



HEALTHCARE WITHOUT HARM

A benchmark tool towards a greener footprint of
the Operation Rooms

Radboud University Nijmegen

Name student: Ruby Wemmers

Student number: s1027108

Thesis supervisor: prof. dr. K. Lauche

Second examiner: Dr. R. Smals

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Abstract

Sustainable development has been one of the most urgent challenges for the healthcare sector. Such an important development asks for a great movement initiated by a group of internal actors that together deliberately formed a national platform for the Green OR that aims for sustainable development for the operating rooms. They find it very important to have the ability to measure that sustainable development in a benchmark tool for the operating rooms. Therefore, the Green Barometer for the OR is invented.

This study was conducted within an academic hospital in the Netherlands and examined the process of environmental issue selling aiming at designing a benchmark tool to monitor the sustainable development of the OR, and also contributes to the actual development of that benchmark tool called the Green Barometer for the OR on the subject of waste distribution in the OR. Therefore, the following two research questions have been derived: *“How can the acceptance of a benchmark tool for the Green OR be created through a process of environmental issue selling?”* and *“How can the degree of sustainable waste flows in the operating room be measured in a benchmark tool?”*. In order to answer those two research questions a qualitative, inductive approach with a, social constructivist perspective was used to gain insight about this process of environmental issue selling and about how a design for the Green Barometer for the OR should look like. The data was gathered through semi-structured in-depth interviews.

The results showed that the internal activists deliberately approached possible allies that were already interested in sustainable development for the OR. Together they formed a coalition of the willing and started the national platform for the Green OR. During that process, members of that platform wanted to create two types of pressure for commitment, namely internal and external pressure. The results about the desired barometer showed that the Green Barometer for the OR should be transparent, clear, unambiguous, and approachable. The specific indicators for measuring the status quo with respect to waste can be found in appendix 2.

This research contributes to current literature on environmental issue selling as it examines the development of an interorganizational collaboration from the perspective of an insider activist. On top of that, a prototype for the Green Barometer for the OR is developed and provides a first glance of what the eventual benchmark may look like.

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Chapter 1: Introduction

Environmental issues have become much more important and urgent over the last decades. Because of the large impact on society, combating climate change even became one of the most important challenges for our generation. According to the United Nations we need to change our current way of life before 2030, otherwise the effects of climate change will become irreversible (United Nations, 2019). The predicted consequences of climate change on society are very severe (demographical changes, the increasing scarcity of fresh water and other natural resources, and growing human conflicts because of those scarcity) (Milieu Centraal, n.d.; Raleigh & Urdal, 2007), hence human society needs to do as much as possible to prevent irreversible climate change from happening (Amendola et al., 2018).

Climate change is partly caused by the emission of carbon dioxide (hereafter: CO₂) (Solomon et al., 2009). The emission of CO₂ is on the one hand caused by natural influences, and on the other hand caused by human activity (Wageningen University & Research, 2019). Since the industrial revolution, human influences on CO₂ emission became bigger (Wageningen University & Research, 2018). Due to this increase of CO₂ emission because of the industrialization, the global temperature has been rising ever since, which is called global warming. The process of global warming is not preventable, however without human CO₂ emission this process will evolve much slower (Milieu Centraal, n.d.).

Organizations are known of their heavy influence on society and on climate change. In society, organizations have made the current way of life of human citizens possible. Apart from positive developments, organizations also cause negative side effects, like a large amount of CO₂ emission, to society. Therefore, organizations must play an important role in decreasing CO₂ emission. The healthcare sector is one of the sectors that emits a large amount of CO₂. The amount of CO₂ emission of the healthcare sector even runs up to 11 megaton, which, converted, amounts to 7% of the total CO₂ emission in the Netherlands (Gupta Strategists, 2019). Hence, for the hospital sector, the Dutch Green Deal has been developed. According to the Dutch Green Deal, every Dutch hospital needs to half its CO₂ emission in 2030, and needs to become CO₂ neutral in 2050 (Milieuplatform zorgsector, 2019).

Such an important theme like climate change asks for a radical change process (Plowman et al., 2007). It is important to create awareness about climate change and its causes, because

awareness among humans can cause a bigger change to happen (Dutton et al., 2001). This master thesis zooms in on the process of environmental issue selling, that is often used by internal activists to convince others inside and outside their organization in order for change to happen (Dutton et al., 2001).

This master thesis focuses on the operating rooms (hereafter: OR) department of a Dutch academic hospital, specifically on the distribution of waste that is generated in and around the ORs. The definition of OR-waste that is used in this master thesis is: surgical apparatus, devices, material or other articles that are used in the operating rooms, that will be thrown away (NEN, n.d.). Research shows that 30% of all hospital equipment and supplies are used at the ORs (Heijnen, 2020). This means that the ORs do have a large impact on the total environmental footprint of the hospital. The problem of waste in ORs is known in the literature, and a lot of (local) initiatives were taken already in order to reduce the large amount of waste that is produced in the OR every day (e.g. Modules & Studies, 2011; Kagoma et al., 2012; Albert & Rothkopf, 2015). Most of the ideas were developed independently from each other, causing they only will help to solve a small part of the problem.

The cause of the large material use in the ORs is based on the requirements for the operations. Recent developments show that materials and equipment, that used to be sterilised for frequent use, now only is used once as disposable materials and equipment (Heijnen, 2020). This is causing an enormous amount of waste generated in the ORs often to the annoyance of many OR employees (Sevil, 2019; Heijnen, 2020). Besides that waste in ORs cost lots of money (Hoffman et al., 2012), the significant impact of the OR waste on the environment is even an much more important reason to reduce OR waste (Zygourakis et al., 2017).

Medical waste, also called biohazardous waste or infectious waste, are types of waste that possibly can transfer diseases to others, therefore this type of waste is burnt in incinerators in Dordrecht (NL) (Omroep West, 2018). This process is known for the massive amount of CO₂ emission and therefore causes a lot of public concerns about the harm for the environment (Lee et al., 2002). The medical waste is delivered in special containers for medical waste that cannot be opened after it is closed, if this happens the chance on infection within the area is possible. In the residue of the burnt waste, a lot of non-flammable materials like pliers and needles are found which are eventually deposit at the landfill, which is the end place for the medical waste (Omroep West, 2018).

Some initiatives have already been taken by some players in the field. Mostly the initiatives came from so called, insider activists that expressed themselves in interorganizational collaboration. These insider activists have developed the national platform for the Green OR. An important milestone for the national platform for the Green OR is launching a benchmark tool, called ‘The Green barometer’ for the OR, that intends to measure the degree of sustainability of the OR on several dimensions.

The goal of this research is to gain insight in how the waste part of the green barometer for the OR can be elaborated, and can be used as a sustainability benchmark tool among other hospitals in the Netherlands. In order to become a sustainability benchmark tool, the green barometer for the OR must be accepted and integrated by other hospitals. Therefore, the process until acceptance and integration out of a less powerful position, called issue selling as an insider activist, is examined as well. The outcomes of this research will contribute to the development of the actual benchmark tool in one way, and in the other way to the process towards general acceptance of the benchmark tool. The results of this research will provide new steps in the development of the insights in how to reduce the environmental footprint of an hospital, and the ORs in particular.

Hence, the following two research questions are elaborated:

“How can the acceptance of a benchmark tool for the Green OR be created through a process of environmental issue selling?”

And

“How can the degree of sustainable waste flows in the operating room be measured in a benchmark tool?”

This master thesis first examines the theoretical background of literature regarding the issue selling theory and benchmarking theory. Then, in the methodology chapter the chosen research methods will be discussed followed by the result chapter where the results of the interviews are discussed. In the discussion the key findings of this research will be explained, followed up by

the reflection, theoretical contribution, practical implications and suggestions for future research.

Chapter 2: Theoretical background

In this chapter the relevant literature regarding environmental issue selling and benchmarking will be elaborated in order to form a theoretical background for this master thesis. First, the literature on environmental issue selling will be discussed. This is divided in three themes namely, literature on internal activists, literature on issue crafting, and literature about interorganizational collaboration. Secondly, the literature about benchmarking is discussed.

2.1: Issue selling and insider activists

In the last twenty years, issue selling became a promising and developing concept (Ashford et al., 2017). In order to gain a general understanding about the concept of issue selling, this section starts off with general theory about issue selling described by Dutton et al. (2001). They defined issue selling as “the process by which individuals affect others’ attention to and understanding of the events, developments, and trends that have implication for organizational performance” (Dutton et al., 2001, p. 716). An issue arises from trends, developments and events in the environment of an organization (Dutton et al., 2001; Sonenshein, 2009). The goal of the issue seller is to create internal or external support in order to create support from top management for the intended change (Dutton & Ashford, 1993).

The issue sellers are defined as efficacious and self-motivated *internal change agents* or *internal activists* who try to influence others through social interaction (Dutton et al., 2001; Alt & Craig, 2016; Wickert & de Bakker, 2018). Meyerson & Scully (1995) refer to insider activists as “tempered radicals” which they describe as minorities who oppose the status quo in their environment (p. 586). Most of the insider activists are responding to events in their personal environments and appoint them as, what they believe, are the most relevant societal problems. In order to create more legitimacy for the potential change, the insider activists are intentionally trying to convince individuals with more coercive power in the organization about the importance of the issue (Sonenshein, 2006). Insider activists often also try to find a group with like-minded peers (Dutton et al., 2001), also called *allies*, who can help them during their issue selling activities, this group is also referred as the *coalition of the willing* (Blazevic & Lauche, 2018). This process of looking for allies and the coalition of the willing is defined by various events that may include unexpected opportunities (Meyerson & Scully, 1995), or also called *serendipitous encounters*, which could determine the degree of successfulness of the issue selling process (Blazevic & Lauche, 2018; Lauche, 2019). Characterizing for these types of

internal change agents is that they do not operate from a management perspective, but from a *middle management* perspective with a *bottom-up approach* that intends to influence organizational strategizing through *upward influencing* (Dutton & Ashford, 1993; Howard-grenville, 2007; Alt & Craig, 2016), due to that bottom-up approach the initiated change process often proceeds emergently (Plowman et al., 2007; Howard-grenville, 2007; Gehman et al., 2013). The issue-selling process is characterized as an ongoing emergent process that is adjusted and specialized through interaction with the internal activists and the recipients (Howard-Grenville, 2007).

Internal activists from a less powerful position often need to establish an entrance for themselves in order to create the possibility to conduct issue-selling activities (DiBenigno, 2019). DiBenigno (2019) emphasized the importance of creating critical and influential relationships with line managers or other influential persons. She came up with a three phase model where peripheral experts found an opportunity to gain access and trust that results in more successful influencing of core line managers. The peripheral expert needs to find a way to “rapidly getting in”, than “rapidly providing oneself”, and lastly “continuously using relational expertise” in order to create the foundation for successful influencing (DiBenigno, 2019, p. 14). For issue selling, it is important to know who the change recipients are and what their values are in order to build a relation with the change recipients (Wickert & de Bakker, 2018). Not only bottom-up issue selling is possible, top-down and across issue selling has also proven to be successful (Bansal, 2003). In recent research, even issue selling with external parties has taken place (Blazevic & Lauche, 2018). Also an important factor for success is the specific timing of the change agent to sell the issue to the recipients (Dutton et al., 2001; Mayer et al., 2019), this specific activity is also referred as *seeking momentum for change* (Blazevic & Lauche, 2018). Not only the moment for the change initiative is important, because it also matters how the issue is sold and framed to the recipients (Mayer et al., 2019). Dutton et al. (2001) described various issue selling moves: packaging moves that describe how the issues should be framed, involvement moves that describe who to involve and coalition building, process moves that describe the actual process of issue selling, and contextual knowledge about the relational, normative and strategic considerations that need to be taken before the issue is sold. Howard-Grenville (2007) also refers to specific issue-selling moves that, in combination with recipient’s schemes and continued adjustment of the issue-selling strategy, can be used as a resource for change over time. She emphasizes that the entire issue-selling process is an experimental process with a combination of successful and unsuccessful moves, where issue-

sellers learn what the most effective moves are during the process (Howard-Grenville, 2007). In order to gain greater influence in the issue selling process, *agenda building* is an important concept. Agenda building is about exerting influence on the strategic agendas of powerful players in the field (Dutton, 1986). Which issues will have a place on the strategic agenda of an organization, and thus are up for debate, is determined by several tactics of the internal activists. Those tactics seek to affect three different elements which together determine the strength of an issue, namely: an issue's salience, an issue's sponsorship, and agenda structure (Dutton, 1986). Furthermore, the internal activist can choose several manners to share the issue are possible, namely "campaigning, emotionalizing through stories and seeking external support" (Blazevic & Lauche, 2018, p. 14).

2.2: Issue selling and issue crafting

In order to actually sell the issues to others, the issues have to be shaped and personalized for their audience which is called *Issue crafting* (Sonenshein, 2006). Most issues are crafted from an economic or moral point of view (Dutton & Ashford, 1993; Sonenshein, 2006; Mayer et al., 2019), and recent research shows that both points of view are effective ways to craft an issue (Mayer et al., 2019). Social issue sellers can use humanistic messages to create empathy for the social issue (Wickert & de Bakker, 2018). For that reason, the internal activist deliberately chooses to shape the message in a clear-obscure way in order to fit to the cognitive scheme, collective beliefs and strategy of the change recipients (Dutton & Ashford, 1993; Dutton et al., 2001; Mayer et al., 2019). Therefore, issue crafting is a combination from sensemaking, issue-selling and influence tactics (Sonenshein, 2006). Important here is the use of specific language that shapes the issue in order to suit congruent behaviour in the institution in order to gain credibility and legitimacy for the issue (Dutton & Ashford, 1993; Sonenshein, 2006). It is important that internal activists take the common experiences, language, and accepted logics of the change recipients into account when they are actually crafting the issue, and they should make a trade-off between their personal integrity and the organization's best interest when they are crafting the issue (Dutton & Ashford, 1993). Meyerson and Scully (1995) state that it may be advisable to use multiple language to different groups. For example, internal activists should use different language for issue crafting for change recipients with less coercive power (economic public language), than people who do have a position with formal power in order to gain legitimacy for their issue with their change recipients (Sonenshein, 2006). The arising issue causes some sort of trigger that, has an effect on the cognition and emotions of the issue

recipients that, together, will emerge into (alternate) sensemaking towards the issues (Sonenshein, 2009). In order to create a sense of urgency to resolve the issue drama, novelty and clear formulation should be used to frame the issue (Dutton & Ashford, 1993), important here is to use illustrations for the issue with quantitative examples as evidence what could be the benefit the sense of urgency and eventually the total change (Dutton & Ashford, 1993; Dutton et al., 2001; Girschik, 2020). Issue crafting also consist of the choice for the channel where the issue is spread, namely a public or private channel (Dutton & Ashford, 1993). Visualizing the issue helps to make an intangible issue become more clear (Blazevic & Lauche, 2018). Also, bundling the issue with other issues could be beneficial for the issue selling process, however bundling the issue could also have a negative outcome, so good consideration is needed with this packaging move (Dutton & Ashford, 1993; Dutton et al., 2001). The degree of successfulness of the internal activists depends on the degree of support of the recipients, reputation risks for the issue seller, and the chances in that particular context to successfully sell the issue (Mayer et al., 2019). The speed and degree of organizational response to an issue depends on two different factors, namely the personal efforts of the issue seller and the coherence between the issue and the organizational core values (Bansal, 2003). Information flows are a very important mechanism in informing and arousing the enthusiasm of recipients towards the issue, and will help to accelerate the process (Bansal, 2003).

Issue crafting for climate change is really difficult, because of the complexity, uncertainty, and evaluatively nature of the concept (Ferraro et al., 2015). This is the case because climate change is dependent from several aspects that are influencing this process, the unpredictability of the outcomes and the definition of the problem and solution differs among professional actors (Ferraro et al., 2015). Because of the complexity, uncertainty, and ambiguity of the environmental issues, the change efforts require long-term planning that need to be accomplished by joint efforts of several parties (Corbett & Van Wassenhove, 1993; Howard-Grenville et al., 2017; Blazevic & Lauche, 2018; Lauche, 2019). Therefore, Wickert and de Bakker (2018) argue that the issue needs to be comprehensible for the issue recipients in order to sell the social issue successfully. By that reason, the issue should not be too big and impossible, preferably the issue should consist of small and reachable steps in order to achieve small wins (Dutton & Ashford, 1993; Wickert & de Bakker, 2018). Recent research shows that it is beneficial for the willingness to deal with grand challenges like sustainable development to use a more narrow and practical definition of organizational responsibilities and to show the responsibilities in order to show the shared responsibility of organizations towards sustainable

development (Girschik, 2020). It may even help to craft issues that already have been combined with an issue solution (Dutton & Ashford, 1993). Furthermore, also stated is that in order to successfully sell environmental issues, relations with likeminded issue buyers should be build that will eventually help them to build a network or coalition that will support the change (Wickert & de Bakker, 2018).

2.3: Issue selling and Interorganizational collaboration

Other insider activist initiatives involved a process of deliberate network creation of players with mutual interests who try to make use of opportunities in gaining external support, inspiration, and legitimacy in order to initiate internal change through a process of *interorganizational collaboration* (Blazevic & Lauche, 2018; Lauche, 2019). This process of interorganizational collaboration often happens emergently from a tangential perspective trough coalition building, with like-minded players in their organizational field (Lauche, 2019). It is proven to be successful because it creates collaborative advantage for the mutual interests of both parties because they can bundle their gains in order to tackle their (grand) problems (Blazevic & Lauche, 2018; Mayer et al., 2019; Lauche, 2019). Most change attempts are based on a moral claim of the actors inside an occupation to change something about the current status quo in the organizational field (Howard-Grenville et al., 2017). Interorganizational collaboration issue selling in several occupations appeared to be more difficult when the network of actors is very diverse and has several divergent interests (Lauche, 2019). Howard-Grenville et al. (2017) therefore argue that peer-driven occupational change with like-minded professional is a powerful mechanism for occupational change. Hence, in order to overcome those difficulties various tactics are drawn up, namely if the internal activist understands the relational context and the power relations that are at stake in the organizational field, it is more likely that the internal activist acts well according to that certain situation. Furthermore, the internal activist should be alert for the occurrence of serendipitous encounters, because also for interorganizational collaboration those serendipitous encounters can play a large role in forming allies and strengthening the network. By deliberately building an interorganizational network, internal activists are creating a movement that will help to create internal support for the change within the organization (Lauche, 2019).

For interorganizational collaboration, commitment towards that collaboration is crucial for the result of that collaboration. It is important for interorganizational collaboration to try to

convince the more influential parties, like professional bodies, to join the movement, because they can help to create a larger movement in order to change the organizational field (Blazevic & Lauche, 2018). These parties are innovative and bringing about institutional change. This powerful mechanism creates an institutional field of actors with several rules they need to obey in order to gain and maintain institutional legitimacy (Scott, 2014). If actors disobey those institutional rules, they are not legitimate in the eyes of the institution, which will create a feeling of shame and disgrace. For example, several scholars with concerns for integrity shared their concerns and they eventually collaboratively developed a code of honour that is meant for incorruptible institutional behaviour (Gehman et al., 2013). This formation process eventually led to institutionalization of that code of honour, that created new accepted or unaccepted behaviour (Scott, 2014). In the research of Howard-Grenville et al. (2017) the network of interorganizational actors made use of their heterogenic backgrounds to combat their grand challenges. Although in the research of Howard-Grenville et al (2017) the heterogeneity of the actors did not form a very big obstacle, they state that this could form a problem in different situations. Therefore, they are stating that the use of professional bodies can ease the differences of the interorganizational actors by having a more stimulating role in the change process to ensure that the change is secured in the organizational field (Howard-Grenville et al., 2017). Those professional bodies can set up rules that enforce commitment among the members of the organizational field, important here is to keep the flexibility in mind in order for members to deal with the complexity of the grand challenge and to retain the possibility for innovation and improvement (Wijen, 2014). The reason for this is because causal complexity and multiplicity is often the reason for not reaching organizational goals. Transparency in the organizational field helps making goals and rules more clear and help for members to obey to those rules and achieve organizational goals (Wijen, 2014).

2.4: Benchmarking sustainability in operating rooms

Benchmarking originates from the late twentieth century and is found often in a total quality management system (De Fátima Castro et al., 2015). Benchmarking is usually meant to measure the organization's status quo (Moriarty, 2011), in order to use that data for the comparison of organizations, the identification of organization's best practices, and eventually the improvement of organizational performance (De Fátima Castro et al., 2015). Because of the goal for improvement of the organization, the benchmarking method is meant to expose subjects of improvement with the concept of comparison (De Fátima Castro et al., 2015). By that reason,

benchmarking is based on variables (what is measuring the status quo), and processes (how can the current status quo be improved) (Moriarty, 2011). Because of the comparison between organizations and the attempt to improve the status quo, benchmarking can even lead to comparable working processes in the entire sector (Gift & Stoddart, 1994). In this research the definition for benchmarking of Kumar et al., (2006) is used, namely “the process of identifying, understanding, and adapting outstanding practices from organizations anywhere in the world to help your organization improve its performance. It is an activity that looks outward to find best practice and high performance and then measures actual business operations against those goals.” (p. 294). Benchmarking can be divided in two categories, namely internal benchmarking or external benchmarking. These two types of benchmarking are based on the place where the information for the benchmark is coming from (Anand & Kodali, 2008). In research based on customer satisfaction in several industries, benchmarking could lead to better performances among companies that join the benchmark, an internal benchmark can lead to more adequately structured processes. These improvements are meant to create financial and strategic synergy in the organization (Kumar et al., 2006).

A proper benchmark tool should have valid content. This means that the measurements are weighed and scheduled in the benchmark tool properly (Voss et al., 1994). Furthermore, the benchmark tool should be usable and useful. For benchmarking sustainability it is harder to measure the effects of the efforts, therefore primary benchmarking initiatives on this subject are often meant to create some transparency and exposure about what the indicator actually entails (Dahl, 2012). It often helps to create a ranking list where members can see how they are doing in comparison to other members, because this causes a political process where members are committing to improve their position (Dahl, 2012). In order to determine indicators that are used in a benchmark tool, it is important that general definitions about the indicators have been determined (De Fátima Castro et al., 2015). For developing these indicators for measuring sustainability, transparency about the definitions is very important (de Olde et al., 2017). Furthermore, the specific context matters in this process of determining the definitions of the benchmark indicators, the development of the benchmark tool, and lastly the weight of the indicators in the benchmark tool (de Olde et al., 2017).

Chapter 3: Methodology

In this third chapter the research methodology that was chosen for this master thesis is discussed. In this chapter the research approach with amongst others the epistemology, the case description, the data collection methods, and data analysis are being discusses. Lastly, the research ethics are an important part of this chapter.

3.1: Research approach

Together with two peers, I was asked via my thesis supervisor to join the project of the Green Barometer for the OR. Each of us examined a different aspect of organizational change and a different part that can be linked with the sustainability of an OR. The topics were energy use, the use of surgical tools, and the degree of waste generated in the OR. This thesis zooms in to the issue selling literature from the perspective of an internal activist and the degree of waste in the OR.

In order to answer the two derived research questions: *“How can the acceptance of a benchmark tool for the Green OR be created through a process of environmental issue selling?”*, and *“How can the degree of sustainable waste flows be measured in a benchmark tool”*, an inductive qualitative research approach was used, to gain in depth knowledge about the current situation about the degree of sustainable waste flows of the ORs, and how the sustainability of the OR can be benchmarked (Myers, 2013). For answering the first research question about the creation of acceptance by environmental issue selling, preliminary knowledge has gained in the theoretical framework of this master thesis. However, because of the inductive nature of this master thesis more important was the information gained through interviewing experts from the healthcare sector. The second research question about the most sufficient way of benchmarking the degree of sustainability of waste flows in the ORs was mostly answered through specialists on this subject from the healthcare sector were consulted, both in literature and through interviews. This research is a diagnosis-based and design-based research, because on the one hand the diagnosis of the organizational change process has been examined in order to establish a diagnosis, and on the other hand the partial aim for this research to design a prototype template of a benchmark tool that is meant for the measurement of the waste flows in the OR. For answering both these research questions, the experiences and opinions of expert in the healthcare were consulted and inductively analysed through template analysis. Hence, the ontological approach for this research is based on a social-constructivist

perspective, because of the belief that human interpretation form the basis of our knowledge (Duberley et al., 2012, in Symon & Cassell, 2012).

The first research question about how acceptance should be created via a process of environmental issue selling is done via theoretical research in prior literature, via the data gathered by a previous master thesis (more about this in the data collection section), and most importantly via semi-structured interviews via Skype with experts in the healthcare sector. Secondly, the benchmark tool should be developed on the basis of the information gained through interviewing experts about how the sustainability of waste flows can be measured, and via benchmarking literature.

3.2: Case description

The research case for this master thesis has been executed at the OR-department of an academic hospital in the Netherlands. In this master thesis the change process toward sustainability is discussed. It takes a lot of effort to create such a drastic change for a very large industry as the Dutch healthcare sector. This master thesis looks at the change process from the view of several insider activists. These insider activists initiated the project about ‘The Green Barometer for the OR’, in which is referred to the benchmark tool. The insider activists have tried to compose a group, through interorganizational collaboration, with different actors in several different positions, from different hospitals or stakeholder companies in order to create a growing initiative of support base that will help him to make the ORs in the hospitals more sustainable. The difficulty in this case is that such a benchmark tool is not accepted overnight.

As already described in the introduction, the social issue in this master thesis is about the degree of sustainable waste flows created in the OR. Because of the agreements in the Dutch Green Deal, which is discussed in the introduction, this case is of great relevance for the healthcare sector in the Netherlands. Dutch hospitals and, in this case, the ORs in particular have to deal with a great amount of legislation regarding safety and hygiene. Because of those rules, it became more difficult to simply reduce waste from the ORs. Although OR-waste will probably never be eliminated, it is not impossible to reduce waste at all. This sustainable development requires an enormous amount of effort made by several parties in the healthcare sector. However, hospitals in general often do not know exactly how they are performing in terms of the degree of sustainability of waste generated in the OR. Hence, it was needed to develop the

benchmark tool that helps ORs in measuring the degree of sustainable waste generation, comparing those results with other hospitals, and eventually learning from each other in order to enlarge the degree of sustainability of waste generation in the OR. Therefore, the aim for this research is on the one hand gaining insight in how the change perspective from an insider activist's perspective looks like for this case, and on the other hand the creation of a prototype of a template for the benchmark tool that measures the degree of sustainability of waste in the ORs.

3.3: Data collection

Due to the Corona-crisis, it became impossible to collect data via face-to-face communication, so the main data source for this master thesis was through Skype, Zoom, or phone interviews. This data collecting method allowed for talking and seeing interviewees during the interview from distance. Although this type of data collection method is not the same as face-to-face interviewing, it does “mitigate the distance of space” (Deakin & Wakefield, 2014, p. 605). Sometimes the internet connection was bad, which caused some hiccups during the conversations, however it did not adversely affect the final quality of the transcripts and the coding process. Above all, it was a sufficient method to collect data during these difficult times of social distancing, and the collection of primary data helped to gain a larger degree of credibility for this research (Myers, 2013).

The data was collected through nine semi-structured interviews. This interview guideline was compiled by the preliminary information that was gained in the theoretical framework, and with the information from a previous master thesis at the same OR-department that was analysed in a concept mapping session. This semi-structured interview which can be found in appendix 1. The interviewees all work in the healthcare sector, at a different organization. The diversity of respondents ensured that a diverse public was heard, which could make it more likely that transferability of the Green Barometer for the OR eventually will be achieved. The respondents that were interviewed had the following positions (the functions in the list are not in chronological order as the interview numbers mentioned in chapter 4):

- An employee of Benchmark OR Netherlands
- Project manager of the Dutch ministry of VWS
- A senior advisor in the healthcare sector

- Manager business bureau of an OR
- An employee of a healthcare supplier (1)
- An employee of a healthcare supplier (2)
- A sustainability coordinator
- A senior advisor at a professional body in the healthcare sector
- An expert on the subject of waste

3.4: Data analysis

The data that was collected from the semi-structured interviews that were held by me and my peers, are transcribed verbatim, roughly analysed via a collaborative concept mapping session, and after that coded inductively and analysed via template analysis (Myers, 2013). Verbatim transcripts will help in increasing the degree of credibility of this master thesis because quotes from the interview data will illustrate the findings and will show that they are correctly interpreted, which adds face validity to this master thesis (Myers, 2013). The choice for template analysis was made because it offers a great amount of structure in the interview data, and it offers flexibility that allows for interim adjustments (King, 2012, in Symon & Cassell, 2012). Furthermore, the template analysis data analysis method is consistent with the aim for this research and the subjective constructivist approach that was chosen as the research approach of this master thesis (King, 2012, in Symon & Cassell, 2012).

During the template analysis, the verbatim transcribed data from the interviews and the data gained during the other master thesis was coded in a hierarchical manner with more specified second and third level codes (King, 2012, in Symon & Cassell, 2012). The priori themes for the coding scheme were developed during the literature research, the first look on the interviews from the previous master thesis, and the concept mapping session. During the coding process in the template analysis, the codes were reviewed constantly in order to see whether the primary chosen codes still were sufficient. The template analysis eventually led to a full analysis of the interview data from interviews (King, 2012, in Symon & Cassell, 2012)

In appendix 2 the codebook for the process of environmental issue selling can be find. In the theoretical background three overarching themes for environmental issue selling were discovered, namely the internal activist, the process of issue crafting, and interorganizational

collaboration. These three themes formed also the themes in the coding process. The final themes for the process of environmental issue selling can be find below in figure 1.

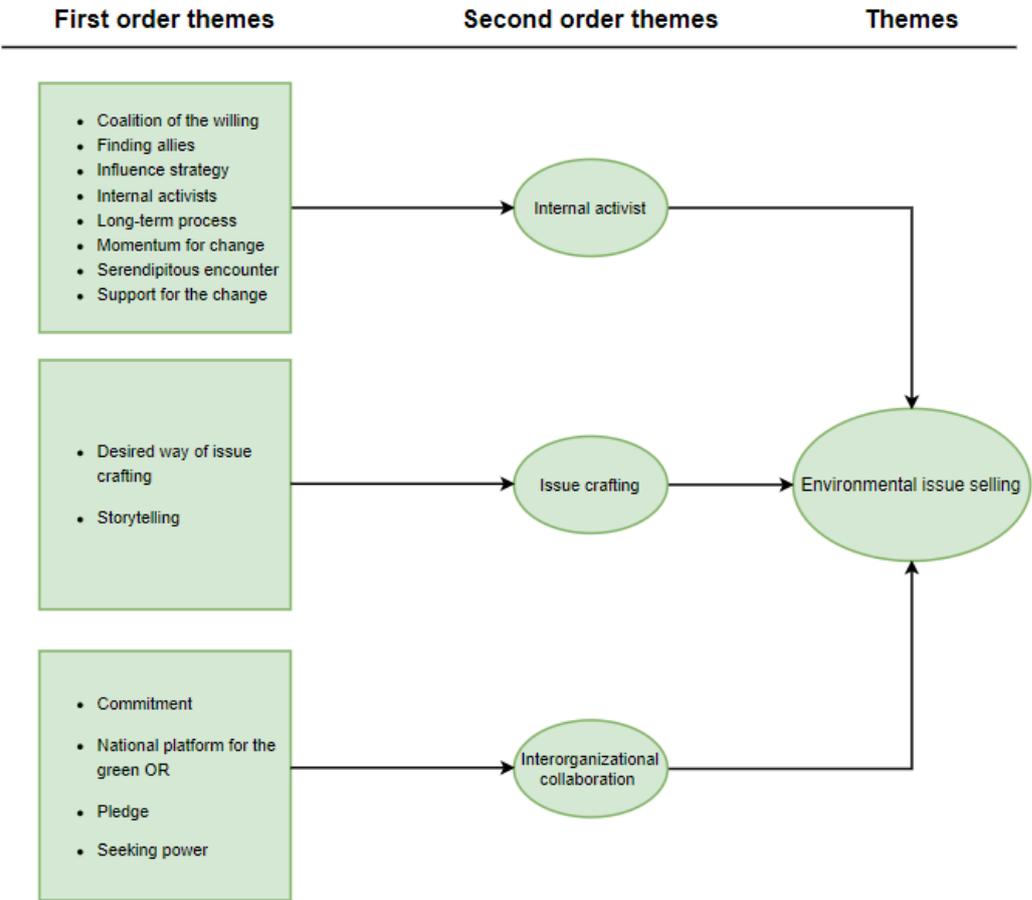


Figure 1: Final themes - Environmental issue selling

In appendix 3 the codebook for the Green Barometer for the OR can be find. The third order theme for the entire coding process was the Green Barometer for the OR, because of the research question how the design should look like. Furthermore, the general design of the barometer and the indicators for the barometer form the two secondary themes for all quotes in the codebook, because in this way the research question will be answered. In figure 2 the final themes for the Green Barometer for the OR can be find.

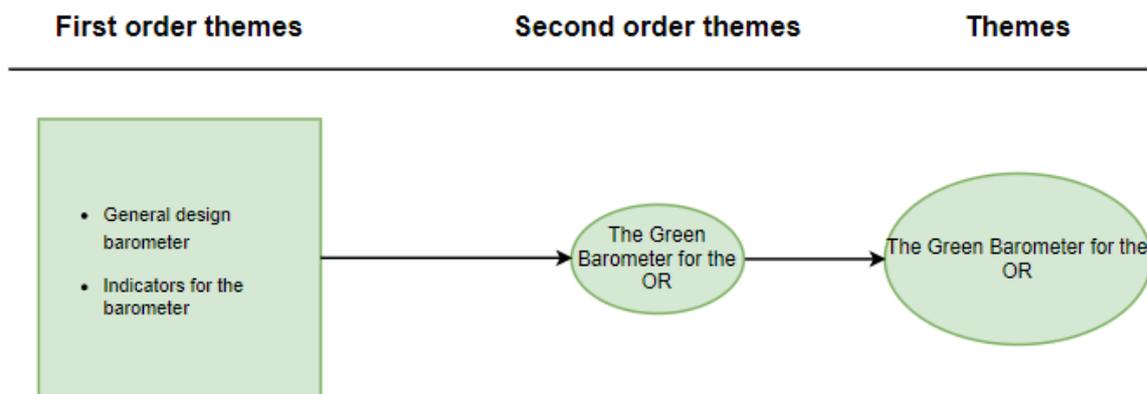


Figure 2: Final themes - The Green Barometer for the OR

3.5: Research ethics

Ethical considerations were very important during the process of this master thesis. First of all, because during this master thesis Skype interviews have been the source of information, it is an important measure to consider how to treat your respondents. All interviewees got an invite to join this research. In this invitation, information about the research and the purpose of the research were shared in order to prepare them and give them the full knowledge about where they were participating in. It is very important to state that the respondents were free to accept or deny the invitation, so there has been no coercion. All respondents were treated with respect and confidentiality. Prior to each interview, the interviewee was asked for permission for recording the interview and they got the possibility to stop the interviews at all times.

Secondly, all data, that was gained during this master thesis and that was gained by the previous researcher on this topic at this organization, contained confidential information. All information was analysed in template analysis for research properties and all information that could be traced back to the interviewee, was anonymized. Their names, functions, departments, and any other personal information is not shown anywhere in this report for the same reasons. In order to make sure that no information that was gained during the interviews was leading back to an interviewee, the transcripts were send to the interviewee to provide them the possibility to see if there is any information left that contains information that they did not wanted to share. In the end, all empirical information that is shown in this report are in the form of quotes or the code book in appendix 2 of this report. Hence, the interview transcripts are, of course, not included in the appendix of this master thesis.

Due to the corona-crisis, an alternative method for gaining enough relevant data to answer the research questions properly in order to deliver a high-quality research contribution for society was used. Therefore, also data gathered in a previous research on this topic in the same OR-department was used for gaining preliminary knowledge on the topic. The respondents on this research were not told when they held their interviews that their input from the interviews were also used in other master thesis researches, because the corona-crisis and its impact on society could not have been predicted. Contacting these respondents and asking them for their permission for using the data again in this research has been considered, however the previous researcher had anonymised the transcripts so well that identifying them was not possible. Nevertheless, the data gained during that master thesis project was used and treated with the same confidentiality as all other gained information during interviews.

Chapter 4: Findings

In this chapter the results from the interview and analysis will be elaborated. Firstly, the findings for the environmental issue selling process will be presented. After that the findings for the Green Barometer for the OR will be shown.

4.1: Findings for environmental issue selling

4.1.1: Internal activist

The results show that the sustainability initiatives were started with an internal workgroup on local sustainability projects. Sustainability efforts were taken and from there the initiative for the Green OR started to grow. The change initiative was started by several intrinsically motivated internal activists who were concerned for the carbon footprint that the hospital was leaving, and the big share that the OR has in it: (interview 10) *“He just thought, because he is intrinsically motivated, it was so important.”*. This intrinsic motivation is seen in the internal workgroup for the Green OR: (interview 9) *“Because I do find in that workgroup, they really are people who are intrinsically motivated. Keep on moving even if they don't succeed or even if colleagues don't want to.”*.

The internal workgroup started several sustainability projects and developed into the workgroup for the Green OR with the purpose to reduce the carbon footprint of the OR. In this workgroup for the Green OR a long-term vision can be recognized: (interview 11) *“You notice it's still developing. It's really in a growth process. It's very nice that it develops like this, but we're not there yet.”*. This long-term vision was also emphasized by a member of the national platform for the Green OR who said (interview 15) *“The only advice I want to give is that it's a matter of the long run. So you could just say it will probably take ten years. Then you don't really want to think that far ahead, at least I don't, but if you do you shouldn't think that you have quick results and you should like to keep working on a change for a long time.”*.

During the early stages of the project for the Green OR, personal leadership can already be recognized. Not only inside the hospital, but also outside the hospital a search for allies has occurred: (interview 11) *“So I saw very clearly, also due to the stimulating role of [name], a national movement for making the ORs more sustainable is actually going on.”*.

Searching for allies have been very important and prominent process for this sustainability project. General findings were that there are many willing people and groups who were already interested in sustainability: (interview 16) *“so we started with the people who already liked it and wanted to think about it with us, also from different hospitals.”*. The choice for the search for allies have been deliberately made, because they were aware of the fact that it is almost impossible to convince an entire group at once: (interview 10) *“Because if you start such a phase with trying to get the whole mass in motion, so actually if you look at that whole curve of the early adapters, if you immediately start with the middle part, then you just won't make it.”*. The process of searching for allies resulted in a deliberately formed coalition of the willing: (interview 16) *“I do have to admit that I really started at, as I call it, the coalition of the willing. I really started with the surgeons and the hospitals that are already working on it and that want to develop it further.”*.

An important tactic for the environmental issue selling process that was mentioned is to strive for continuity. At professional bodies, the elected chair change hands after a few years. Therefore, an important sustainability change agent stated (interview 10): *“If you focus too much on the hierarchy, you underestimate the sustainable factor of the people who work there for a longer time and are passionate about their jobs.”*. During the process of environmental issue selling, timing and waiting for the right moment is also found important: (interview 10) *“The fact that she can't take sustainability in consideration at all times now, is simply not possible, ... So you shouldn't do that at a time like this. So momentum is also very important and also the moment to slide back.”*. Influence tactics are used in the process of environmental issue selling: (interview 15) *“So you have to focus on the pioneers and the and yes. Just think of good things, you know, don't convince them, just seduce them and see how you can get people to come along.”*

4.1.2: Issue crafting

Issue crafting was found as a means to create support for the environmental issue. Here the distinction between internal support and external support can be made: (interview 9) *“I honestly think sometimes it's even the other way around. That it's easier to get the support externally than internally.”*. For both internal and external issue crafting, storytelling has been used in order to create awareness and support for the change: (interview 11) *“And that newsletter actually had to contribute a little to the colleagues to get an idea of what that is. What are we doing now? Where do we want to go.”*, and: (interview 16) *“we just showed them a presentation*

about the best way of doing it and at the same time we also had a few slides about the national network green OR and what our intention was and if they had any good ideas for it. So, uh give a lot of information and get information, but we didn't have to make a lot of effort to convince people because they already asked us to come because they wanted to work on sustainability.”

Other things that play a role for issue crafting for the national platform for the Green OR is the creation of common narrative. In the OR, a certain hierarchy is recognizable: (Interview 6) *“I know that at higher level of the hierarchy, then eh you know doctors always shout 'where is the scientific evidence?' so if you're going to tell the story you should search for some articles that will help in the conviction.”*. Therefore, a different approach in issue crafting among different groups is predicted to work better.

Furthermore, a competition was held for suppliers in order to select the greenest supplier for medical supplies. This created a lot of positive advertising for sustainability and the greenest supplier received a little name recognition from it: (interview 11) *“That was a euh rather extensive competition with all suppliers had to fill out a questionnaire in which they could show how they are working on sustainability and finally with the assessment of a professional jury the most sustainable supplier of the [hospital] was announced.”*. The same applies for other initiatives in issue crafting, where several prizes or photo moments for a person, professional body, or other type of organization was awarded for doing a good job: (interview 15) *“Yeah, positive at least. Putting the people in the spotlight and lifting up on stage who are doing a good job. So constructive, don't punish people if you don't do it, but make sure that they are leaders in an industry.”*.

Other types of issue crafting were based on communicational vehicles where the sustainability issue can be spread. An important vehicle for the national platform for the Green OR is the future website, where information, stories, and the barometer will be shared. Apart from the website, the message about the Green OR will be spread via as much channels as possible, like speaking at congresses and symposia, via social media channels, and via posters in the hospitals in order to reach a broad audience: (interview 6) *“but especially in the OR, people don't always have time to read their mail, eh those posters you can easily just hang in a coffee room. So if you grab a cup of coffee or a sandwich then it is very easy to take a look at them and react if desired.”*.

4.1.3: Interorganizational collaboration

In the results interorganizational collaboration is viewed. The several local change initiatives, and the search for the coalition of the willing have resulted in a national platform for the Green OR: (interview 16) *“So, uh, yes, that's where the national network came out as a kind of umbrella club that thinks about making the OR more sustainable.”*. In this platform, important professional bodies are involved and are helping to further expand the network with all concerned parties in order to create a diverse national network of players: (interview 15) *“Together in the Dutch Society for Surgery we have someone who is exempted for almost a whole day to implement the green OR together with those other associations. Implement what has already been discovered, but also learn from each other and exchange. So I really think that's such a great thing. That we, yes that it won't stay with NSE, but that it will grow in the Netherlands.”*.

The national platform for the Green OR is meant for sharing ideas and knowledge to combat their grand challenges (greening the OR): (interview 6) *“So yes, you do notice that it eh works well and that people find it very pleasant to easily exchange knowledge and experiences in this way.”*. The platform is also meant for becoming a larger movement, that can put pressure on suppliers and other important players in the supply chain: (interview 16) *“So that's why we also have that national network to tackle those goals together and to see whether we can make a kind of fist against the big manufacturers and waste processors to alter a certain work process (read: more sustainable).”*.

In the previous paragraph it was shown that current support for the change has been created by storytelling at the professional bodies and trying to make them commit to the national platform for the green OR. In order to create commitment among the members from the national platform for the Green OR, each member needs to sign the Green Deal and make a pledge. In that pledge the future members promise that they will engage in greening the OR: (interview 15) *“And one of those efforts is that you are going to form a national network in which you actually join forces and in which you are going to work out that obligation. You sign the Green Deal. That's a commitment, right. You're committed to it.”*. Because of that pledge, members are allowed to confront each other with their actions and point out that they should stay committed to the national platform for the Green OR: (interview 10) *“But I say [name], you have signed the Green Deal, so don't forget there's also an aspect to sustainability in all that waste we're generating together now.”*.

The creation of this type of commitment is meant for a process of institutionalization, that causes a feeling of a group that they belong to with all certain types of rules that members are obeying to: (interview 15) *“So you have to make sure that the group that is working on sustainability is pleasant to belong to.”*. Another respondent mentioned this: (interview 16) *“It's got to be that you, uh, you want to be part of it as a hospital. That it's a bit of a flop if you don't join that national network, if you don't do anything about sustainability. That that would be a bit embarrassing, that would be a nice thing”*.

This type of internal pressure, needs to ensure that sustainability is causing commitment for the sustainability goals of the national platform for the Green OR: (interview 15) *“I think it's a risk that at the moment when there are other priorities, you know, at the moment that there are a lot of priorities, it is the first thing that gets pushed aside, isn't it? So that's the other side. You have to make sure that doesn't happen.”*. The pressure should reach further than inside the hospitals, also other important players in the supply chain of the healthcare sector should feel this type of pressure: (interview 11) *“Because they all see it's important and as a supplier you can't really stay behind. They just notice that sustainability is becoming a serious agenda item and if as a supplier you want to continue to matter, then you just have to go to work, whether you want to or not.”*.

Apart from the internal pressure, the pressure to keep sustainability on the agenda can also come from other players in the field. Insurance companies could also form a coalition party for the national platform for the Green OR, because they can help to formalize the process of commitment: (interview 15) *“And then you must not slowly develop, like first between hospitals because that always is possible, but then take the big step, because then you will push from two sides.”*.

4.2: Findings for the green barometer for the OR for waste

4.2.1: The Green Barometer for the OR

In order to demonstrate the degree of sustainability in the OR and the improvement or decline in comparison to previous years, the desire to design the barometer for the Green OR has come to life: (interview 10) *“I just want to be able to monitor my progress.”*. For the regular design of the barometer, respondents found it important that it is a transparent measurement tool that

shows at a glance what is the status quo of a certain hospital or a certain OR: (interview 11) *“It would be very nice if we could get an insight into what are the aspects that contribute to a sustainable OR and how do we score on that ranking.”*

Another general requirement that came forward during the interviews was the degree of approachability of the barometer. The measurement tool should be simple and clear in order for it to fully comply to the requirements: (interview 9) *“So a threshold could be that it's not approachable enough. Uh, and yes, simple. So if it's not simple then that's a threshold, I guess.”*. Furthermore, clear definitions and essentially unambiguous definitions should be used in the barometer: (interview 6) *“I think you should start at the very beginning. Which is what we want to measure, what definition do we attach to it, is it workable, huh, try asking some hospitals for that commitment.”*

Furthermore, it is important to notice that hospitals differ from each other and that should be taken into account: (interview 14) *“There are a lot of different hospitals with different interventions and actually you may have to make some distinctions.”*. By that reason, the Green Barometer for the OR can only become a benchmark tool, if a certain amount of data is already collected. Therefore, some respondents mentioned that the Green Barometer for the OR should be considered as a self-evaluating tool: (interview 15) *“if you get a very educational thing in the first phase, I'd love it too... The moment you just start with a self-evaluation and you are going to use it to start that conversation in the OR.”*. After that period of data collection through self-evaluation of the hospitals, the barometer should be formalized into a proper benchmark tool: (interview 15) *“then I'd say I'll just start with the self-evaluation and then you'll have something to show in it, and don't slow down, but make the big step.”*

In the interviews became clear that the most important possibility of reducing waste is mainly at the front of the supply chain in the purchasing process. Namely when purchasing the materials for the OR: (interview 14) *“I find waste a very interesting area in the healthcare sector, because I always say to all of our members, hey, you see, everything that comes out as waste in the back, is something you bought in the front of the process.”*. Another respondent mentioned this: (interview 13) *“When you talk about waste, sustainability plays a very little role, because you actually wish you had to do something about it before it became waste.”*

In the OR, a lot of waste is generated because of several reasons. An important reason for the amount of waste that is generated in the OR is because of packaging material that is around the medical tools, for example infusion systems: (interview 16) *“Of course, that could be a nice incentive by the numbers that you can then bring to the surface. Gosh, where does that waste actually come from, what does it actually consist of? And if, for example, hospitals say we're very high up in waste, where does that actually come from? With you that's less, where does that come from then today. Then they can, for example, take a critical look at what our waste consists of and can't some things be packed with less extra plastic layers? That would save us so many kilos, so that would be a nice incentive.”*

Another way to look at waste in ORs is whether waste is separated in several streams. Currently (almost) no recycling is taking place: (interview 14) *“there's little or no separation from the ORs.”*. So a good indicator for the barometer could be to determine the degree of separation that is taking place in the hospitals: (interview 13) *“So you can then look at what is recycled. A bit of a measurement in the sense of a percentage.”*. Another respondent said this: (interview 11) *“Look, you can do a little waste separation, keep a little more paper separate, keep a little more plastics separate. But the real impact that's going to be in the bulk of waste, look at your cover material, for example”*. Yet another respondent mentioned this: (Interview 14) *“Yeah, yeah, that's right. And then with the next step in the chain, with a recycler to look at, like we've produced all this junk, what can you do with it? And uh well, is it still separable, is it still recyclable, is there a new product to make, so you have to look at the whole chain.”*. So it is important to notice that waste separation can be done within hospitals and it is possible to collaborate with waste processors about what can be a right solution for a separated stream.

Yet another way to look at waste in the OR is by the division between reusable medical tools and disposable medical tools. Disposable medical tools of course cause a lot of waste, because they are thrown away after one use only. So decreasing the amount of disposables would also prevent waste. Different noises about this distinction were to be found in the interviews: (interview 11) *“That we still work a lot with disposable that we go more to the reusables. I think there's a pretty easy hit there.”*. However, other respondents stated that it probably wouldn't be that easy to return to reusable medical tools: (interview 14) *“the reusable market has dried up a bit. Just everything has become disposable. Uh, and I don't think you're gonna be able to reverse that very easily.”*. This was confirmed by another respondent: (interview 13) *“I think there will always be some products that will just remain disposable. Nobody goes back*

to glass syringes and stuff like that or to very complicated devices. You see more and more that the treatments are getting more and more complicated. We can do more and more. That also means that there will be more and more complicated devices, which may not be cleanable at all or may be very difficult to clean.”.

Beside waste in the form of disposables, medical devices also form a source of waste. A lot of medical devices are shipped to Afrika in order for them to be thrown away not very much later. This forms a waste of good and valuable materials, that might not be necessary. Therefore, an end of life plan may form for the medical devices would be a solution: (interview 8) *“Yeah, look at the total life cycle. How long does the thing last? How intensively is it used? Is a device only purchased for a few hours a week? Or does it run full time with everything? And do you have a plan at the end of life of a device? What are you going to do with it? Will it go back to the supplier, will it be refurbished or will it be dumped in Africa, which happens a lot with OK equipment”.*

Chapter 5: Discussion

In this final chapter of this master thesis the research questions will be answered in the key insights paragraph. The discussion of this master thesis will start with the key findings of the research followed by a methodological reflection, where the limitations of this research and my personal influence on this master thesis will be discussed. Furthermore, the theoretical contribution and the practical implications for the client will be elaborated. Lastly, this master thesis ends with possibilities for future research will be discussed.

5.1: Key insights

This research is aimed to answer two different research questions. Both of them contribute to the question how to create a more sustainable healthcare sector regarding the impact of the OR. The first research question focusses more on the diagnosis part of the change initiative, while the second research question focusses more on the design part of the intervention cycle. The answer on both research questions is answered in two different paragraphs.

5.1.1: Environmental issue selling

In this paragraph the answer to the research question: *“How can the acceptance of a benchmark tool for the Green OR be created through a process of environmental issue selling?”* is given. By answering the first research question, the information gained through interviewing several important players in the healthcare sector with semi-structured questionnaires. The findings are structured in terms of three themes: internal activist, issue crafting and interorganizational collaboration.

Firstly, the first theme that was found in the interview data was the insider activist. Regarding the role of the insider activists was that change initiatives were found in the local sustainability workgroup who showed passion and motivation for the sustainable development of the Green OR. The analysis showed that the sustainability workgroup was aware of the necessity of long-term efforts before the total impact of the efforts will become visible. Furthermore, internal awareness and support was created through various information sessions, and by spreading a periodical newsletter with information about the Green OR. Beside the creation of awareness, it appears to be important for the workgroup that possible allies who are already interested in sustainable development of the OR from inside and outside the hospital are found and the actors deliberately formed the coalition of the willing. Some influencing tactics are recognized in the

analysis of the data. Namely, the awareness of the sustainable factor of not-managerial positions in an organization, and therefore the search for a continue contact person that will ensure continuity in the sustainable development. Not only the continuity was mentioned as important, also waiting for the right moment and the seduction of personal allies were used by the members of the workgroup for the sustainable OR.

Secondly, the second theme found in the interview data was issue crafting. The most predominant way of issue crafting that was found in the interview data was the use of storytelling during the information sessions. This way of issue crafting was used for both internal and external acceptance. During those sessions the importance of sustainable development was spread, however not any convincing tactics were used because of the willingness of the recipients. Yet, the requirement of the different approaches for issue crafting depending on the change recipient was predicted as well. Another important feature in the data was another way of issue crafting, namely the use of rewards for companies, groups or individuals who were showing commitment towards the sustainable development of the OR. Those mechanisms were considered as very important tools to create awareness and motivation among organizations, groups, and individuals for the sustainable development of the OR. Furthermore, an important finding was that the future website for the Green OR will be an important vehicle to share information about the sustainable development of the OR. Other idea for the information channels is to share the information on as much as channels as possible in order to spread the message as widely as possible.

Lastly, the third theme that was found in the interview data was the interorganizational collaboration. An important finding in the data was that the search for allies and the formation of the coalition of the willing that eventually led to a national platform for the Green OR. This mechanism was known for the join of their forces in order to combat grand challenges. Besides that, the role of the internal activists that were joining the national platform of the Green OR was to expand the coalition by campaigning and information sharing by storytelling. Another important finding in the data was the awareness of the internal activists for the fact that sustainability is easily pushed aside. Being aware of this feature of sustainable development the commitment for the national platform for the Green OR was ensured by a pledge where involvement and commitment was promised, which serves as an accountability mechanism. An important feature of this type of commitment is institutional feeling is intended to be created, whereby members want to belong to the national platform of the Green OR and a feeling of

embarrassment goes along with not participating in the sustainable development of the OR. This is an example of internal pressure, however commitment through external pressure is also predicted. This external pressure can be caused by coalition parties like professional bodies or insurance companies.

Therefore, the conclusion to the question: *“How can the acceptance of a benchmark tool for the Green OR be created through a process of environmental issue selling?”* is that the acceptance for this Green Barometer for the OR is gained via the efforts of a group of intrinsically motivated internal activists who are committed, show passion, and long-term planning for the sustainable development of the OR. What manifested in change effort where the role of the insider activists was to gain support by storytelling via campaigning, and the formation of the national platform for the Green OR where the grand challenge of the sustainable development of the OR is combatted. Commitment is very important for the national platform for the Green OR. Therefore, is found that the members of the network attempted to create internal pressure by making their members pledging for commitment, and by the intention of the future creation of an external pressure from a professional body or another coalition party that has an controlling function.

5.1.2: The Green Barometer for the OR

In this paragraph the answer to the research question: *“How can the degree of sustainable waste flows in the operating room be measured in a benchmark tool?”* is given. By answering the first research question, the information gained, like the previous research question, through interviewing several important players in the healthcare sector with semi-structured questionnaires. The information given by the experts helped at the design of the final template of the prototype for the Green Barometer for the OR on the concept of waste.

In the interview data came forward that monitoring needs to be the main purpose of the Barometer for the Green OR. Furthermore, the importance of transparency, clarity, approachability, and unambiguity of the Green Barometer for the OR became clear during the interviews. An important feature of the future Green Barometer for the OR that was found in the data was that the barometer first needs to serve as a self-evaluating tool, that eventually will become more formal when enough data is collected. Also, the importance of the prevention of waste in the front of the supply chain was mentioned several times, because this is the reason why a lot of waste is caused in the first place. Furthermore, the separation of several waste

flows may cause the circular use of materials in the future. Another indicator for the Green Barometer for the OR is the degree of single-used material, because a lot of medical tools that used to be reusable, is now only made for single use only. Lastly, the medical apparatus are often not produced sustainable, hence when the apparatus are end of life they are discarded. This is also something that needs consideration when purchasing apparatus.

Therefore, the answer on the research question: *“How can the degree of sustainable waste flows in the operating room be measured in a benchmark tool?”* is that the Green Barometer for the OR needs to be a transparent, clear, and unambiguous monitoring tool that that approachably measures, with several indicators, the status quo of the degree of sustainability in an OR. The final template for the prototype version of the Green Barometer for the OR about the subject waste is shown in appendix 2. This is a questionnaire that every hospital needs to fill in. The results of the questionnaire are presented in the dashboard in figure 1 presented below.



Figure 3: The Green OR dashboard Designed by: Bouwzaken Radboudumc (2020)

5.2: Theoretical contribution

During this master thesis, multiple findings contributed to the knowledge on the diagnosis of how acceptance for a benchmark tool can be created through a process of environmental issue selling, and the design of a prototype template for the Green Barometer for the OR. The present theory has been enriched in several ways.

Firstly, in this master thesis it became clear that the internal activists were more focussed on the process of coalition building and less on how to craft the issue in certain ways in order to convince the change recipients. Several interviewees mentioned that they did not had to do much effort for convincing the current allies, because the internal activists approached potential allies from whom they knew were already interested in the sustainable development of the OR. The probable cause for this is because environmental issues have become more important over the year and the urgency of human action became more clear (United Nations, 2019). Therefore, it can be stated that the current developments and attention around sustainability in general helped to shape the cognitive field of the current allies (Dutton & Ashford, 1993; Dutton et al., 2001; Mayer et al., 2019), and already created a certain form of common narrative which made it easier for internal activists to convince them to join the movement (Blazevic & Lauche, 2018). They provide their potential coalition of the willing with information about the issue trough campaigning (Blazevic & Lauche, 2018), with the aim for causing the recipients to become aroused for the issue and to join the national platform for the green OR (Bansal, 2003). However, during these campaigns issue crafting did not play an important role. This means that issue crafting strategies may be less important if the social issue already gets a lot of societal attention.

Secondly, the national platform for the Green OR intents to create commitment by two types of control. Firstly, the national platform for the Green OR intents to create internal pressure by making their members make a pledge for commitment by signing the Green Deal. This type of promise making is reviewed in literature before, and is meant to create a feeling of personal responsibility for committing to the sustainable development of the OR (Gehman et al., 2013). Secondly, the national platform tries to find coalition parties that want to take on a controlling and formalized role, like an insurance company or a professional body. In earlier literature, the importance of the use of professional bodies and other powerful coalition partners for reinforcement of the movement in the organizational field has been recognized before (Howard-Grenville et al., 2017). Both commitment related mechanisms are already used before (Gehman

et al., 2013; Howard-Grenville et al., 2017), however using both mechanisms at the same time in order to create internal and external pressure for two sided control for commitment is fairly new. Of course it is important to notice the national platform for the Green OR is still in its infancy and the commitment mechanisms are currently in a development stage, however because of the effectiveness of both mechanisms separately, the combination of both internal and external pressure is likely to be even higher and reach to a new level of commitment for the sustainable development of the OR.

Furthermore, an interesting finding in this master thesis is the use of rewards as an awareness and motivational tool for organizations, groups and individuals. These rewards helped to spread positive information about the sustainable development of the OR, what caused a positive step towards the desired state of the OR. Rewarding individuals for the creation of motivation is seen in organizational literature before (e.g. Pierce et al., 2003), however using rewards in the healthcare sector in an issue selling process as a form of issue crafting is not seen before. In this master thesis came forward that the responses to those competitions and rewards worked very well and spread a lot of positive noises in the healthcare sector.

5.3: Practical implications

The practical implication from this master thesis is mostly based on the national platform for the Green OR, and other comparable platforms with the aim for sustainable development in the OR. Therefore, several practical recommendations for the national platform of the Green OR are elaborated below:

Firstly, the process of coalition building has been very important for the creation of support and the ability to combat the grand challenge of the sustainable development of the OR together (Dutton et al., 2001); Blazevic & Lauche, 2018; Lauche, 2019). Therefore, the expansion of the national platform for the Green OR is very important. Until now, the coalition of the willing is mostly approached to join the movement, however it is important to also involve parties that not seem interested in the first place. The recommendation is to conduct a proper stakeholder analysis and find out which stakeholders are at stake and what certain values are of those stakeholders (Dutton & Ashford, 1993; Dutton et al., 2001). This will help to create some ideas about what will trigger some group and it will help to make some decisions for crafting the

issues (Sonenshein, 2006; Wickert & de Bakker, 2018). Try to make use of specific issue crafting for the parties that need to be convinced in the future.

Furthermore, the Green Barometer for the OR on the concept of waste is to use the benchmark initially as a self-evaluation tool in order to collect data to set a null measurement. Try to formalize the benchmark after there has been collected enough data by looking for a controlling mechanism. This controlling task is possible appropriate for a professional body or an insurance company who operationalizes sustainable development in their strategy (Howard-Grenville et al., 2017).

The last recommendation for the national platform for the Green OR is that they need to make a distinction between internal and external support for the change towards sustainability and the Green Barometer for the OR, because in the analysis from the interviews it became clear that there might be a discrepancy between internal staff of a hospital and the external support towards the acceptance of Green Barometer for the OR. Therefore, try to find out what is needed to create acceptance internally and externally and try to shape the message according to that needs.

5.4: Future research

Based on the information from the interviews, it has come forward that the members from the national platform of the Green OR, mostly has been reaching out to groups and persons who were already interested in the degree of sustainability of the ORs. From that effort, an impactful coalition of the willing originated from this process. However, there are of course also parties in the healthcare sector that need more convincing in order for them to join the national platform for the Green OR or for them to cooperate with the parties that wish for more sustainable products or processes. Therefore, it is also a good idea to look into the process of how the other parties in the organizational field are convinced to join the national platform for the Green OR. Issue crafting may have an important role in this process, so for previous research it will be advisable to look in that mechanism of issue selling.

Additionally, in this master thesis only a prototype design for the Green Barometer for the OR has been made. Therefore, the implementation phase of the barometer needs further examination. As concluded earlier, the status quo of the ORs first need to be determined in order

for the eventual benchmark will be implemented. After the first data is collected, it is possible to compare the findings between the different ORs in order to see what is the average degree of sustainability of the OR, and in order to see what possible points of improvement are for the Green Barometer for the OR itself. Only then the Green Barometer for the OR can be transformed into a validated benchmark tool. This process is very important to investigate as well.

Furthermore, in the interviews the difference between internal and external support for the sustainable development of the OR was mentioned. In this master thesis the emphasis was not on this difference, because this research was aimed to see what is needed to create acceptance for the Green Barometer for the OR. Therefore, doing research to the difference between internal and external support towards this social issue can provide valuable insight.

Lastly, the further development of the national platform for the Green OR, its impact and the impact of the interorganizational collaboration can lead to valuable insights. The reason for that is because of the early stages the national platform for the Green OR is in right now and the final impact of this interorganizational collaboration is not experienced yet. Especially interesting for future examination is the effect of the creation of internal and external pressure for commitment to the national platform for the Green OR, because of the novelty of this finding.

5.5: Reflection

5.2.1: Methodological reflection

An important limitation for this research is that, because of the Corona-crisis, it was not possible to spend time at the hospital to conduct the research. Therefore, the prolonged engagement during this master thesis was limited or virtual interaction (Guba and Lincoln, 1989, in; Symon & Cassell, 2012). In order to compensate this, a greater amount of peer debriefing during the collaboration sessions with the two peers that also conducted their research at the same OR-department, and with my thesis supervisor has occurred. During these collaboration sessions the research process, the results, and the report were discussed and reflected. Furthermore, notes for every meeting and the general research process have been tracked in order to reflect on the sensemaking process of this research helped to gain credibility and dependability (Guba and

Lincoln, 1989, in; Symon & Cassell, 2012). Lastly, the Green Barometer for the OR was iteratively developed in coordination with interview respondents and the client.

Given the fact that the experts that were interviewed for this master thesis belonged to several organizations, it is more likely that the theoretical contributions of this master thesis are transferable to more OR-departments in the Dutch (and similar countries) healthcare sector (Guba & Lincoln, 1989, in; Symon & Cassell, 2012). The experts were working in several important organizations in the healthcare sector and thus made sure that the issue of this master thesis was highlighted at several levels. The degree of transferability is to be determined by the reader who can judge whether the characteristics of this master thesis are comparable to its own context. However, due to the Dutch legislation and other standards and procedures for the ORs, it is very probable that similar situations on ORs can be found. Also because this master thesis is aimed to develop a prototype for a benchmark tool that makes it possible to compare ORs on their degree of sustainability in terms of waste distribution, several indicators are drafted that allow for general measurement. This master thesis is therefore an important step towards a generally accepted benchmark tool that has been accepted through a process of environmental issue selling.

5.2.2: Reflexivity

As I took a social-constructivist stance during this research, I asked experts in the healthcare sector to inform me about the process of environmental issue selling, and the preferred Green Barometer for the OR. Before I started my master thesis about the examination of the environmental issue selling process and the development of a prototype of the Green Barometer for the OR, I did not have that much experience with the healthcare sector or with the subject of environmental issue selling in practice, benchmarking and the subject of waste that is generated in the OR. Therefore, I am aware of the fact that the master thesis that I wrote is based on social construction, because the findings are highly probable to be influenced by personal interpretation and emotion. Because of this awareness, a lot of peer discussions in order to check the interpretation have occurred.

Another important moment of reflection is about my interviewing and researching skills. After one of the first interviews I was confronted by an interviewee who told me that he or she was not sure whether we had our goal to develop a Green Barometer for the OR in mind. This was for me an important moment of realization, that helped me realize that I needed to steer my

interviews a little better in order to be able to answer my research questions. Hence, I looked back to the aim of the research and I adjusted by interviews a little bit. After that I was more aware about the information I needed to receive and I saw an immediate improvement.

Lastly, it is important to state that I have a lot of affinity with the healthcare sector and the sustainable development of the healthcare sector. Because of that I have a great amount of motivation to deliver an important contribution to the sustainable development for the OR. It may be the case that I am, because of that motivation, a little bit biased and overly determined to develop the Green Barometer for the OR.

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Appendices

Appendix 1: Interview guide

Interview guide for the change part

1. Could you explain what your **role** at the green OK / barometer have been so far?
2. What are your **experiences** in this process so far?
3. What has helped to create **support** so far?
4. What have you done to make the message understandable?
5. **Who** needs to be convinced (of this message)?
6. **What would be the best way** to communicate about the implementation process?
7. What **reactions** do you expect from healthcare stakeholders?
8. What **obstacles** do you expect when implementing a green barometer (in other hospitals)?
9. Do you have any final advice?

Interview guide for the waste flows and the green barometer for the OR

1. What is the current process around waste flows from the OR and what role does sustainability play in it?
2. How does the degree of sustainability of the waste process in the OR currently measured?
3. How can waste flows become more transparent?
4. Which persons and professional bodies are important for the waste process in the OR?
5. I know that patient safety and costs play a role at the sustainability process. What are the current discussions for the waste flows in the OR?

Appendix 2: Codebook issue selling
Insider activist

First order themes	Definition	Quote
Coalition of the willing	Start the change process at the coalition of the willing	Do I have to admit that I really started at, as I call it, the coalition of the willing. I really started with the surgeons and the hospitals that are already working on it and that want to develop it further.
	The internal activists have found different types of allies	And then as many euh different allies as possible so UMC's, but also ordinary smaller hospitals. The surgeons, but also the anesthesiologists, nurses, recovery room staff, the working groups of green ORs, all of which are already active in the country. Just where they felt like doing it or were already doing it.
	Start the change process at the coalition of the willing	So and tip is, start with the hospitals that are already working on sustainability. They can already give their first data and once that barometer is available, the other hospitals that don't have that much data will automatically join them. They'll join us, they'll want to.
	The internal activists first involved the parties that were already interested	Actually we don't have to, because we didn't impose ourselves, we mainly talked to those people who were already very much on the stand and we would like to do something about this.
	Try to find a coalition of the willing among the medical specialists who work on the OR	So he said let's focus at least on the medical specialists who have responsibility in the OR in the first place. Let's see if you can find energy there, well coalition of the willing that's such a trendy word of course, but let's see if you can find energy there to dedicate yourself to that green OR.
Finding allies	Lots of people want to join the movement	I notice that there is a lot of willingness to change and to deal with this.
	The internal activists tried to find allies that were already interested in joining	So we started with the people who already liked it and wanted to think with us, from different hospitals.
	First allies need to be found because it will not work to convince an entire group at once	Well then of course the awareness had to come into the organization and yes then it's also changeable, where are your quick wins? Because if you start such a phase with wanting to get the whole mass in motion, so actually if you look at the whole curve of the early adapters, if you immediately start with the middle part, then you just can't make it.
	A group of individual medical specialists are eager to start with sustainability	A group of individual medical specialists who are eager to get started.

Influence strategy	Internal activists first try to involve the most powerful groups to join the movements	And we are talking about urology, ophthalmology, plastic surgery and the scientific association Dutch association of surgery, they had a members' meeting. And then they always have speakers. Well [name] and I spoke there last November and I tried to seduce them to sign the green deal and really sign up for the green OR. And that really resonated, to my great gratitude.
	The internal activist should tactically choose who to approach in a professional body.	It's necessary, but who's staying? That's one of those desk clerks who has that in her portfolio. So I'm not like the hierarchy. So I do have in my head, what's the deal. But think of oh if someone changes every two years ... but if you focus too much on that hierarchy, you underestimate the sustainable factor of the people who work there longer and are passionate about it.
	Try to seduce potential allies to join the movement	So you have to focus on the pioneers ... you know, not convince, but just seduce and see how you can get people along.
Internal activists	Leadership has created a movement	So I saw very clearly, partly due to the stimulating role of [name], that a national movement has actually started around making those ORs more sustainable.
	The internal activists are passionate for sustainability	He also thought it was ordinary, intrinsically motivated, he thought it was so important
	The internal activists need to show resilience	You don't have to move too fast, how do you say that, I always think but I have a lot of change processes you know then you always think of now this battle we have sometimes you have to have resilience to be able to go on with it, so to speak. Sometimes you just lost a battle, but the war isn't over yet.
	The workgroup for the Green OR has shown commitment to sustainable development of the OR	Well there's an enthusiastic club, let me put that first, because that's an enthusiastic group of employees who really want to get down to work, who really want to make the OR more sustainable.
	The workgroup for the Green OR has shown commitment to sustainable development of the OR	Because I do find in that workgroup, they really are people who are intrinsically motivated. Keep pulling even if they don't succeed or even if colleagues don't want to
	The influential internal activists are driving others to join	I do have the idea that also with [name] for example is just someone who goes on stage a lot in the country too. Well, last year he or she won the award for most sustainable healthcare professional. Things like that do gives an extra drive to continue.
Long-term process	It probably take long before the change have occurred. Therefore, the internal activist must be committed and in for a longer project	The only advice I want to give then is it's a matter of the long run. ... but if you do you shouldn't think that you have quick results and you should like to keep working on a change for a long time.

	Internal activists are aware of the long-term requirements of the project	You notice it's still developing. It's really in a growth process. It's very nice that it's like this, we're not there yet.
Momentum for change	Internal activists need to be aware of the moments when they should be present for issue selling	But also just really the big symposia like the national surgeons days, almost all surgeons from the Netherlands come there yes you just have to stand there with your story, because they hear it and take it back to their own hospital.
	Try to involve the more passive hospitals during region sessions	So when we have those regional sessions, I just want to invite all those hospitals from that region, so also those hospitals that were still a bit quiet in that area and then uh a nice flyer or folder about what the green OK is and what we all do and uh invite them to the region session and in that way create awareness and let the change there also start a little bit. That is my thought.
	Internal activists need to know when they have to set back and wait for another moment	The fact that she can't always keep sustainability in mind, because those mouth caps are really vital for workers in care and in the vital professions. So you shouldn't do that at a time like this. So momentum is also very important and also the moment to move back.
	Moments for change are created and used	We just seize moments or we create moments to show that we are serious and that we really want to make things sustainable. And that they really need to come up with ideas.
Serendipitous encounter	By coincidence a chance to become more sustainable occurred	And then he said to our chairman: is it an idea that you want to join us? We're still looking for a university hospital. And our president thought ah, [name] lifted her finger. Let's just do that.
	Luck is a change instrument	it's also a change management tool, uh, to be lucky. So one, put your finger up saying you think it's important. And for a moment, you don't have to do anything with it, just say hi, can we talk about sustainability for once? And then all of a sudden, you're lucky.
Support for the change	Creating support for the change	You have to try to get people to join you. That's the problem. The moment I do, the moment you start shouting something we're gonna do it this way, it's just not gonna work.
	Internal support for the change is harder to gain than external support	I honestly think sometimes it's even the other way around. That it's easier to get it on stage externally than internally.
	Try to involve all parties in the design of the barometer because it helps to create support for the barometer	So even if you only have a concept, just keep presenting it. Because that's also in creating support, it's super clever to do. ... But also take those people who are in the national network to think along with you. Then you really end up with a great barometer.

Issue crafting

First order themes	Definitoin	Quote
Desired way of issue crafting	The language used for issue crafting should be allined with the language of the change recipients	Of course, you have a conversation with people. And before you, before I really do a presentation, I'll tune in with some of the people I've been in the process with before. So, this is what I want to tell you, is that in line with what you normally do?
	The message needs to be positive and give credits to people who are doing a good job	Yeah, positive anyway. Putting the people in the spotlight and raising them on stage who are doing a good job. So constructive huh, don't punish people if you don't do it, but make sure they have that you're in an industry.
	For issue crafting there is a need for visualization and insightful information	Yes, people often have a great need for visible, for numbers, for infographics, on a4, so to speak, it must be insightful, hey. People often have a great need for that.
	Issue crafting in a form of a competition was used	That was a euh rather extensive competition with all suppliers had to fill out a questionnaire in which they could show how they are working on sustainability and finally with the assessment of a professional jury the most sustainable supplier of the [hospital] was announced.
	The right way for issue crafting was not found yet	o I think, uh, we're still a little searching or at least paying attention to communicating that well.
	The use of posters is convenient for OR employees	but especially in the OR, people don't always have time to read their mail, eh those posters you can easily just hang in a coffee room. So if you grab a cup of coffee or a sandwich then it is very easy to take a look at them and react if necessary.
	Doctors prefer scientific evidence in order to be convinced	you know doctors always shout he 'where is the scientific evidence?' so hey, if you're gonna tell the story care for some articles that help in the conviction.
Storytelling	The issue crafting was done by storytelling	So we're asked a lot at symposia and congresses to talk about it. So in that sense awareness is, so to speak, in that phase we are now very much at that stage.
	Storytelling will help to spread the word and to share ideas	And our idea was to meet four times a year and, prior to the national network meeting, to hold the region session in the region where the meeting is also taking place so that hospitals and working groups of Green ORs could come together to exchange ideas and discuss problems and, uh, put changes on the table.
	Story telling via a website for the national platform for the green OR	And the important tool of the national network is a website. ... we would like to have a website of the national network about the green OR with also the green barometer and a lot of information about it.

	<p>Crating a common narrative in order to create awareness and support</p>	<p>We just showed them a presentation of how to do it best and at the same time we had a few slides about the national network green OK and what our intention was and if they had any good ideas for it. So uh give a lot of information and get information, but we didn't have to make a lot of effort to convince people because they already asked us to come because they wanted to work on sustainability.</p>
	<p>Issue crafting was used for awareness creation</p>	<p>Well, I think what I really like is that a lot of awareness-raising is being done, so if I compare that with before the project started, there is now just a really big group of people going for the sustainable OR and that has its impact.</p>
	<p>Via a newsletter the communication around the purpose and the vision of the green OR was spread</p>	<p>And that newsletter actually had to contribute a little to the colleagues to get an idea of what that is. What are we doing now? Where do we want to go.</p>

Interorganizational collaboration

First order themes	Definition	Quote
Commitment	Allies need to keep each other focussed	But I say [name], you signed the Green Deal, so you shouldn't forget that there's also a sustainability aspect to all that waste we're now generating together.
	Commitment for the sustainable development for the OR needs to be secured	I do think it's a risk at the moment that there are other prio, you know, at the moment that there are a lot of priorities, it falls off your plate first, doesn't it? So that's the other side. You have to make sure it doesn't fall off your plate first.
	Insurance companies can form an important coalition party	So the insurer that is able to operationalise sustainability in its purchasing policy and also gets away with it financially well, has an advantage over other insurers because they can also propagate this.
	Pressure from outside the hospitals causes that there is pressure from two sides	And then you shouldn't develop slowly... but take the big step because then you're going to push from two sides.
	If the highest layer in the OR do not commit, than the lower layers probably also do not commit	Because the moment half the surgeons say 'what a nonsense, I'm not participating', then you will also lose the commitment lower down the line.
	Joining the movement is an appealing option	So you have to make sure that the group that is working with sustainability is pleasant to belong to.
	Creating a new normal for sustainability	That's actually a new value you're creating
National platform for the green OR	The internal activists reached out at the professional bodies in order to set up the National platform for the green OR	I need to speak to the staff who also work in the OR ... So through the scientific associations of the medical specialists, so to speak, that's where I came in and that's where the national network for the green OR originates. With a representation of the scientific associations that are active in the OR.
	The national platform for the green OR is collaboratively thinking about how the OR can become more sustainable	And we have now written letters to the scientific associations whether they want to participate and already a lot of people do. So, uh yes, that's where the national network came out as a kind of umbrella club that thinks together about making the OR more sustainable.
	Try to involve every important party in the national platform	You also have in a hospital, more and more hospitals euh coordinators walk around sustainability. Uh, don't forget those. ... and you also have a sustainability committee at the NFU in the Dutch Federation of University Centers. Don't forget it in your target group. And the Dutch Hospitals Association, the NVZ, is also an important group. They also know that it will come and that it is there and maybe they want to say something about it, but don't exclude them.

	The purpose of the collaboration is to share ideas and experiences in order to grow	You do notice that it is very appealing and that people like it very much to exchange knowledge and experiences in this way.
Pledge	A pledge from the professional bodies where they promise to be dedicated for the national platform for the green OR	That is a kind of promise and a kind of pledge, so to speak, for the scientific associations active in the OR that they will also commit themselves to the green deal and to the national network of green ORs to which the green barometer is also linked.
	Participation in the national platform means that an organization commits to becoming more sustainable and vice versa	So you can't just sign the Green Deal, because then you're automatically in the network. And if you are in the network, you also sign from us because we think this is important, but also because we want to implement the Green Deal. So that is also connected to each other.
	A price or a photo that shows that people belong to some group is a change instrument	prizes and pictures, and stuff like that, competition... That's just a tool for change. . . .people want to be proud of something, to belong to something, and that gives a tremendous boost to the organization's ability to change if you can focus on that kind of thing.
	A pledge means that an organization will show commitment for the Green Deal	And that one of those efforts is that you are going to form a national network in which you actually join forces and in which you are going to work out that obligation. Signing the Green Deal. That's an obligation to make an effort, hey, you're committed to it.
Seeking power	Seeking for collaboration in order to create a bigger power against suppliers and waste producers	So that's why we also have that national network to tackle those goals together and to look at them, we can't make a kind of fist against the big manufacturers and waste processors to start designing a certain work process differently (read: more sustainable).
	Seeking for collaboration in order to create a bigger power against suppliers and waste producers	If you have that data then you can say we produce so many kilos of plastic on so many percent of all the hospital waste in the OR that is plastic, we want to get rid of that and you say that together, yes then you just have a very good story.
	Social or institutional pressure will 'force' other hospitals to join the movement	It's gotta be that you, as a hospital, want to be a part of it. That it's a bit of a flop if you don't join that national network, if you don't do anything about sustainability. That that would be a bit embarrassing would be the nice thing.
	Organizations and professional bodies can help to formalize the barometer	but i think euh with scientific associations in this question it is important, but really every organization is important in this process and with organizations it is also important to formalize the informal.

Appendix 3: Codebook Green Barometer for the OR

First order themes	Definition	Quote
General design for the barometer	First data needs to be collected in order to see the status quo	But it all starts with measuring and that's why [name] attaches so much value to the barometer. It only starts when you have data. In order to be able to prove it.
	Information on the barometer should be visual and insightful	It would be very nice if we could get an insight into what are the aspects that contribute to a sustainable OR and how do we score on that ranking, so to speak.
	It fist needs to be clear what and how you want to measure	I think you should start at the very beginning. What is what we want to measure, what definition do we hang on to, is it workable
	The barometer is a monitoring tool	I just want to be able to monitor my progress.
	The barometer needs to be approachable and simple	So a threshold could be that it's not low enough. So if it's not simple then that's also a threshold.
	The barometer needs to get more formal after the first period of self-evaluation	then I'd say I'll just start with the self-evaluation and then you'll have something to show for it, and don't slow down, but make the big step.
	The barometer should be unambiguous	So if it is reported, monitored or if figures are kept, we then have the same definitions of the figures.
	The barometer should be visual	And then you visually make on those subjects what are important points of it
	The diversity among hospitals should be taken into account	There are a lot of different hospitals with different interventions and actually you may have to make some distinctions.
	The first version of the barometer it doesn't mind that it is only a self-evaluation tool and not yet a benchmark tool	if you get a very educational thing in the first phase, I'd love it too... The moment you just start with a self-evaluation and you are going to use it to start that conversation in the OR.
	The measurements for the barometer should be simple and easy to execute and not too time consuming	how do you get the data, because the OR staff will say that the workload is already very high.
Indicator barometer	Circular purchasing for prevention waste	So if you look at your entire process, I think you can make a lot of profit by better purchasing, circular purchasing, extending the useful life of products.
	Collecting waste separately per waste flow	So you can then look at what is recycled? A bit of a measure in the form of a percentage.
	End of life plan for a medical apparatus	And do you have a plan at the end of life of a device? What are you going to do with it? Will it go back to the supplier, will it be refurbished or will it be dumped in Africa, which happens a lot with OK equipment.

	No separation of waste	everything that's released in the OR actually goes away in one flow, the specific hospital waste. so everything goes into the blue barrels and goes to the Zavin in Dordrecht.
	No separation of waste	there's little or no separation from the ORs.
	Seperating waste is a good way to become more sustainable	Yeah, yeah, that's right. And then with the next step in the chain, with a recycler to look at, like we've produced all this junk, what can you do with it? And uh well, is it still separable, is it still recyclable, is there a new product to make, so you have to look at the whole chain.
	The degree of disposable material can form an indicator for the barometer	That we still work a lot with disposables that we go more to the reusables. I think there's a pretty easy hit there.
	The market for reusable medical tools is not very active anymore	the reusable market has dried up a bit. Just everything has become disposable. Uh, and I don't think you're gonna be able to reverse that very easily.
	The trade-off between reusables and disposables	I think there will always be some products that will just remain disposable. Nobody goes back to glass syringes and stuff like that or to very complicated devices. You see more and more that the treatments are getting more and more complicated. We can do more and more. That also means that there will be more and more complicated devices, which may not be cleanable at all or may be very difficult to clean.
	The trade-off between reusables and disposables	So you can chart the percentage of disposables in the OR, I think it's over sixty percent, the only question is what can we do about it?

Appendix 4: Green Barometer for the OR

Instruction leaflet: prerequisite information

General information:

- This hospital concerns a(n):
 - o Academic medical centre
 - o Community hospital
 - o District hospital
 - o Government hospital
 - o Clinic

- The number of operating rooms of the hospital:
... ORs

- The number of surgeries per month / per year:
... per month / ... per year.

Disclaimers:

- All question in the checklist refer to “to what extent” precautions are being taken. This means that answering them with “yes” or “no” is not sufficient.

- In the case of there being no information available on a certain measurement indicator, this will result in zero points for the corresponding indicator.

- Measurement indicators will be compared per operating room to secure the comparability and transparency. Meaning: measurement indicators have to be measured in the specified measuring unit per month / per year. These numbers need to be calculated per operating room in order to be comparable.

- The type of hospital will be included in the comparison with a correction factor for more complex surgeries (is yet to be determined, based on empirical data).

- The aim of the self-evaluation is data collection to obtain a zero reading of the momentarily status. Based on this zero reading, a comparison scheme has to be created to benchmark the data.

Definitions sub-themes:

- Energy:

All the electricity consumed in an operating room

- Waste:

“surgical apparatus, devices, material or other articles that are used in the operating rooms, that will be thrown away”.

- Surgical tools:

“surgical apparatus and devices used in operating rooms when performing surgery on a patient”.

*Surgical tools such as implants do not fall within this definition.

Self-evaluation:

- Please attach a short summary (textual, visual, video, be proud and creative) of how sustainability efforts have been initiated and how this compares to the situation to a year prior. This may help to visualise your achievements and a source of inspiration for other hospital to promote sustainability.

Waste (10 points)

General

- How many kilograms of waste are produced per operating room per month/year?

.... Kilogram

Separating waste

- How many different waste flows are currently distinguished?
- Which flows are these?

Reuse of materials

- What percentage of the medical devices listed below are currently discarded after single use?
 - Laryngoscope blade anaesthesia... %
 - Staplers ...%
 - Sealing devices (such as harmonic, sonosurg, ligasure, thunderbeat) ...%

- Bronchoscopes ...%
- Clip pliers ...%
- Staplers for closing of the skin ...%
- Diathermy handpieces ...%
- Diathermy pads (stickers that are stuck on the patient before using diathermy) ...%

Procurement

- To what extent is waste reduction taken into account when procurement is carried out?
 - No attention is paid at all to the reduction of waste during the procurement process
 - A little attention is paid to the reduction of waste during the procurement process
 - Frequent attention is paid to the reduction of waste during the procurement process.
 - Continued attention is paid to the reduction of waste during the purchasing process.
- To what extent does waste reduction form part of a procurement procedure? De vermindering van afval is helemaal geen onderdeel van het aanbestedingsproces (0%)
 - Reducing waste is a small part of the procurement process (between 0% and 25%)
 - The reduction of waste is an average part of the procurement process (between 25% and 50%).
 - Reducing waste is a major part of the procurement process (between 50% and 75%).
 - Reducing waste is a very large part of the procurement process (between 75% and 100%).

Apparatus

- To what extent are plans developed for the end of life of equipment? How much is returned circularly or leased and refurbished? 0% van de apparaten wordt op dit moment circulair ingenomen of refurbished
 - Between 0% and 25% of the devices are currently either circularly collected or refurbished.

- Between 25% and 50% of the devices are currently either circularly collected or refurbished.
- Between 50% and 75% of the devices are currently either circularly collected or refurbished.
- Between 75% and 100% of the devices are currently either circularly collected or refurbished.

Behaviour

- Are all groups of OR staff aware of the reduction of waste? Tick what is applicable and explain *If so, how...
 - All groups of OR personnel have sufficient knowledge to deal sustainably with waste production, *namely...*
 - All groups of OR staff are aware of the use of materials to ensure that as little waste as possible is produced during an operation, *namely...*
 - Currently thinking about how waste consumption can be made more sustainable is done, *namely....*