely to lead to hospitals being able to advance their level of environmental sustainability.

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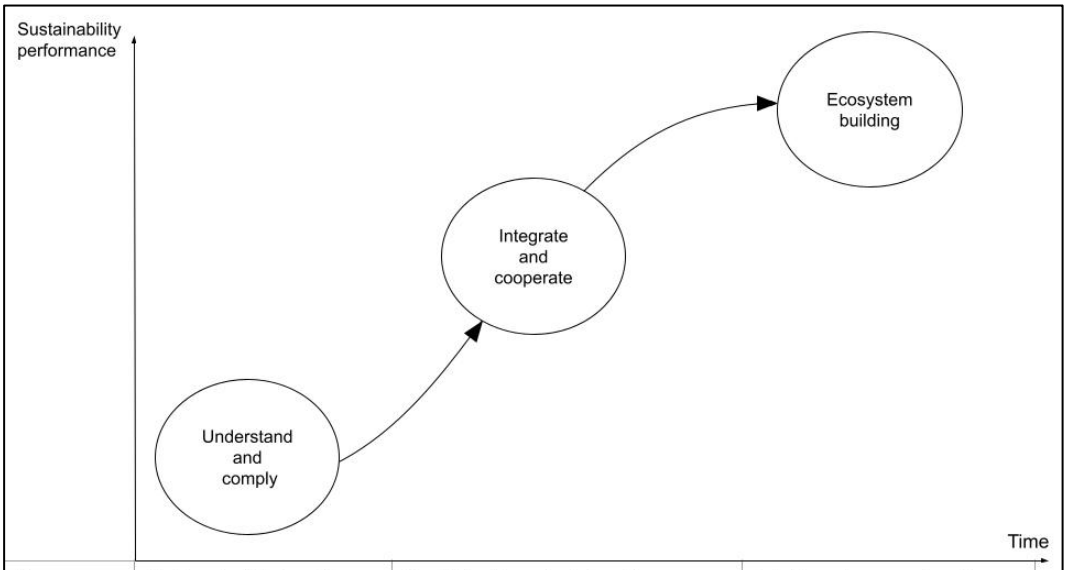
Appendix A: Interview Template, English

Interview Template—Practitioners, English

1) Initiatives/overview of sustainability levels:
   a) Where did sustainability begin at your hospital and can you explain your role in it?
      i) What were the motivations and benefits of taking sustainability action?
      ii) Did you have a good overview of environmental impacts and did that influence how you prioritised sustainability initiatives?
   b) This figure (Figure 2) shows an organisational evolution. Where would you say your hospital sits on this figure?
      i) Does your sustainability program focus on minimising the environmental footprint of the organisation, or does it extend to disaster resilience and preventative healthcare in the broader community?
      ii) For the hospital to move to sustainability as a core part of its strategy, a lot would have to change. What has been your focus: low hanging fruit, technological substitution, structural changes, behavioural change?
      iii) What are your goals for the hospital regarding sustainability?



Scope	Peripheral within hospital	Hospital and supply-chain wide	Industry and community-wide
Narrative	Cost-efficiency Low hanging fruit Compliance	Sustainability as strategic opportunity Cultural and behavioural shifts Cooperation with external organisations	Sustainability core to strategy Disaster resilience & community health prevention Sector leader

Figure 2

Sustainability Levels Based on Frameworks by Benn et al. (2018), Edwards (2009) and Jacobsen et al. (2020)

c) Could you tell me about some of your sustainability successes?
    i) Who/What were the main facilitators and what were some of the factors that pushed initiatives along?
d) Could you tell me about things that have not worked, and what obstacles you faced?
    i) Why do you think that did not work and how could the initiative have been more successful?

2) Procedure when introducing an initiative (Strategy making and organising processes):
    a) Take example from success
        i) How have you gone from developing ideas to implementing sustainability initiatives?
        ii) Who was involved in the decision-making process?
        iii) How was this project/initiative funded? What about other initiatives?
        iv) How did you determine to focus on this environmental issue? (might be covered with question 1a)
        v) How did you go about rolling out sustainability initiatives across the hospital?
            (1) Did you face challenges when communication with different stakeholders?
        vi) How do you follow up and assess if initiatives have worked?
    b) Thinking back to the Figure, would you say there has been continuous improvement and adaptation?
    c) How do you ensure sustainability is taken into account in all important decisions in the hospital?
        i) Can you provide an example?

3) Management capabilities and relational assets:
    a) Are there stakeholders within the organisation that have been key to your successes?
    b) How do you make sure your initiatives reach employees on different hierarchical levels?
    c) How do you keep employees engaged despite workload/understaffing etc.?
    d) Have you seen improved awareness and behaviour change through any of your work? What allowed this to come about?
    e) Tell me about the external stakeholders that have influenced the success of your sustainability initiatives and the role they play.
    f) Why do you think that you were able to achieve a deeper approach towards sustainability, when many other hospitals struggle to do so?
    g) In your opinion, what role do hospitals play regarding climate change?

4) Resilience:
    a) Do you think your hospital is sufficiently flexible, resilient and innovative to effectively respond to climate change and sustainability challenges?
        i) What would allow it to better evolve, innovate and manage change?

5) Additional questions:
    a) Are there other people within your hospital I should talk to in order to gain a holistic overview of sustainability in your hospital?
    b) Is there anything else you wish to add to this interview?
    c) Would I be able to follow up with you if I had any follow up questions?

Second Interview template—intermediary/informant, English

1) Questions about sustainability across the healthcare sector drawing on your current work:
    a) Do you think most hospitals focus on minimising the environmental footprint, or do some hospitals take broader community and supply chain wide initiatives extending to disaster resilience and preventative healthcare in the broader community?
    b) Do you see most hospitals as implementing low hanging fruit measures (energy efficiency, commercially available technological substitution) or are they also implementing more challenging structural and behavioural changes?
        i. In your experience, who/what are the main facilitators and what are some of the factors that push initiatives along?
    c) In your opinion, what characterises hospitals that do a particularly good job in implementing sustainability initiatives?
        i. Why do you think that they were able to achieve a deeper approach towards sustainability, when many other hospitals struggle to do so?
        ii. Do organisational aspects such as strategy development, processes and monitoring differentiate industry-leading hospitals from lagging hospitals?
        iii. And do management skills and resources or external partnerships differentiate leading from lagging hospitals?
    d) In your opinion, what role should hospitals play regarding climate change?
    e) What do you see as the key barriers to sustainability initiatives in the health sector?
    f) In what ways do you support hospitals to address sustainability issues?

i. To what extent do you influence the political and regulatory environment?

g) In your opinion, what would have to change in order to substantially increase sustainability performance across the sector?

h) Do you have the impression that the number of hospitals trying to integrate sustainability is growing?

2) Additional questions:

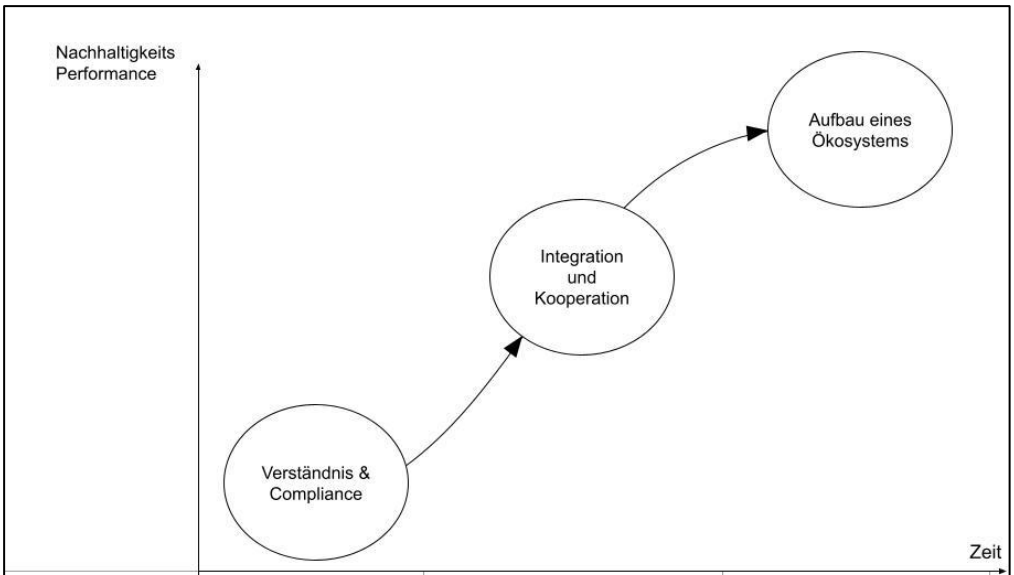
a) Is there anything else you wish to add to this interview?

b) Would I be able to follow up with you if I had any follow up questions?

Appendix B: Interview Template, German

Interview Template—Practitioners, German

1. Initiative/Überblick über Nachhaltigkeitslevels
    a. Wann begann Nachhaltigkeit in Ihrem Krankenhaus und können Sie Ihre Rolle dabei erläutern?
        i. Was waren die Beweggründe und die Vorteile dabei?
        ii. Hatten/haben Sie einen guten Überblick über die Umweltauswirkungen des Krankenhauses und hatte dies einen Einfluss auf die Priorisierung der Nachhaltigkeitsinitiativen?
    b. Diese Abbildung (Figure 3) zeigt die Entwicklung von Organisationen in Sachen Nachhaltigkeit. Wo würden Sie sagen, dass Ihr Krankenhaus in dieser Abbildung steht?
        i. Wo liegt Ihr Fokus der Nachhaltigkeitsprogramme?
        (Konzentrieren Sie sich eher auf die Minimierung des ökologischen Fußabdrucks des Krankenhauses oder erstreckt es sich auch auf die Widerstandsfähigkeit gegen Katastrophen und die Gesundheitsvorsorge in der breiteren Gemeinschaft?
        ii. Und worauf haben Sie sich dabei besonders konzentriert? z.B. schnelle, einfache Erfolge, strukturelle Veränderungen, Verhaltensänderungen?
        iii. Was sind Ihre Ziele für das Krankenhaus in Bezug auf Nachhaltigkeit?
    c. Können Sie mir etwas über einige Ihrer Nachhaltigkeitserfolge erzählen?
        i. Wer/Was waren die Hauptvermittler/Förderer oder Interessengruppen, die die Initiativen vorangetrieben haben?
    d. Können Sie mir auch etwas über Maßnahmen oder Pläne erzählen, die nicht funktioniert haben, und was waren die Hindernisse?
        wie hätte die Initiative erfolgreich sein können?



Wirkungsbereich	Innerhalb des Krankenhauses	Innerhalb der Lieferkette	Innerhalb der Branche und der Gemeinschaft
Eigenschaften und Fokus	Kosteneffizienz geringer Aufwand aber hohe Effektivität Orientierung an Richtlinien	Nachhaltigkeit als strategische Möglichkeit Veränderung von Verhalten und Organisationskultur Kooperation mit externen Organisationen	Nachhaltigkeit ist der Kern der Strategie Katastrophenresilienz und Gesundheitsprävention der Gemeinschaft Führend in der Branche

Figure 3

German Figure of the Sustainability Levels Based on Frameworks by Benn et al. (2018), Edwards (2009) and Jacobsen et al. (2020)

2. Strategieentwicklung/vorgehen beim Einführen einer Initiative:
    a. Aufgreifen eines der Erfolgsbeispiele
        i. Können Sie da einmal den Prozess beschreiben, wie kam es zur der ersten Idee und wie war dann der Prozess bis es in konkrete Maßnahmen umgesetzt wurde?
        ii. Wer war an der Entscheidungsfindung beteiligt?
        iii. wie wurde festgelegt, dass Sie sich auf genau dieses Thema und genau diese Maßnahmen konzentrieren sollten?
        iv. Wie wurde das Projekt/die Initiative finanziert? Gilt das auch für andere Projekte?
        v. Wie sind Sie dann bei der tatsächlichen Einführung von der Nachhaltigkeitsinitiative im gesamten Krankenhaus auf allen Hierarchie ebenen vorgegangen?

1. Welche Schwierigkeiten gibt es bei der Kommunikation?

vi. Wie überprüfen und bewerten Sie, ob Initiativen funktioniert haben?

b. Gibt es einen Prozess zur kontinuierlichen Verbesserung und Anpassung?

c. Wird Nachhaltigkeit bei allen wichtigen Entscheidungen im Krankenhaus berücksichtigt?

i. Können Sie ein Beispiel geben?

3. Managementfähigkeiten und Beziehungswerte

a. Gab oder gibt es noch weitere Interessengruppen innerhalb der Organisation die das Outcome beeinflusst haben?

b. Wie stellen Sie sicher, dass Initiativen alle Mitarbeitenden auf allen Hierarchieebenen erreichen?

c. Wie halten Sie die Mitarbeiter trotz Arbeitsbelastung/Unterbesetzung etc. motiviert?

d. Haben Sie durch Ihre Arbeit eine Verbesserung des Bewusstseins und des Verhaltens der Mitarbeiter festgestellt?

e. Gibt es auch externe Interessengruppen, die den Erfolg Ihrer Nachhaltigkeitsinitiativen beeinflusst haben?

f. Was denken Sie, warum es Ihnen gelungen ist, einen tiefergehenden Ansatz zur Nachhaltigkeit zu erreichen, während viele andere Krankenhäuser damit Schwierigkeiten haben?

g. Welche Rolle spielen Ihrer Meinung nach Krankenhäuser im Hinblick auf den Klimawandel?

4. Resilienz:

a. Glauben Sie, dass Ihr Krankenhaus ausreichend ausgestattet ist (flexibel, belastbar und innovativ), um effektiv auf die Herausforderungen des Klimawandels zu reagieren?

i. Was würde es dem Krankenhaus ermöglichen, sich besser weiterzuentwickeln und Veränderungen zu bewältigen und widerstandsfähiger zu werden?

5. Zusatzfragen:

a. Gibt es bei Ihnen im KH noch andere beteiligte, mit denen ich sprechen sollte wenn ich einen ganzheitlichen Eindruck über die Nachhaltigkeit bei Ihnen bekommen möchte?

b. Gibt es noch etwas, das Sie diesem Interview hinzufügen möchten, von dem Sie glauben, dass es für mich relevant sein könnte?
c. Falls ich im Verlauf noch weitere Fragen habe, dürfte ich Sie erneut kontaktieren?

Second Interview template—intermediary/informant, German

1) Fragen zur Nachhaltigkeit im gesamten Gesundheitssektor, die sich auf Ihre Arbeit bei KLUG beziehen:
    a. Was glauben Sie worauf sich die Krankenhäuser in Bezug auf Nachhaltigkeit am meisten konzentrieren? Minimierung des ökologischen Fußabdrucks innerhalb des Krankenhauses oder erstrecken sich die Maßnahmen auch auf die Wertschöpfungskette, oder sogar auf die Widerstandsfähigkeit gegen Katastrophen und die Gesundheitsvorsorge in der breiteren Gemeinschaft?
    b. Und worauf wird sich bei den Nachhaltigkeits-initiativen besonders konzentriert? z.B schnelle, einfache Erfolge, oder auch strukturelle Veränderungen (Änderung von Prozessen) und Verhaltensänderungen?
        i. Wer/Was waren die Hauptvermittler/Förderer und was waren einige der Faktoren, die die Initiativen vorangetrieben haben?
    c. Was zeichnet Ihre Meinung nach Krankenhäuser aus, die einen besonders guten Job beim Implementieren von Nachhaltigkeitsinitiativen leisten?
        i. Warum glauben Sie können diese KH einen tiefergehenden Ansatz zur Nachhaltigkeit erreichen, während viele andere Krankenhäuser damit Schwierigkeiten haben?
        ii. Unterscheiden sich Branchen-führende Krankenhäuser von hinterherhinkenden Krankenhäusern durch organisatorische Aspekte wie die Integration von Nachhaltigkeit in Strategieentwicklung, Prozesse und Überwachung?
        iii. Und wie ist es bezüglich Fähigkeiten im Management und Ressourcen oder externe Partnerschaften?
    d. Welche Rolle spielen Ihrer Meinung nach Krankenhäuser im Hinblick auf den Klimawandel und welche Rolle sollten sie spielen?
    e. Was sind Ihrer Meinung nach die größten Hindernisse für das Umsetzen von Nachhaltigkeitsinitiativen im Gesundheitssektor?
    f. Auf welche Weise unterstützen Sie Krankenhäuser bei der Bewältigung von Nachhaltigkeitsthemen?

i. In wie fern beeinflussen Sie das politische/regulatorische Umfeld?

g. Was müsste sich Ihrer Meinung nach ändern, um die Nachhaltigkeitsleistung der gesamten Branche zu steigern?

h. Haben Sie den Eindruck, dass die Anzahl an KH wächst, die versuchen Nachhaltigkeit zu integrieren?

6. Zusatzfragen:

   a. Gibt es noch etwas, das Sie diesem Interview hinzufügen möchten?

   b. Falls ich im Verlauf noch weitere Fragen habe, dürfte ich Sie erneut kontaktieren?

Appendix C: Information Sheet

Englisch:

Sustainable transformation in healthcare: Integrating environmental sustainability into German hospital business models

I would like to invite you to participate in a study that aims to help to understand how to integrate environmental sustainability into German hospital business models. This research is being undertaken as part of my Master's in Business with a specialisation in Management.

In this study I am investigating the barriers of shifting towards green sustainability in German hospital business models and how to overcome them from the management perspective. I would like to interview you online for approximately 30 minutes to 1 hour between May and July 2024. In this interview, I will ask you about your experience in hospital management and green innovations; management's initial motivation for addressing issues of environmental sustainability, opportunities and barriers you had to conquer, management's practices and benefits of a holistic approach to sustainability.

Why participate?

I hope this study will help to identify barriers and potential strategies for management to surmount them regarding implementing environmental sustainability in German hospital business models. I will share my findings with you if you wish.

Your rights as a participant

I guarantee full confidentiality to all participants in this study. Your contact details and interview transcript will be kept in a secure environment only accessible to myself and my supervisors. No participants or hospital names will be identified in any way, unless you wish to be named. Participation in this research is completely voluntary. If you decide to participate, you have the right to:

- Ask any questions about the research at any time
- Decline to answer any question
- Decline to be recorded or to ask for the recorder to be switched off during the interview
- Be provided with a summary of the research findings when the study is concluded
- Withdraw from the study at any time within one week following the interview

Please feel free to contact me if you have any questions about the project.

German:

Nachhaltige Transformation im Gesundheitswesen: Integration ökologischer Nachhaltigkeit in deutschen Krankenhäusern

Dieses Schreiben ist eine Einladung an Sie, an einer Studie teilzunehmen, die einen Beitrag zur Integration ökologische Nachhaltigkeit in deutschen Krankenhäusern leisten soll. Die Arbeit wird im Rahmen meines Masterstudiums in Betriebswirtschaft mit Spezialisierung auf Management durchgeführt.

In dieser Studie untersuche ich aus Managementsicht, wie die Integration von ökologischer Nachhaltigkeit in deutschen Krankenhäusern gelingen kann. Dafür möchte ich Sie gerne zwischen Mai und Juli 2024 für ca. 30 Minuten bis 1 Stunde online interviewen.

In diesem Interview werde ich Sie nach Ihren Erfahrungen im Krankenhausmanagement und ökologischer Innovationen, der Koordination und Implementation von Nachhaltigkeitsinitiativen, dem Vorgehen bei Entscheidungsfindung, Kommunikation und Überprüfung von Strategien und dem Einfluss der Stakeholder fragen.

Warum teilnehmen?

Ich hoffe, dass diese Studie dazu beitragen wird, andere Krankenhausmanager bei der Transformation hin zu einem ganzheitlichen Nachhaltigkeitsansatz zu unterstützen. Auf Wunsch teile ich meine Erkenntnisse mit Ihnen.

Ihre Rechte als Teilnehmer

Ich garantiere allen Teilnehmern dieser Studie absolute Vertraulichkeit. Ihre Kontaktdaten und das Interviewprotokoll werden an einem sicheren Ort aufbewahrt, der nur mir und meinen Betreuern zugänglich ist. Es werden keine Namen von Teilnehmern oder Krankenhäusern genannt, es sei denn, Sie möchten namentlich genannt werden. Die Teilnahme an dieser Forschung ist freiwillig. Wenn Sie sich zur Teilnahme entscheiden, haben Sie das Recht:

- jederzeit Fragen zur Forschung zu stellen
- die Beantwortung einer Frage abzulehnen
- die Aufzeichnung abzulehnen oder zu verlangen, dass der Rekorder während des Interviews ausgeschaltet wird
- nach Abschluss der Studie eine Zusammenfassung der Forschungsergebnisse zu erhalten
- jederzeit innerhalb einer Woche nach dem Interview von der Studie zurückzutreten

Wenn Sie Fragen zum Projekt haben, können Sie mich gerne kontaktieren.

Appendix D: Declaration of Consent

English:

I have read and I understand the Information Sheet attached. The details of the study were explained to me, any questions I had have been answered to my satisfaction, and I understand that I may ask further questions at any time. I have been given sufficient time to consider whether to participate in this study and I understand participation is voluntary and that I may withdraw from the study at any time.

I agree to participate under the conditions set out in the Information Sheet.	☐ Yes	☐ No
I agree to the interview being sound recorded.	☐ Yes	☐ No
I wish to have my recordings returned to me.	☐ Yes	☐ No
I wish to see a summary of findings	☐ Yes	☐ No

Declaration by Participant:

I, _____, [print full name] hereby consent to take part in this study.

Signature: _____ Date: _____

German:

Ich habe das beigefügte Informationsblatt gelesen und verstanden. Mir wurden die Einzelheiten der Studie erläutert, alle anfälligen Fragen wurden zu meiner Zufriedenheit beantwortet und ich verstehe, dass ich jederzeit weitere Fragen stellen kann. Mir wurde ausreichend Zeit zur Reflexion der Informationen eingeräumt, um die Teilnahme an der Studie abzuwägen. Mir ist bewusst, dass die Teilnahme freiwillig ist und ich jederzeit (innerhalb einer Woche nach Durchführung des Interviews) von der Studie zurücktreten kann.

Ich erkläre mich mit der Teilnahme zu den im Informationsblatt aufgeführten Bedingungen einverstanden. ☐ Ja ☐ Nein

Ich bin mit der Tonaufzeichnung des Interviews einverstanden. ☐ Ja ☐ Nein

Ich möchte eine Kopie der Tonaufzeichnung erhalten. ☐ Ja ☐ Nein

Ich möchte eine Zusammenfassung der Ergebnisse einsehen. ☐ Ja ☐ Nein

Erklärung des Teilnehmers:

Hiermit erkläre ich _____, [vollständiger Name] mich mit der Teilnahme an dieser Studie einverstanden.

Unterschrift: _____ Datum: _____

Appendix E: Low Risk Ethics Letter

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

19/03/2024

Dear: Nora Suessenguth

Re: Low Risk Notification - 4000028677 - Sustainable transformation in healthcare: Understanding how to integrate environmental sustainability into German hospital business models

Thank you for submitting a low risk notification for your research/teaching/evaluation.

This email is to acknowledge receipt of the low risk notification and to inform you that the details of your project have been recorded in our database for inclusion in the annual reports to the Health Research Council Ethics Committee (HRCEC) and the Massey University Research Committee (URC).

You may proceed with your research, though it is advisable to provide a couple of weeks before commencing, as all low risk notifications are checked for completeness and clarity by a Research Ethics Advisor. You may be contacted if your application is incomplete and/or further clarification is required.

The low risk notification for this project is valid for a maximum of three years.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis.

If a sponsoring organisation, funding authority (e.g., the Health Research Council) or a journal require evidence of ethical approval from a Human Ethics Committee (with an approval number), you need to complete a full Massey University Human Ethics application to be reviewed and approved by one of our Human Ethics Committees. Applications must be submitted and approved prior to the commencement of the research.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact the Research Ethics Office, email humanethics@massey.ac.nz. "

Please include the following statement on all public documents (e.g., information sheet, consent form) related to your project:

> ***This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.***
>
> ***If you have any concerns about the ethical conduct of this research that you want to raise with someone other than the researcher(s), please contact Massey University Human Ethics by email: humanethics@massey.ac.nz.***

I wish you all the best in your research, teaching or evaluation activities and appreciate your thoughtful consideration of ethics principles and practices.

Ngā mihi nui,

Professor Tracy Riley
Acting Chair, Research Ethics Chair's Committee

Research Ethics Office, Research and Enterprise
Massey University, Private Bag 11 222, Palmerston North, 4442, New Zealand T 06 951 6841; 06 951 6840
E humanethics@massey.ac.nz; animalethics@massey.ac.nz; gtc@massey.ac.nz