TOWARDS A HEALTHY REAL ESTATE SECTOR

An explorative study on the stakeholder interests and potentials of a new type of lease in office buildings in the Netherlands, the healthy lease

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Foreword

This thesis is the last step in the MSc Management in the Built Environment at the Delft University of Technology. Finalizing this thesis also means the end of my student period at the University. My thesis process can be characterized as a bumpy road in which I overcame several big challenges and learned a lot about myself. Nevertheless I am satisfied with the result and learned a lot about the topic of health and wellbeing in office buildings and more specific, healthy leases. This knowledge can be used during my professional career. Furthermore I hope this thesis to a certain extent contributes to new insights in the academic field as it comes to healthy leases in office buildings.

I want to thank my mentors, Tuuli Jylhä and Peter de Jong for assisting me during my graduation process. Furthermore I want to thank the participants of the interviews. Finally a word of thank for my family for supporting me.

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Executive Summary

In this executive summary a comprehensive explanation of the essential parts of this research is presented. Reading this summary should give a full picture on all aspects, motivation to conclusions, of this research. Nevertheless it is recommended and appreciated to read the whole thesis for a detailed understanding.

1.1 Introduction

In general people spend 80% of their time in a building (DGBC, 2014). More specifically, on average an employee spends around 40% of his time per week in an office building (CBRE, 2016). We do know that certain office features impact on employee health (Colenberg et al. 2020), this is also noticed in the current real estate market.

Agreements on sustainability aspects can be laid down in lease contracts between building owners (landlords) and tenants. This is done by specific articles, an addendum to the lease or in a separate lease document, a so-called green lease. In a green lease landlord and tenant lay down agreements on mutual sustainability targets and costs and benefits are shared between the contract holders (Quispel & Bausch, 2011).

With user health in a more prominent role, it is interesting to examine in what ways landlord and tenants can make legal agreements relating to health and wellbeing in office buildings, the healthy lease.

Research question and scope

The aim of this research is to explore and develop guidelines for a new type of lease agreement in office buildings, the healthy lease. The main research question is:

"What are the different stakeholder interests and potentials of a healthy lease model which can be applied in office buildings in the Netherlands?"

To answer the research question this thesis consists of three main phases:

Phase 1: Analyse the concept of user health in office buildings

By analysing this concept, the research aims to define the relevant indicators with respect to health symptoms amongst office users and building features. Determination of these indicators and features is essential input for a healthy lease model. The indicators will be defined by analysis of relevant literature. Based on the literature a framework will be drawn of the most occurring health indicators and the related building features. This framework will then be combined with the mechanisms of green leases to create a theoretical foundation of a healthy lease.

Phase 2: Understanding the origins and mechanisms green leases

This research phase aims at a better understanding of the drivers and barriers of green leases and their structure. Why are green leases applied? What are the advantages and disadvantages of these types of contracts and how are they structured? This understanding is based on existing literature in this field. A good understanding on the mechanisms and structure of green leases is important to develop a healthy lease. After all both leases concern a type of sustainability (energy performance versus user health) and are aimed at improving and stimulating this.

Phase 3: Develop and explore the stakeholder interests and potentials in a health lease
By understanding the concepts of user health and green leases and combining the body of knowledge on these subjects, the guidelines for a healthy lease model can be developed and explored. This is done in the empirical part of this research.

1.2 Theoretical Framework
In the theoretical framework chapter, phase 1 (user health in office buildings) and phase 2 (mechanisms of green leases) will be presented. The start of phase 3 (develop and explore the potentials of a healthy lease) is also described in this chapter but is further elaborated in the empirical research chapter.

Phase 1: User health in office buildings
This phase is structured on the basis of three questions:

1. What are the characteristics of user health in office buildings?
2. Which health features can be identified and what are their health effects?
3. How can user health be structured in an applicable framework?

Characteristics of user health in office buildings (question 1)
Larsson (1999) indicates that (user) health is a very broad term which is hard to describe unambiguously. He describes four major conceptual models of health, of which the WHO model is the most comprehensive: *"State of complete physical, mental and social well-being and not merely the absence of disease or infirmity".*

The human body and mind respond to external stressors, that can be both physical and psychosocial. Depending on how the body and mind react to these stressors an imbalance can occur in the human systems, which may result in physical and/or psychosocial changes. In other words, external stressors can impact on people in terms of physical and psychosocial discomfort (Bluyssen, 2014). This research will exclude confounding and modifying factors and only focuses on building related external stressors and their possible health effects.

Health features in office buildings and their effects (question 2 & 3)
In literature several main physical stressors (building features) are identified. Colenberg et al. (2020), identify six stressors: (1) layout; (2) furniture; (3) greenery; (4) noise; (5) light and (6) personal control. Bluyssen (2014), describes four main physical stressors in the office environment: (1) air quality; (2) lighting quality; (3) noise comfort and (4) thermal comfort. This research only focuses on the stressors that can be controlled by building owners. These are:

1. Air quality
2. Light
3. Noise
4. Personal control

Layout, furniture and greenery are within the control of the tenant and therefore excluded from this research. Thermal comfort will be integrated with personal control. In this thesis these stressors will be indicated as (main) health features. The potential health effects of each of the health features are studied from literature. An overview (theoretical framework) is presented in table 1.2.

Theoretical overview user health

	Health features			
Health symptoms	**Air**	**Lighting**	**Noise**	**Personal Control**
1. Dry Eyes	(1,15)	(2)		(2)
2. Dry Throat	(1,3)			
3. Stuffy/Runny Nose	(3)			
4. Headache	(1,11, 15)	(7)	(5)	(28)
5. Lethargy	(1)	(8,9)	(10)	
6. Itchy Eyes		(2)	(6)	
8. Breathing Difficulty	(1,12,14)			
9. Flu-like Symptoms	(12, 32)			
10. Dry Skin	(3)		(5,6)	
11. Irritated Skin			(21)	
12. Irritated Eyes	(11)	(1,7,9,16)		(28)
13. Wheezing	(12)			
14. Coughing	(12)			
15. Sneezing	(12)			
16. Trachycardia (rapid heard rate)			(17)	
17. Irregular Heart Beats			(17)	
18. Bradycardia (slow heart rate)			(17)	
19. Stress		(16)	(20,21,22)	
20. SBS symptoms overall	(12,14,18)		(6)	
21. Musculoskeletal symptoms		(2,16)		(2)
22. Perceived comfort / satisfaction	(4)	(8,9)	(20,21, 24)	(25, 26, 27, 29, 30, 31)
23. Absenteeism	(13, 32)		(19)	

	Author	Title
1	Bluyssen et al. (1996)	European Indoor Air Quality Audit Project in 56 Office Buildings
2	Joines et al. (2015)	Adjustable task lighting: Field study assesses the benefits in an office environment
3	Jaakkola et al. (1991)	Mechanical Ventilation in Office Buildings and the Sick Building Syndrome. An Experimental and Epidemiological Study
4	Roulet et al. (2006)	Perceived health and comfort in relation to energy use and building characteristics
5	Kristiansen (2010)	Is Noise Exposure in Non-Industrial Work Environments Associated with Increased Sickness Absence?
6	Niven et al. (2000)	Building sickness syndrome in healthy and unhealthy buildings: an epidemiological and environmental assessment with cluster analysis
7	Aries et al. (2013)	Daylight and health a review of the evidence and consequences for the built environment
8	Lamb and Kwok (2016)	A longitudinal investigation of work environment stressors on the performance and wellbeing of office workers
9	Veitch et al. (2008)	Lighting appraisal, well-being and performance in open-plan offices: A linked mechanisms approach
10	Jahncke et al. (2011)	Open-plan office noise : Cognitive performance and restoration
11	Brightman et al. (2008)	Evaluating building-related symptoms using the US EPA BASE study results
12	Fisk (2000)	Health and productivity gains from better indoor environments
13	Milton et al. (2000)	Risk of Sick Leave Associated with Outdoor Air Supply Rate, Humidification, and Occupant Complaints
14	Seppanen and Fisk (2001)	Association of Ventilation System Type with SBS symptoms in Office Workers
15	Bluyssen et al. (2016)	Self-reported health and comfort in modern office buildings: first results form the EU OFFICAIR study
16	Fostervold and Nersveen (2008)	Proportions of direct and indirect lighting
17	Kristiansen et al. (2008)	Noise frequency components and the prevalence of hypertension in workers
18	Seppanen et al. (1999)	Associations of ventilation rates and CO2 concentrations with health and other responses
19	Fried et al. (2002)	The joint effects of noise, job complexity, and gender on employee sickness absence: An exploratory study across 21 organizations
20	Schlittmeier & Liebl, A. (2015)	The effects of intelligible irrelevant background speech in offices – cognitive disturbance, annoyance, and solutions
21	Shafiee Motlagh et al., (2018)	Empirical study of room acoustic conditions and neurophysiologic strain in staff working in special open-plan bank offices
22	Seddigh et al., (2015)	The effect of noise absorption variation in open-plan offices: A field study with a cross-over design
23	Sundstrom et al., (1994)	Office noise, satisfaction and performance
24	Croon et al., (2005)	The effect of office concepts on worker health and performance: a systematic review of the literature
25	Wells (2000)	Office clutter or meaningful personal displays: The role of office personalization in employee and organizational well-being
26	Knight and haslam (2010)	Organizational identification and comfort as .... of workspace and employees' satisfaction and well-being
27	Bluyssen et al. (2011)	Comfort of workers in office buildings: The European HOPE project
28	Toftum (2010)	Central automatic control or distributed occupant control for better indoor environment quality in the future
29	Boerstra et al. (2015)	Comfort and performance impact of personal control over thermal environment in summer: Results from a laboratory study
30	Shahzad et al. (2017)	Energy and comfort in contemporary open plan and traditional personal offices
31	Huizinga et al. (2006)	Air quality and thermal comfort in office buildings: Results of a large indoor environmental quality survey
32	Bluyssen et al. (2020)	How can airborne transmission of COVID-19 indoors be minimised?

Figure 1 Theoretical overview user health (own illustration)

From the theoretical framework can the following be concluded.

Air quality
- 15 of the 23 (65%) health symptoms are impacted by air quality
- The most occurring symptoms are:
    - headache
    - breathing difficulty
    - Sick Building Syndromes (SBS) symptoms (overall)

Lighting
- 8 of the 23 (35%) health symptoms are impacted by lighting
- The most occurring symptoms are:
    - irritated eyes
    - lethargy
    - musculoskeletal symptoms
    - impact on perceived comfort

Noise
- 12 of the 23 (52%) health symptoms are impacted by noise
- The most occurring symptoms are:
    - stress
    - impact on perceived comfort and satisfaction

Personal control
- 5 of the 23 (22%) health symptoms are impacted by personal control
- The most occurring symptom is:
    - impact on perceived comfort and satisfaction

Phase 2: Green Leases
Phase 2 is also structured based on three questions:

1. What are the origins of green leases?
2. Why are green leases applied in commercial real estate?
3. How are green leases structured in commercial real estate (mechanisms)?

Origins of green leases (question 1)
Green leases were first introduced in Australia. The concept was originally initiated by tenants and later picked up and stimulated by the government (Power, 2004 ; Roussac, 2004). In the Dutch real estate market the introduction of green leases is something of the last ten years (Quispel and Heemskerk, 2011).

Several definitions of green leases are applied in literature. Sayce et al (2009), argue that a green lease is an addition to standard legal contracts between landlord and tenants(s). Furthermore the green lease provides a mutual obligation for both parties to improve environmental performance of a building in a collaborative way. Woodford (2007), states that green leases not only benefit the environment. They can also create financial benefits for landlords and tenants. Quispel and Heemskerk (2011), describe green leases as follows: “a green lease is a performance oriented lease agreement in which the lessor (landlord) and the tenant (lessee) make agreements about the sustainable use and sustainable exploitation of a building”.

There can be concluded that there is no generally used definition of green leases. However recurring items in almost all definitions are:

- Improvement of environmental performance of a building
- Collaboration between landlord and tenant
- Shared costs and benefits (responsibilities and incentives)
- Applicable in various forms, as addendum to a lease or as separate lease document

Applicability of green leases (question 2)
Green leases are applied for multiple reasons. Two major reasons are (Quispel and Bausch 2011):

- the positive contribution to the environment.
- financial advantages for both landlord and tenant

In addition to the environmental and financial benefits, Quispel and Bausch (2011) mention that tenants also can benefit from green leases in terms of: productivity increase, corporate branding and corporate risks and opportunities. Productivity increase of employees contributes positively to the organizations overall performance. Furthermore green leases contribute to the corporate branding of an organization towards their stakeholders (employees, clients, financiers), Corporate Social Responsibility (CSR) and reducing reputation risk.

From the perspective of the landlord, a sustainable building has more quality than a conventional building and therefore, in a normal situation, a higher value than the latter.

Another important reason to strive for green leases is to overcome the so-called split incentive. Investments on sustainability are often postponed by building owner because the actual benefits or return on investments are not clear. Furthermore the extra investments on the owner side result in lower costs for the tenant and not necessarily for the building owners. A green lease tries to overcome this split incentive by creating agreements with shared responsibilities and targets

Finally green leases are applied to break down the vicious circle of blame, developed by Cadman (2000). It illustrates a situation in the real estate market where the various stakeholders talk about the implementation of sustainability, but nobody wants to take the initiative. They are finger pointing at each other without anything happening. By agreeing on mutual incentives in green leases, e.g. shared environmental targets and shared costs and benefits this circle of blame can be broken down.

Mechanisms of green leases (question 3)
A green lease can be designed and applied in different forms. This is partly dependent on the nature of the agreements. Less strict agreements can be captured in a letter of intent between landlord and tenant. More binding agreements can be drafted in an allonge, or a new lease agreements between both parties (Quispel & Heemskerk, 2011).

Janda et al (2016), state that green leases are based on green clauses which account for energy efficiency and other sustainability goals. Traditional leases often ignore these environmental considerations. In addition, traditional leases often are characterized by distant and distrustful relationships between the stakeholders. Green leases are structured in a way to stimulate collaboration between landlords and tenants.

According to Quispel and Bausch (2011), the ultimate form of a green lease consist of at least the following parts:

- It is a performance contract with (predefined) agreements on sustainable use and exploitation of a building.

- Agreements with mutual responsibility, aimed at achieving energy-saving and environmental technical objectives.
- Agreements on proportionally distributing costs, benefits and risks for ensuring sustainable use and sustainable exploitation.
- There must be a mutual incentive. Both the landlord and tenant are held responsible for the efficient use of materials and resources, resulting in lower costs for both parties.

In addition to this the authors made a schematic overview of a traditional lease versus a green lease. This is presented below in figure 1.2.1.

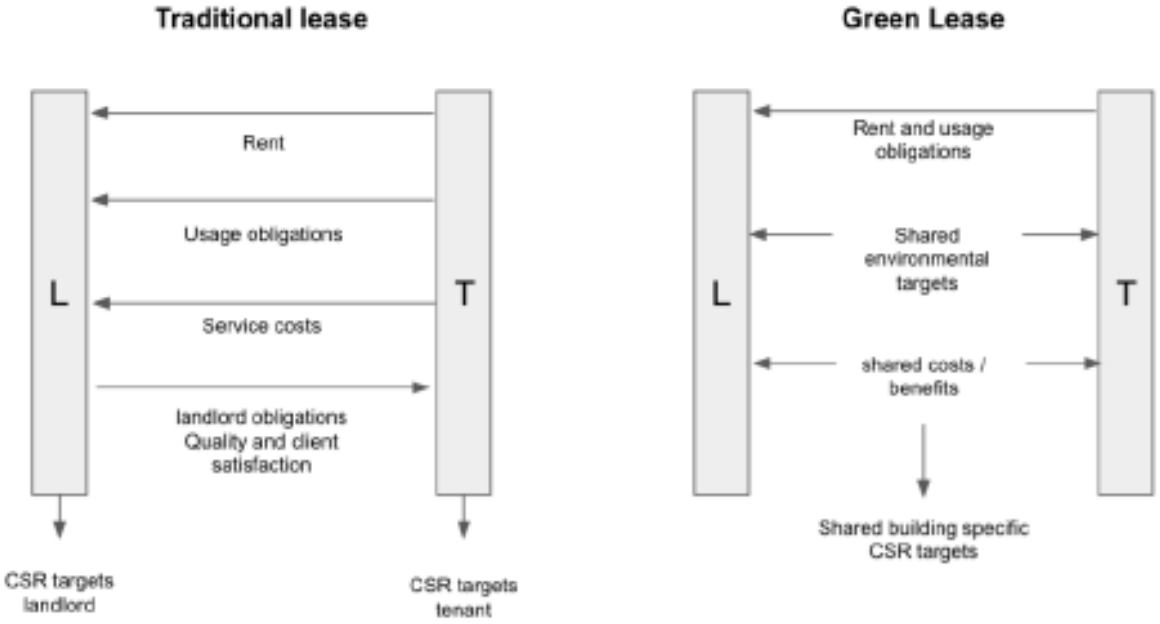

Fig. 2 Schematic overview of Green lease vs. Traditional lease (own figure, adapted from Quispel & Bausch, 2011).

Furthermore two important starting points to consider in a green lease are discussed by Quispel and Heemskerk (2011). These are:

- Single tenant versus multi-tenant office buildings
- newly constructed buildings versus existing buildings

In a multi-tenant building multiple interests should be taken into account. Ideally all tenants have the same green lease in order to coordinate the overall exploitation of the building optimally. The basis of the green leases can be the same but specific agreements can be laid down from tenant to tenant depending on the wishes and demands of their organization. Also the difference between new and existing buildings plays an important role in drafting green leases. In an existing building improvements are made within an already existing context of (technical) characteristics of the building. In an newly developed building there is the possibility to include the wishes of both stakeholders in an early (design) stage.

Finally, in literature (Quispel and Heemskerk, 2011 ; Bugden et al., 2013) several components (themes) of a green lease are identified. The components which will further be explored in the empirical research in relation to a healthy lease are:

1. **Cooperation obligation** - *Setting out the shared aim of landlord and tenant to improve sustainability in the building. Agreement to cooperate with each other to accomplish this.*

2. **Building Management Group** - *A platform/forum to discuss sustainable related issues and strategies on a regular basis with each other.*

3. **Data Sharing** - *Sharing and monitoring data with respect to the sustainable performance of the building. This is done a regular basis.*

4. **Threshold guarantees** – *Applying Threshold guarantees (by landlord) to ensure the performance and safety of the indoor environment.*

5. **Landlord's right to do works** - *Agreements to extend or restrict rights to carry out works that potentially have impact on the sustainable performance of the building*

6. **Tenant's right to do works** - *Agreements to extend or restrict rights to carry out works that potentially have impact on the sustainable performance of the building*

7. **Reinstatement obligation tenant** - *Agreement on reinstatement obligation of the leased space (fit-out) by the tenant at the end of a lease term*

8. **Label and Certificate obligation** - *Agreement with regard to the obligation to have a (minimum) achievable certificate in the building*

9. **Dispute Settlement** - *Agreement which describes to which extent remedies/consequences are applied when parties are in breach*

Phase 3: development guidelines and potentials of a health lease

The nine components described above are clustered in five main themes:

- Communication : components 1 and 2
- Data sharing & Monitoring : components 3 and 4
- Workspace : components 5,6 and 7
- Labels and Certificates : component 8
- Dispute Settlement : component 9

The five main themes are considered as main potential guidelines for healthy leases. The potentials of these guidelines (themes) are explored via stakeholder interviews in the empirical research.

1.3 Empirical Research + Results and Recommendation

Phase 3: explore stakeholders interests and potentials

The data collection in this empirical research is based on the Delphi method. Skulmoski et al. (2007) describe the Delphi method as an iterative process, consisting of multiple questionnaires, to collect opinions

from experts on a certain problem. The questions of each following round are based on the results and feedback of the previous round. This process stops when the main research question is answered or when consensus is achieved among the participants. For this research three rounds were applied. The first round consists of open questions based on the identified healthy lease themes in chapter 3. In round 2 the interviewee is asked to rate all themes on a Likert scale from 'not important at all' to 'highly important'. Round 1 and 2 were combined, due to the fact that there was a limited amount of time available for conducting the interviews. Round 3 was conducted after the P4 date and was designed as an evaluation and validation round.

For the stakeholder interviews, 2 case studies (buildings) were selected. A multi-tenant office building in Hoofddorp, named Pharos and a single-tenant office building in Utrecht. Both buildings are existing buildings which will be or are recently modernized from the inside. The case studies are chosen due to their difference in single and multi-tenant configuration, different lease length (average length of 5-7 years in Pharos and long-term lease of 15 years plus in Utrecht) and a difference between tenant background (more corporate oriented in Pharos versus governmental in Utrecht).

Based on the combined conclusions of both case studies a schematic overview of a healthy lease is drafted, see figure 3. The themes Communication and Data Sharing & Monitoring were perceived as essential in a healthy lease by all stakeholders. Stakeholders indicated that both themes are closely related to each other. The different building features (Air, Light, Noise, Personal control) are integrated with data sharing & monitoring. The themes Labels & Certificates and Workspace were rated differently amongst the stakeholders in both case studies. In Round 3 these themes have been discussed again with the aim to reach consensus on them, which succeeded. In addition to that the theme Dispute Settlement would have been discussed in the presence of a real estate lawyer, but due to Covid this was not possible. Finally the themes Data sharing & Monitoring and Communication have been extra validated.

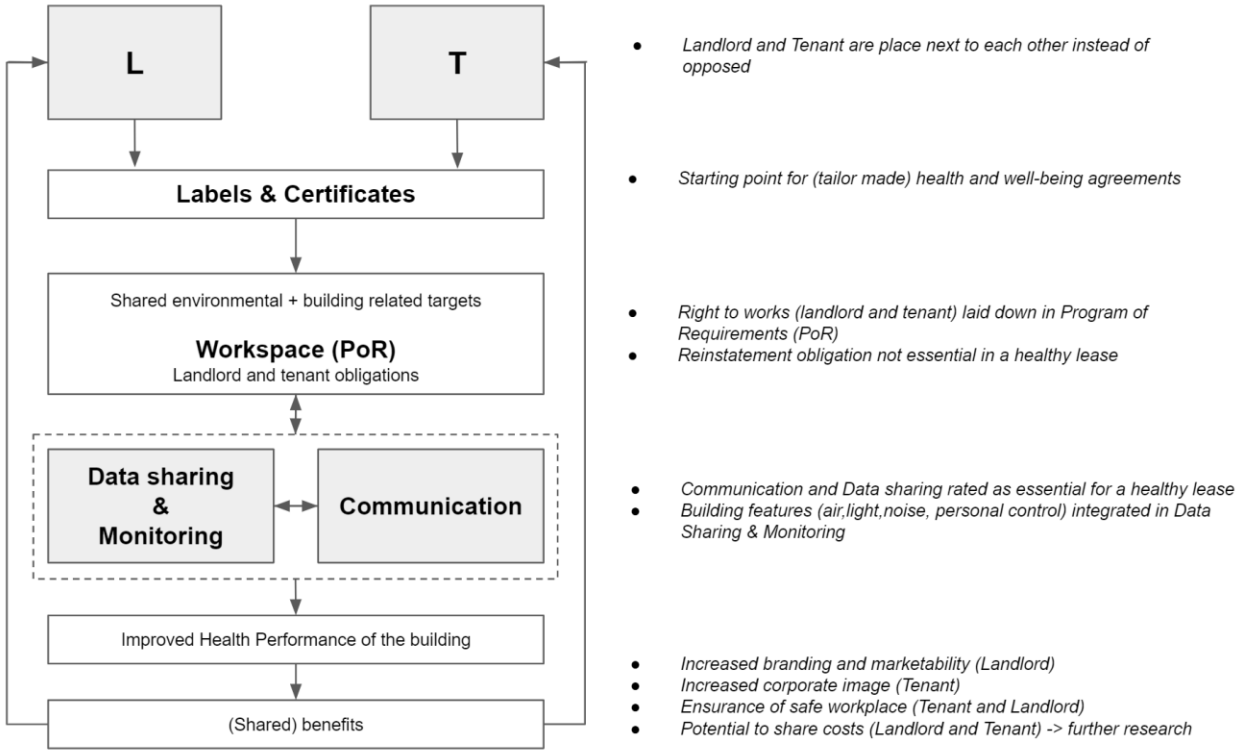

Figure 3 – schematic overview healthy lease (source: own illustration)

1.4 Conclusion

This research explored the different stakeholder interests and potentials of new type of lease, the healthy lease. The main research question was: **"What are the different stakeholder interests and potentials of a healthy lease model which can be applied in office buildings in the Netherlands?"**
The answer to this question follows based on the conclusions of the empirical research and conclusions. This is summarized below.

- A healthy lease is defined as a lease contract between landlord and tenant in which health promoting strategies have a central role. These strategies are made based on four main themes: 1) Labels and certificates, 2) Workspace, 3) Data sharing and monitoring and 4) Communication. A fifth potential theme, Dispute settlement is not included in this thesis. In a healthy lease the aim of the landlord and tenant is to create and maintain a healthy indoor environment for office users throughout out the lease term. This can result in mutual benefits for both stakeholders, like increased branding, ensurance of a safe workplace and cost sharing.
- The case study findings did confirm the added value of Communication in healthy leases. Both, landlords and tenants replied that communication should be increased compared to the current situation and should focus on (long-term) health performance strategies of the building. A Building Management Group can be an excellent platform to facilitate this. This is in line with the literature findings. (Bugden et al., 2013 ; Quispel and Bausch, 2011).
- The case study findings did confirm the added value of Data Sharing & Monitoring in healthy leases. According to the stakeholders this theme is closely related to Communication, as it forms the input for discussions. Furthermore applying threshold guarantees, in particular on air quality, were perceived as assurance on the safety of the workspace, especially in the light of the current Covid pandemic this was rated as highly important. This is in line with the literature findings of the theoretical framework on user health and other literature (BBP, 2016 ; Quispel and Heemskerk, 2011)
- The cases study findings did confirm the added value of Labels and Certificates in a healthy lease. Labels and certificates can function as a general starting point in a healthy lease from which tailor made agreements on health performance can be made between landlord and tenants
- The cases study findings did not confirm the added value of reinstatement obligation in a healthy lease as it was perceived as non-essential in a healthy lease. On the sub-themes alterations to the workspace by landlord and tenant a consensus was reached. It is concluded that these alterations should be laid down in a PoR and added to a healthy lease.
- The case study findings did confirm that the vicious circle of blame is still present to a certain extent. Especially from the side of the landlord (landlord 1). It was found that landlords are aware of the added value of a healthy lease and accompanying themes, but tend to link this to short-term benefits (return on investment). Potential obligations forthcoming of a healthy lease can be perceived as 'too much responsibility' and 'hassle' by potential buyers, who are focused on quick and easy investments and returns. In order for a healthy lease to succeed, there must be a mindset change of building owners.
- The case studies did confirm the difference between multi-tenant and single-tenant buildings as mentioned by Quispel and Heemskerk (2011). Implementing Communication (BMGs) and Data sharing in multi-tenant buildings will be more challenging than in a single-tenant building due to the simple fact that there are more stakeholder involved.
- The case studies did confirm that a healthy lease, and in specific Communication and Data Sharing can contribute to the overall branding of a building and marketability of a building (Quispel and Bausch, 2011).

Limitations & Future Research

- This research has studied a limited (2) amount of cases. Case study findings are based on interviews with 2 landlords and 4 tenants. Statistical findings are therefore only applicable for the cases that have been studied. However the focus of this research is on analytical generalization rather than statistical generalization.
- A first recommendation for further research is to confirm the findings of this research, by conducting more case studies in different buildings and with different stakeholders.
- A second recommendation for further research is to focus on different type of investors and their interest in health and well-being, and more specific healthy lease. A differentiation can be made between short-term investors (added value) and long-term investors (institutional). Both type of investors have different drivers as it comes to sustainability (health and well-being) in office buildings.

Chapter 1. Introduction

This chapter introduces the background of the research problem and relevance of this thesis. Based on the research background and motivation, the research aim, main question (research phases) and research scope will be presented. Thereafter the scientific and practical relevance is described. The chapter concludes with an overview of the thesis structure.

1.1 Background and motivation of the research

In general people spend 80% of their time in a building (DGBC, 2014). More specifically, on average an employee spends around 40% of his time per week in an office building (CBRE, 2016). It is known that certain office features impact on employee health (Colenberg et al. 2020) and this is also noticed in the current real estate market. In our modern day society personal health and wellbeing are very relevant topics. People are more and more aware of and interested in their personal health and wellbeing. A healthy lifestyle is promoted by governments and also social media contribute to ideal images of health and wellbeing. A quick look in some Dutch newspapers, shows that a healthy lifestyle is a very trendy topic. For example in an article of the Volkskrant of November 2019, there is stated that around 90% of the Dutch inhabitants are happy. The most important driver for this happiness is health. An article in the NRC describes that more and more schools introduce a canteen with healthy food. This shows that a healthy lifestyle is not an option anymore but rather becomes the norm.

Sustainability in the real estate sector is often linked to energy efficiency in buildings. When governments became aware of the environmental impact of real estate, stricter regulations were introduced in order to reduce this impact (Fuerst & McAllister, 2011). The Dutch Ministry of Housing, Spatial Planning and the Environment (VROM), introduced in the 1970s the first subsidy for energy efficiency measures (VROM, 2002). Collaboration between government and market parties on this topic increased in the 1990s and in 1995 the Energy Performance Coefficient (EPC) was developed and introduced. In the following years several sustainability certificates were introduced to the market. Their aim was to lower the energy consumption and environmental impact and to increase resource efficiency (Krizmane et al., 2016). From these certificates the BREEAM-NL certificate is the most common in the Netherlands. Building features where these certificates on focus are: energy, water, management, materials, waste and health and well-being. This makes it possible to rate buildings on multiple sustainability aspects, which is done by independent experts. It provides stakeholders, such as building owners and tenants, assurance on the quality and value of their assets. Also from a Corporate Social Responsibility (CSR) point of view certificates are advocated by stakeholders.

Agreements on sustainability aspects can be laid down in lease contracts between building owners (landlords) and tenants. This is done by specific articles, an addendum to the lease or in a separate lease document, a so-called green lease. In a green lease landlord and tenant lay down agreements on mutual sustainability targets and costs and benefits are shared between the contract holders (Quispel & Bausch, 2011).

The last few years the focus shifts towards health and wellbeing of office users, rather than reducing the energy consumption (green buildings) can be notified. In 2014 the WELL Building Standard was introduced. This is the first building certificate that primarily focuses on health and wellbeing of office users. It is a performance based system that measures characteristics of the built environment that have influence on user health and wellbeing. It has seven main categories: air, water, nutrition, light, fitness, comfort and mind (International Well Building Institute, 2018).

This certificate was developed within the new norm of a healthy lifestyle and the fact that working life and private life are merging. Furthermore, personnel costs (including salaries) account for 90% of the operational costs of a company. The other 10% percent consists of 9% rental costs and 1% energy costs (World Green Building Council, 2014). Companies become more and more aware of this and it is crucial for them to attract and retain talent, by putting their employees centrally. The recent Covid-19 pandemic will most likely increase this awareness of user health in office buildings (Cushman & Wakefield, 2020). With user health in a more prominent role, it is interesting to examine in what ways landlord and tenants can make legal agreements relating to health and wellbeing in office buildings following green lease contracts.

1.2 Research question and scope

The aim of this research is to explore and develop guidelines for a new type of lease agreement in office buildings in office buildings, the healthy lease. The main research question is: **"What are the different stakeholder potentials of a healthy lease model which can be applied in office buildings in the Netherlands?"** To answer the research question this thesis consists of three phases: (1) analyse the concept of user health in office building and define the relevant health features; (2) understanding the mechanisms of green lease contracts and (3) combining the knowledge from the previous phases to develop and explore the potentials of a healthy lease.

Phase 1: Analyse the concept of user health in office buildings

By analysing this concept, the research aims to define the relevant indicators with respect to health symptoms amongst office users and building features. Determination of these indicators and features is essential input for a healthy lease model. The indicators will be defined by analysis of relevant literature. Based on the literature a framework will be drawn of the most occuring health indicators and the related building features. This framework will then be combined with the mechanisms of green leases to create a theoretical foundation of a healthy lease.

Phase 2: Understanding the mechanisms green leases

This research objective aims at a better understanding of the drivers and barriers of green leases and their structure. Why are green leases applied? What are the advantages and disadvantages of these types of contracts and how are they structured? Knowing all these mechanisms of green leases will contribute to the development of a healthy lease.

Phase 3: Develop and explore the guidelines / potentials of a health lease

By understanding the concepts of user health and green leases and combining the body of knowledge on these subjects, the guidelines for a healthy lease model can be developed and explored.

This research will be done from the perspective of Dutch real estate investors (building owners) active in the Netherlands. As a building owner there are limited steering possibilities on employee health. In literature seven features are often mentioned in the relationship between interior office space and health (Colenberg et al. 2020) and (Bluyssen, 2016). Four of these features can be controlled and steered by building owners. These are (1) air quality, (2) light quality, (3) noise comfort and (4) personal control. The other features are layout, greenery and furniture. These fall outside the control of building owners and will not be included in this research.

1.3 Scientific and practical relevance

In scientific literature extensive research is done on user health and wellbeing in office buildings and green leases. The body of knowledge on user health and wellbeing in offices consists mainly of studies on self-reported health symptoms of office users and possible building related causes of those symptoms. Studies on green leases tend to focus on the origins and mechanisms of green leases (Janda et al., 2016; Power, 2004; Roussac, 2004) and best practices (Janda et al., 2016; Quispel and Bausch, 2011).

Extensive research is done on (user) health in general (Basch, 1990 ; Larson, 1999 ; WHO, 2006 ; Huber et al., 2011). Furthermore a substantial and also a growing number of health related researchers focusing on the possible relation(s) between user health and (office) buildings. Gustaffsen (1992), Johnson et al (1991), Norlon & Andersson (1991), Burge (1987, 2004), Kukec & Dovjak (2014), discuss the sick building syndrome (SBS) in their papers. Graudenz (2011), the term building related illnesses (BRI), which can be different from SBS. Burge (2004), makes a distinction between building related diseases and SBS. Building related diseases include infectious diseases spread by building services and diseases from individual to individual. Furthermore, in a significant amount of studies, practical experiments and tests are conducted. The Officair project (Bluyssen & Roda, 2016), US EPA BASE study (Brightman et al., 2008) and a SBS study by Burge (1987) are some of them.

Despite all this research it is still hard to give unilateral answers on the impact of offices on user health. One reason for this is that a lot of other factors can have influence on user health and wellbeing. Another reason is that individual perception can differ amongst people. For example, one person would like to work in a closed, private area with low noise levels. Where another person works better in an open and lively area and is less sensitive to noise levels.

As previously mentioned for building related sustainability there are several certificates such as BREEAM, BREEAM-NL and LEED. In addition to that there are specific green lease contracts, which aim to increase sustainability in buildings and increase sustainable engagement between landlords and tenants. However, a lease contract that is focusing on health and wellbeing aspects in office buildings is not available yet. Developing such a healthy lease contract could potentially increase health and wellbeing of building users. For organizations this is desirable to prevent absenteeism and facilitate and meet the demands of their employees. For landlords, such as building owners, a healthy lease contract can increase tenant satisfaction and perceived quality and value of their assets within the real estate sector.

1.4 Research design

The research design describes the structure of the thesis. This thesis consists of four main phases divided over four chapters. These are shown in figure 2.2 below. Chapter 1 is a research summary and is not assigned specifically to one of the main phases. In the introduction the motivation, research gap and accompanying research questions and goals are discussed. In the theoretical part a framework, with relevant indicators, is constructed based on the existing body of knowledge on the concepts of user health and green leases. Based on the theoretical framework the potentials of a health lease are developed and explored . Finally, the main findings will be discussed and evaluated.

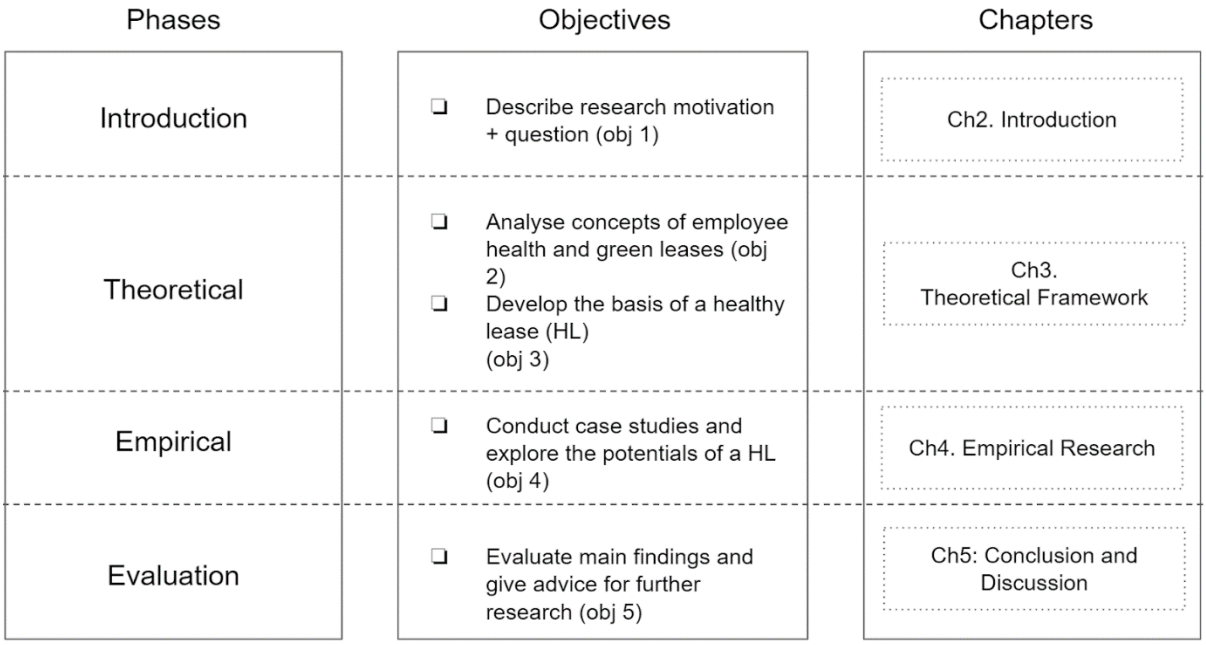

Figure 1.1 Structure of the thesis. source: own illustration

Chapter 2. Theoretical Framework

This chapter presents the theoretical framework that will be the basis for the empirical part presented in the following chapter. The literature review is divided into two main parts. The first part describes the topic of user health in office buildings. The second part describes the topic of green leases. The chapter concludes with a summary.

Part I - User health in office buildings

- What are the characteristics of user health in office buildings?
- Which health features can be identified and what are their health effects?
- How can user health be structured in an applicable framework?

Part II - Green leases

- What are the origins of green leases?
- Why are green leases applied in commercial real estate?
- How are green leases structured in commercial real estate (mechanisms)?

PART I - User health in office buildings

2.1 Characteristics of user health in office buildings

User health is a very broad term which is hard to describe unambiguously. This part discusses the term user health from a wide conceptual scope and narrows it down to an applicable definition for this research. In addition to that a review of literature will be done on the relation between user health and office buildings. The focus is on features of the office interior that are within the steering capability of building owners and landlords.

Larson (1999) describes four major conceptual models of health, these include (1) the WHO model, (2) the Medical model, (3) the Wellness model and (4) the Environmental model. An overview of the models is shown in the table below.

WHO Model	State of complete physical, mental and social well-being and not merely the absence of disease or infirmity
Medical Model	The absence of disease or disability
Wellness Model	Health promotion and progress toward higher functioning, energy, comfort and integration of mind, body and spirit
Environmental Model	Adaptation to physical and social surroundings - a balance free from undue pain, discomfort or disability

Table 2.1 Conceptual models of health, based on (Larson, 1999).

From these conceptual models three types of health can be distinguished (1) physical health; (2) psychological or mental health and (3) social health. Physical health is described as the ability of a human body towards homeostasis or biological balance of the human body. Mental health is the capacity of a human being to cope with, or recover from strong psychological stress and recover from post-traumatic stress disorders. Social health is described as the capacity of a human being to fulfill their potential and obligations, manage their life independently and participate in social activities including work (Larson,

1999). The Medical model focuses on physical aspects, the Wellness model on psychological aspects and the Environmental model on social aspects. The WHO model describes all three health types. In this research none of the health types will be excluded on forehand. However it is important to keep in mind that this research is written from the perspective of building owners and their steering capability on user health within the walls of their office building. It is expected that building owners have more influence on physical health than psychological and social health as these types can have numerous underlying causes that are not only affected by building related factors.

The human model

In order to get a better understanding of the cause of building related symptoms, the human model will be discussed in this paragraph. The human body and mind respond to external stressors, that can be both physical and psychosocial. Depending on how the body and mind react to these stressors an imbalance can occur in the human systems, which may result in physical and/or psychosocial changes. There are three major human control systems, (1) the nervous system, (2) the immune system and (3) the endocrine system. The nervous system relates to muscles and sensory stimuli. The immune system functions as the body's defence system on viruses and such. The endocrine system relates to the hormone balance in the body and copes with the nervous system in steering on muscles, cognitive processes and such (Bluyssen, 2014). External stressors can affect all three systems of the human body, this leads to physical and mental effects (Vroon, 1990; Kapit et al., 2000; Bonnefoy et al., 2004; Fisk et al., 2007; Lewtas, 2007; Houtman et al., 2008; Babisch, 2008).

Figure 3.1 shows a simplified overview of the human model. The human body is exposed to external stressors. Due to this exposure the control systems can be activated within the body. This can lead to immediate or later effects and responses. Furthermore, personal factors, previous exposures and circumstances and other factors, so-called confounders and modifiers, can affect the individual responses on external stressors (Bluyssen, 2014). However this research will exclude confounding and modifying factors and only focuses on building related external stressors and their possible health effects.

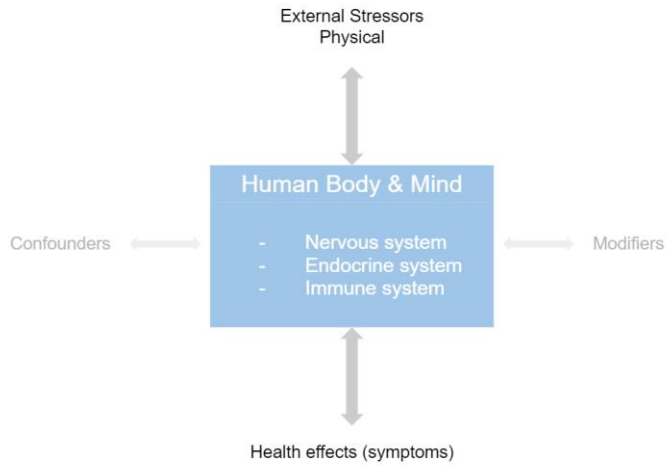

Figure 2.1 The human model. Simplified and adapted scheme from Bluyssen (2014)

Bluyssen (2014) describes four main physical stressors in the office environment: (1) air quality; (2) lighting quality; (3) noise comfort and (4) thermal comfort. In a more recent literature review on the relationship between office interior and employee health, Colenberg et al. (2020) identify six stressors or features: (1) layout; (2) furniture; (3) greenery; (4) noise; (5) light and (6) personal control. In both studies the features

light and noise are described. These features are within the control of the building owner and therefore relevant for this research. In addition to that air quality (Bluyssen, 2009a) and personal control (Colenberg et al. 2020) can be controlled by the building owner and will also be included in this research. The features layout, furniture and greenery are within the control of the tenant and therefore excluded from this research. Thermal comfort will be integrated with personal control in this thesis.

In the next paragraphs all four relevant building features will be described in more detail. This will be done by reviewing the available and relevant body of knowledge on every feature. At the end of part I of this chapter a theoretical framework will be presented that gives an overview of the building features and their potential relation with health symptoms of users.

2.2. Physical stressors (building features)

Air Quality

Fisk (2000) did a study on the potential effects of the indoor environment (specifically air quality) on user health. This was done based on a literature review of relevant studies. The author concludes that there is significant evidence available that links different health effects knowing 1) communicable respiratory illnesses, 2) allergies and asthma, 3) sick building syndrome symptoms to air quality in the indoor environment. SBS symptoms are influenced by many building factors, amongst which are the rate of outside air ventilation, type of ventilation system and the level of chemical and microbiological pollution (Fisk, 2000). Allergies and asthma are triggered by, amongst others, allergens in the indoor air. SBS symptoms can be reduced by increased ventilation and improved cleanliness of the building (Fisk, 2000).

Jaakkola et al. (1991), found significant evidence on the relationship between air humidification in office buildings and health complaints from users. In an epidemiological study the occurrence of symptoms and complaints was compared in a humidified part and non-humidified part of an office building. Workers in the humidified part reported less dryness of skin and nose and throat obstruction than workers in the non-humidified part. Also fewer complaints on air dryness were reported in the humidified part of the building.

Milton et al. (2000), conducted a study on the association of outside air supply rating with the rate of absence from work. 3720 workers in 40 buildings divided were analysed. They found that short-term absence was 35% lower in buildings with higher ventilation.

Seppanen et al. (1999), found that lower ventilation rates are significantly associated with an increase of at least one SBS symptom. In a following study, conducted by Seppanen and Fisk (2001), SBS symptoms related to ventilation systems in problem buildings were analyzed. Debris inside the air and poor drainage from coil drain pans increased respiratory symptoms with a factor three. In addition to that the authors found that daily vacuum cleaning resulted in a 50% decrease of respiratory symptoms.

OFFICAIR study

Bluyssen (2016) compares in her article the results of several studies on health effects and the office environment with an own study called OFFICAIR. The OFFICAIR experiment was developed to describe associations between office workers and characteristics of European offices. The project was conducted during the winter of 2011-2012 in eight different countries (The Netherlands, Portugal, Spain, Italy, Greece, France, Hungary and Finland). In total 7441 office workers (1014 Dutch applicants) and 167 office buildings (20 in the Netherlands), were included in the study.

Building related symptoms were identified based on Raw et al. (1996). In this study a so-called building symptom index (BSI) is described. There is a BSI-5 and BSI-19 index. The first consists of the five following symptoms: dry eyes, blocked/stuffy nose, dry/irritated throat, headache and lethargy, which often

are considered as the most occurring symptoms (Raw et al., 1996). The BSI-19 index describes 14 other, less occurring symptoms.

In the OFFICAIR study a large database was generated of Indoor Environmental Quality (IEQ) perception, health and comfort of office workers and office buildings characteristics across Europe. Dry eyes and headache were the most occurring health symptoms with a direct link to indoor air quality. Furthermore, some building characteristics related to health were identified: number of occupants, lack of operable windows, presence of carpet, cleaning activities. Confounding factors such as psychosocial factors were taken into account in the OFFICAIR study.

BASE Study
A large, similar study in the US, is the BASE study conducted in the 1990's. In this study building related symptoms were evaluated based on the study results of US EPA BASE. The project consisted of 100 selected US office buildings and 4326 respondents. The results of the BASE study were compared to the National Institute for Occupational Safety and Health (NIOSH) study, which consisted of 80 complaint buildings. Similar to the BSI-19 in OFFICAIR, 18 health symptoms were identified in the BASE study. The three most occurring symptoms were tired or irritated eyes, drowsiness and headache. Indoor air quality significantly, but not solely, contributed to these symptoms.

European Audit Project
The Audit project started at the end of 1992 and included 56 office buildings in Europe. Main aim of the project was to develop assessment procedures on ventilation to improve indoor air quality and optimizing energy use in buildings. The investigated symptoms in this study were, similar to the BASE study and HOPE project, mucosal irritation (nose, eyes, throat) as well as tiredness and headache. Again, air quality had substantial impact on these symptoms

HOPE
The main aim of the HOPE study (2002-2004) was to improve understanding of the relationships between building, social and personal factors and perceived health and comfort. Data was collected from the European Health Optimization Protocol for Energy-efficient buildings (HOPE). 5732 respondents in 64 office buildings were included in the study. a significant positive relation between operable windows, ventilation and perceived comfort and control of occupants.
The table below gives an overview of the prevalence of building related symptoms in the studies described above.

Study (year)	N buildings N office workers	Headache (%)	Dry eyes (%)	Itchy eyes (%)	Blocked nose (%)	Runny nose (%)	Dry irritated Throat (%)	Lethargy (%)	Wheezing (%)	Cough (%)	Reference
European Audit (1992 - 1994)	56 buildings 6537 office workers	42	39	17	33	18	36	52	-	-	Bluyssen et al. (1996)
HOPE (2002 - 2004)	64 buildings 5992 office workers	28	27	25	21	14	25	39	-	-	Roulet et al. (2006)
OFFICAIR (2010 - 2013)	167 buildings 7441 office workers	29	31	18	14	8	20	16	1	7	Bluyssen et al. (2016)
NIOSH (US Study) (1992 - 1993)	80 buildings 2345 office workers	25	30	30	22	22	16	-	4	9	Brightman et al. (2008)
BASE (US Study) (1994 - 1998	100 buildings 4326 office workers	15	19	19	13	13	7	-	2	5	Brightman et al. (2008)

Table 2.2 Prevalence of building related symptoms in European and US studies (Bluyssen et al., 2016).

The OFFICAIR study is the most recent study (2012) and is regarded as the most relevant study. It is also the largest study conducted. Compared to the European Audit study most of the results (%) in the OFFICAIR study have decreased. This difference can be explained due to the change in the building stock and in workers lifestyle (Bluyssen et al., 2015).

Due to the recent Covid pandemic, air quality in (office) buildings is a trending topic. Bluyssen et al. (2020) recently did a study on how to minimize airborne transmission of Covid-19 indoors. Generally three routes of infection can be observed: (1) inhalation of small airborne droplets, (2) inhalation of larger respiratory droplets and (3) direct contact with infected people or contaminated surfaces. The authors argue there is sufficiently strong evidence that sufficient air ventilation, filtration, disinfection and avoiding recirculation, together with other non-air related measures, reduces the likelihood of transmission of Covid-19.

The results of the air quality related papers are summarized in the table below.

Paper	Topic	Type of study	Major findings	Potential input healthy lease
Bluyssen et al. (1996)	European audit study on indoor air quality	audit study	• In all buildings the air was perceived as dry and stuffy but not per se odorous • Main air pollution sources where indoor materials and furnishing and HVAC (ventilation) systems • Buildings with high ventilation rates had better perceived air quality than others	• Control on HVAC systems should be included in healthy leases
Roulet et al. (2006)	Multicriteria analysis on health, comfort and energy efficiency in offices (HOPE)	multi-disciplinary study	• operable windows and proper ventilation contribute positively to perceived control and comfort of office users	• HVAC systems are important in an healthy lease
Bluyssen et al. (2016)	European study on self-reported health symptoms of office workers (OFFICIAR)	controlled field study	• dry eyes and headache were the most reported health symptoms • building characteristics that influence air quality are # of occupants, operable windows, carpeting, cleaning activities	• consider carpeting and flooring in HL
Brightman et al. (2008)	US studies (BASE & NIOSH) on building related health symptoms	controlled field study	• 18 health symptoms identified in BASE • most occurring symptoms were irritated eyes, drowsiness and headache • Air quality contributed majorly, but not solely, to these symptoms	• Ventilation in healthy leases
Fisk. (2000)	Potential effects of the indoor environment on user health	literature review	• significant evidence available that links air quality to (1) communicable respiratory	• Ventilation in healthy leases

			illnesses, (2) allergies and asthma and (3) SBS symptoms • SBS symptoms can be reduced by increased ventilation and improved cleanliness of the building	
Jaakkola et al (1991)	The effect of air humidification on health symptoms	epidemiological study	• less reported dryness of skin and nose and throat obstruction in the humidified part of the building • fewer complaint on air dryness in the humidified part	• Air humidification is important to consider in healthy leases
Milton et al. (2000)	Sick leave associations with air supply rate	field study	• 35% less short-term absence in buildings with higher ventilation rates	• Ventilation affects absence (incentive for tenants)
Seppänen et al. (1999)	Ventilation rates vs. SBS symptoms	literature review	• lower ventilation rates significantly impact on SBS symptom(s)	• Ventilation is important in HL
Seppänen and Fisk (2001)	Ventilation systems vs. SBS symptoms	literature review	• Debris inside the air and poor drainage from coil drain pans negatively affect respiratory symptoms • Daily vacuum cleaning results in a decrease of respiratory symptoms	• Cleaning (building) should be considered in a HL
Bluyssen et al. (2020)	Minimize airborne transmission of Covid-19	literature review	• Sufficient indoor air ventilation, filtration, disinfection and avoiding recirculation, diminish the potential transmission of Covid-19	• Proper ventilation contributes positively to reducing transmission of Covid-19

Table 2.3 overview air quality papers (own illustration)

Lighting.

Several studies have been done on the impact of (indoor) lighting on office workers during working hours. This paragraph gives an overview of the most significant studies in this field that are relevant for this thesis.

Fostervold & Nersveen (2008), assessed the effects of indirect and direct lighting systems on health, well-being and cognitive performance of office workers. No long term effects were found, however there were effects in musculoskeletal and ocular symptoms as well as job stress. These effects were not directly related to a particular lighting system.

Joines et al., (2015), did a field study on the benefits of adjustable LED task lighting in office environments. This was done in a control/intervention experiment design. 95 office workers (10 male, 85 female) participated in the experiment. The main findings of the experiment show that significant improvements were made in ratings of eye fatigue. Lower ratings were given on questions about eye tiredness, headaches and eyes hurting during reading tasks. Furthermore, some reductions in discomfort were made at the neck

and right upper extremity (shoulder, upper arm and wrist). On perception of job control improvement was made on working in physically awkward positions. Some barriers in the experiment were the costs involved (a LED task light costs $300 Dollar) and forgetting to use the light. This study shows some interesting findings that are relevant for this research. The significant effects on visual and musculoskeletal comfort contribute to an increase in job comfort and potential associated productivity. From my research perspective the LED task light can be replaced by integrated and adjustable sealing LEDS. The costs will not be for the employees but for the company, who leases the building or specific unit. Furthermore, an automatic sensor system can be installed to overcome the barrier of not using the lights.

Aries et al., (2013), did a reviewing study on the proven effects of daylight exposure on human health. The study consists of an overview of the body of knowledge in this specific field. Diverse results were presented and had either physiological or psychological nature. The specific health effects were divided in positive, negative and positive/negative associations. Positive associations were, amongst others, improved vision and sleep quality and reduction of headaches and eye strain. Negative associations were increased chance of migraine and epilepsy. However the results are not statistically significant. The authors state therefore that more research is necessary in this field on the relation between daylight and potential health effects. Despite this the authors made some practical implementations for daylight in healthy building design:

1. Create operable windows or apply in order to allow exposure to the full radiation spectrum.
2. Create floor plans that stimulate people to go outdoors, for example via balconies.
3. Create rooms with relatively high daylight levels (E>2000 lx on average vertically) and apply operable blinds and screens to control the light doses.
4. Provide automated control of blinds and screens. However it should be possible for users to overrule the automated control at any time.
5. Apply glass that is able to transmit full-spectrum light in order to provide the indoor lighting with the full spectrum and interaction effects can occur naturally and undisturbed.

With respect to this research these practical implications are relevant information from the perspective of the building owner. Number 1, 2 and to a lesser extent 3, are implications that are applicable for new constructions rather than existing buildings. Number 4 and 5 can be implemented in both new and existing buildings. This research primarily focuses on existing buildings, therefore the numbers 4, 5 and partly 3 are the most relevant. In addition to that the positive associations of daylight with headaches, vision and sleep quality are useful findings that underpin the relation between several health symptoms and steerable building components.

Lamb & Kwok (2016), did a cross sectional study on perceived light levels, combined with noise and temperature. The results of this study show that there is a significant relationship between different light levels and mood. More comfortable light levels have a positive effect on participant’s mood. In addition to that external stressors (e.d. lighting) can have negative effects on mood, headaches and wellbeing.

Veitch et al., (2008), have researched the impact of lighting quality on participants' health and wellbeing. In a controlled lab study they found positive relations between lighting quality and participants’ mood and comfort. This can be a good reason for building owners or landlords to apply high quality lighting in their office buildings. Not only is it perceived as an added value of the interior by its users it will also have sustainability related effects, which are beneficial for as well landlords as tenants.

The results of the lighting related papers are summarized in the table below.

Paper	Topic	Type of study	Major findings	Potential input healthy lease
Joines et al. (2015)	adjustable (LED) task lighting	controlled field study	• Use of adjustable task lighting results in higher ratings of (musculoskeletal) comfort and positive impacts on eye fatigue, perception of job content and visual comfort	Falls partly within control of the tenant, but there is potential for control of the landlord. Integrated task lighting in ceiling
Aries et al. (2013)	daylight effect on health	literature review	• Limited statistically proof on the effect of daylight on health. • More research is necessary. 5 practical implications are made	The practical implications can be a good starting point in a healthy lease
Fostervold and Nersveen (2008)	direct vs. indirect lighting	controlled field study	• No effects found in various proportions of (in)direct lighting on musculoskeletal and eye problems and mood	In contradiction with Veitch et al. (2008)
Lamb and Kwok (2016)	perceived light level	cross sectional study	• Comfortable light levels result in the most positive mood. • External stressors (e.g. light) have negative impact on mood, headaches and wellbeing	Personal control of light levels could reduce negative impact on users mood -> added value in space
Veitch et al. (2008)	lighting quality	controlled lab study	• Good office lighting results in higher appreciation of the office space by users. • This results in better overall mood and less discomfort (higher overall wellbeing)	Install high quality (sustainable) office lighting as a landlord. Has twofold advantage

Table 2.4 Overview lighting papers (own illustration)

Noise

Several studies found correlations between office noise, absenteeism and cognitive performance. Kristiansen et al. (2008) describe associations between noise exposure and heart rate variability (HRV) and electromyography (EMG) activity in the trapezius muscles. In a study that consisted of ten female volunteers, several tasks were conducted while being exposed to noise sources that simulated the office environment. Contrary to what the researchers expected, a 4% lower diastolic blood pressure was found in the noise conditions. Furthermore a positive relation was found between short-term exposure to office noise and increased ratings of perceived exertion (RPE) in the head. In a follow up research by Kristiansen (2010), relations between office noise and absenteeism are analyzed. The study consists of a discussion of epidemiological studies on sickness absence and field and laboratory studies related to sickness absence. Conclusion of the research is that there is a possible association between low to moderate office noise levels and sickness absence. However, there are more high quality studies needed to underline this.

Fried et al. (2002) did an exploratory study across 21 organizations amongst 802 office workers. In this study the authors describe possible associations between environmental noise, job complexity, personal

factors and sickness absence. For high noise levels there are laws and maximum allowances. But, in the office environment the effect of moderate, long-term noise levels on workers are interesting to examine. There is a clear body of evidence that moderate noise levels have adverse psychological and physical effects such as somatic complaints, sleep disturbances and elevated blood pressures (Kristiansen, 2010). Furthermore it is proven that chronic exposure to noise has a negative effect on overall well-being of individuals (Babisch, 1998; Kristensen, 1989; Smith, 1991) and contributes to information overload at work which can result in sickness absence (Kearns, 1986). The outcome of the study by Fried et al. (2002) shows that the strongest association between noise and sickness absence occurs among women with a high job complexity and only in the female sample a significant relation was found. Furthermore the study shows that long-term moderate noise levels can have a negative effect as absenteeism increases amongst workers (women in particular) with complex jobs. The difference between men and women is not explained in this study.

Sundstrom et al. (1994), did a field study on office noise in relation to environmental satisfaction, job satisfaction and job performance ratings. More than half (54%) of the employees stated that they were bothered by office noise, in particular people talking on phones and ringing telephones. This was also found to be a major source of office noise in a later study by Branbury and Berry (2005). A negative correlation was found between disturbance by office noise and environmental and job satisfaction. Between disturbance by office noise and job performance ratings no significant correlations were found.

In a study by Niven et al. (2000), associations were found between office noise and several sick buildings symptoms. Five buildings were analyzed. In all the buildings a significant relationship was found between low-frequency noise and health symptoms: 1) stuffy nose, 2) itchy eyes and 3) dry skin.

Croon et al. (2005) found negative correlations between open workplaces and reduction of privacy and job satisfaction. Besides noise from people and telephones, ventilation noise and IT-equipment can also be considered as noise sources. Furthermore the effect of office noise on performance is different depending on the type of work task that has to be performed (Liebl et al., 2012).

Jahncke et al., (2011) did a study on sound levels in the interior office space. They found that higher noise levels have impact on self-rated fatigue and result in more yawning. Other studies found that low to moderate background sound causes disturbance and annoyance (Schlittmeier and Liebl, 2015) and higher noise levels impact on physiological stress among workers (Shafiee Motlagh et al., 2018). Seddigh et al., (2015) found a positive relation between sound absorption and stress levels in open-plan office spaces.

The results of the noise related papers are summarized in the table below.

Paper	**Topic**	**Type of study**	**Major findings**	**Potential input healthy lease**
Kristiansen et al. (2008)	Office noise vs. absenteeism	combined study	• associations found between noise and heart rate variability and perceived exertion (head)	• incentive for organizations (tenants) to minimize office noise
Kristiansen (2010)	Office noise vs. absenteeism	combined study	• possible associations between low to moderate noise levels and absence	• incentive for organizations (tenants) to minimize office noise

Fried et al. (2002)	noise vs. absenteeism. job complexity and personal factors	exploratory study	• long-term moderate noise levels can increase absenteeism • association found between sickness absence and gender and job complexity	• minimize office noise as much as possible • distinction can be made per organization and type of activities. A tailor made approach per case is desirable
Sundstrom et al. (1994)	Office noise vs. satisfaction	controlled field study	• negative correlations between disturbance by office noise and environmental and job satisfaction	• Minimize office noise as much as possible. Check what falls within steering capability of landlord for a healthy lease.
Niven et al. (2000)	Office noise vs. SBS symptoms	Controlled field study	• Significant relations found between low-freq noise and SBS symptoms (stuffy nose, dry eyes, skin)	• Minimize office noise as much as possible. Check what falls within steering capability of landlord for a healthy lease.
Croon et al. (2005)	Workplace noise vs. satisfaction	Literature review	• Workplace noise (open-plan) affects perceived privacy and satisfaction of workers	• Minimize office noise as much as possible. Check what falls within steering capability of landlord for a healthy lease.
Jahncke et al. (2011)	Sound levels, high vs. low	controlled lab study	• More yawning in the high noise condition vs. low noise condition was observed • There were no reliable noise effects on stress hormone levels.	• more noise can result in less energetic/focused employees. This might result in less productivity. • Minimizing noise is therefore desirable for organizations
Schlittmeier & Liebl (2015)	Speech intelligibility	controlled lab study	• Perceived disturbance and annoyance were lower if background sound level and speech intelligibility were diminished. • Background sound (35/55 dBA) was significantly more disturbing than silence was (25 dBA).	• lower noise levels or silence results in more comfort for employees and less annoyances
Shafiee Motlagh et al. (2018)	Speech intelligibility	longitudinal study	• Higher noise levels increase physiological stress (skin conductance respiratory rate) • Speech transmission index had no impact.	• lower noise levels result in higher perceived comfort amongst employees • Incentive for management to keep workers happy and satisfied
Seddigh et al. (2015)	Sound absorption	controlled field study	• Perceived disturbances and cognitive stress in the open-plan office were	• higher perceived comfort due to sound absorption

			lower in the condition with enhanced sound absorption	

Table 2.5 Overview noise papers (own illustration)

Personal control

Shahzad et al., (2017), studied the impact of individual thermal control on user comfort in two different settings: a Norwegian cellular office and a British open plan office. A gap between literature and practice is described. Where literature suggests that the use of thermal control increases user satisfaction and comfort, in practice often centrally operated thermal systems are applied. Occupants' perception of the thermal environment was captured by survey questionnaires. In a series of follow-up semi structured interviews occupants' view on thermal control was investigated. Furthermore building performance was analyzed by environmental measurements. The results show a 30% higher satisfaction level and 18% higher comfort level in the Norwegian offices. In contrast the energy consumption in the Norwegian offices was higher. The authors describe that a balance between energy consumption and thermal comfort depends on thermal control. This results in higher user comfort and satisfaction, which can lead to increased productivity (Van Der Voordt, 2003) and less absenteeism (Eaton 1997; Meir et al., 2009).

Two types of control on the interior space are identified in literature. Several studies link personal control to the ability to adjust conditions of the workspace (Bluyssen, 2011 ; Boerstra et al., 2015 ; Joines et al., 2015 ; Knight and Haslam, 2010 ; Toftum, 2010). The second form of control is the ability to personalize the workstation, which is described in a study Wells (2000). In both cases positive relationships are found with psychological well-being and to a lesser extent, physical well-being (Colenberg et al., 2020)

Also Huizinga et al., (2006), conclude that thermal comfort can have significant impacts on productivity. The authors conducted a large survey, with over 34.000 responses, to air quality and thermal comfort spread over 215 buildings in the US, Canada and Finland. A high correlation, in terms of a linear relationship, between satisfaction and self-assessed productivity impacts was found. Following several other studies, Huizinga et al., (2006), also state that personal control of the indoor environments has positive effects on user satisfaction.

The results of the personal control related papers are summarized in the table below.

Paper	**Topic**	**Type of study**	**Major findings**	**Potential input healthy lease**
Wells (2000)	Workspace personalization	cross-sectional	• Indirect relationship: personalization is correlated with satisfaction with physical work environment and job satisfaction, which is correlated with physical and psychological well-being	• Personalization of the (individual) workspace could be considered in a healthy lease as it increases users satisfaction and indirectly well-being

Knight and Haslam (2010)	Managerial control of office space	cross-sectional	• Both studies indicate that lack of involvement in layout changes and individual control of temperature are moderately associated with physical and psychological well-being	• (Individual) control on temperature could be considered in a healthy lease
Joines et al. (2015)	Adjustable task lighting	controlled field study	• Using the adjustable task lights had significant benefits for musculoskeletal ($p = .011–.041$) and visual ($p = .005–.043$) comfort. • No negative results on health were found.	• Individual task lighting is very interesting to apply in a healthy lease as it benefits several healthy symptoms. Furthermore it contributes to personalization of the workspace as described by Wells (2000)
Bluyssen et al. (2011)	Control of lighting, noise, sun, ventilation, temperature	cross-sectional	• The perceived amount of control was positively associated with overall comfort • Control of sun shading had a stronger relationship with overall comfort than control of noise, ventilation or temperature.	• Personal control on sun shading can be considered in a healthy lease
Toftum (2010)	Operable windows	cross-sectional	• In buildings with opening windows, occupants experienced more opportunities for control. • The degree of perceived control had a greater influence on heavy heads, headaches, and irritated eyes than the ventilation mode per se.	• Applicability in a healthy lease depends on the type of building. In a new building this can be considered in the design phase. In an existing building it is not always possible to create operable windows. • It could be considered by a building owner when investing/transforming an office building
Boerstra et al. (2015)	Personal desk fan, self-controlled or other	controlled lab study	• In the self-control condition, which was preferred by the subjects, perceived control of temperature, air movement, ventilation, light and noise was higher. No differences in thermal comfort and intensity of	• Personal control of one item (in this case ventilation) can contribute positively to perceived control of other items • Office workers will be more satisfied with their workspace. This might result in higher overall tenant satisfaction

			nose/throat/eye irritation, headache or fatigue were observed.	
Shahzad et al. (2017)	Temperature control vs. comfort	controlled field study	• Personal control on temperature in the cellular offices resulted in 30% higher satisfaction level and 18% higher comfort level • Energy consumption on the other hand was higher in cellular offices	• Personal control is an important consideration in a healthy lease • A healthy lease take into account the potential higher energy consumption due to personal control.
Huizinga et al.(2006)	Thermal comfort vs. productivity	controlled field study	• Personal control on the indoor environment positively affects user satisfaction • Thermal and Ventilation control show also contribute positively to productivity	• Personal control on building features (air, light, noise, temperature) should be always considered in a healthy • Applicability should be considered from case to case and depends on the type of building and wishes and demands of the tenant

Table 2.6 Overview personal control papers (own illustration)

2.3 Theoretical framework user health in office buildings

Based on the outcome of the literature review on user health in office buildings, a theoretical overview is presented. It is a summarizing overview of all identified relations in literature between the four health features and health symptoms. It is presented on the following page.

	Health features			
Health symptoms	**Air**	**Lighting**	**Noise**	**Personal Control**
1. Dry Eyes	(1,15)	(2)		(2)
2. Dry Throat	(1,3)			
3. Stuffy/Runny Nose	(3)			
4. Headache	(1,11, 15)	(7)	(5)	(28)
5. Lethargy	(1)	(8,9)	(10)	
6. Itchy Eyes		(2)	(6)	
8. Breathing Difficulty	(1,12,14)			
9. Flu-like Symptoms	(12, 32)			
10. Dry Skin	(3)		(5,6)	
11. Irritated Skin			(21)	
12. Irritated Eyes	(11)	(1,7,9,16)		(28)
13. Wheezing	(12)			
14. Coughing	(12)			
15. Sneezing	(12)			
16. Trachycardia (rapid heard rate)			(17)	
17. Irregular Heart Beats			(17)	
18. Bradycardia (slow heart rate)			(17)	
19. Stress		(16)	(20,21,22)	
20. SBS symptoms overall	(12,14,18)		(6)	
21. Musculoskeletal symptoms		(2,16)		(2)
22. Perceived comfort / satisfaction	(4)	(8,9)	(20,21, 24)	(25, 26, 27, 29, 30, 31)
23. Absenteeism	(13, 32)		(19)	

	Author	Title
1	Bluyssen et al. (1996)	European Indoor Air Quality Audit Project in 56 Office Buildings
2	Joines et al. (2015)	Adjustable task lighting: Field study assesses the benefits in an office environment
3	Jaakkola et al. (1991)	Mechanical Ventilation in Office Buildings and the Sick Building Syndrome. An Experimental and Epidemiological Study
4	Roulet et al. (2006)	Perceived health and comfort in relation to energy use and building characteristics
5	Kristiansen (2010)	Is Noise Exposure in Non-Industrial Work Environments Associated with Increased Sickness Absence?
6	Niven et al. (2000)	Building sickness syndrome in healthy and unhealthy buildings: an epidemiological and environmental assessment with cluster analysis
7	Aries et al. (2013)	Daylight and health a review of the evidence and consequences for the built environment
8	Lamb and Kwok (2016)	A longitudinal investigation of work environment stressors on the performance and wellbeing of office workers
9	Veitch et al. (2008)	Lighting appraisal, well-being and performance in open-plan offices: A linked mechanisms approach
10	Jahncke et al. (2011)	Open-plan office noise : Cognitive performance and restoration
11	Brightman et al. (2008)	Evaluating building-related symptoms using the US EPA BASE study results
12	Fisk (2000)	Health and productivity gains from better indoor environments
13	Milton et al. (2000)	Risk of Sick Leave Associated with Outdoor Air Supply Rate, Humidification, and Occupant Complaints
14	Seppanen and Fisk (2001)	Association of Ventilation System Type with SBS symptoms in Office Workers
15	Bluyssen et al. (2016)	Self-reported health and comfort in modern office buildings: first results form the EU OFFICAIR study
16	Fostervold and Nersveen (2008)	Proportions of direct and indirect lighting
17	Kristiansen et al. (2008)	Noise frequency components and the prevalence of hypertension in workers
18	Seppanen et al. (1999)	Associations of ventilation rates and CO2 concentrations with health and other responses
19	Fried et al. (2002)	The joint effects of noise, job complexity, and gender on employee sickness absence: An exploratory study across 21 organizations
20	Schlittmeier & Liebl, A. (2015)	The effects of intelligible irrelevant background speech in offices – cognitive disturbance, annoyance, and solutions
21	Shafiee Motlagh et al., (2018)	Empirical study of room acoustic conditions and neurophysiologic strain in staff working in special open-plan bank offices
22	Seddigh et al., (2015)	The effect of noise absorption variation in open-plan offices: A field study with a cross-over design
23	Sundstrom et al., (1994)	Office noise, satisfaction and performance
24	Croon et al., (2005)	The effect of office concepts on worker health and performance: a systematic review of the literature
25	Wells (2000)	Office clutter or meaningful personal displays: The role of office personalization in employee and organizational well-being
26	Knight and haslam (2010)	Organizational identification and comfort as .... of workspace and employees' satisfaction and well-being
27	Bluyssen et al. (2011)	Comfort of workers in office buildings: The European HOPE project
28	Toftum (2010)	Central automatic control or distributed occupant control for better indoor environment quality in the future
29	Boerstra et al. (2015)	Comfort and performance impact of personal control over thermal environment in summer: Results from a laboratory study
30	Shahzad et al. (2017)	Energy and comfort in contemporary open plan and traditional personal offices
31	Huizinga et al. (2006)	Air quality and thermal comfort in office buildings: Results of a large indoor environmental quality survey
32	Bluyssen et al. (2020)	How can airborne transmission of COVID-19 indoors be minimised?

Figure 2.2 Theoretical framework on associations between building features and health symptoms (own. Illustration)

2.4 Conclusion

Air quality

- 15 of the 23 (65%) health symptoms are impacted by air quality
- The most occurring symptoms are:
    - headache
    - breathing difficulty
    - SBS symptoms (overall)

Lighting

- 8 of the 23 (35%) health symptoms are impacted by lighting
- The most occurring symptoms are:
    - irritated eyes
    - lethargy
    - musculoskeletal symptoms
    - impact on perceived comfort

Noise

- 12 of the 23 (52%) health symptoms are impacted by noise
- The most occurring symptoms are:
    - stress
    - impact on perceived comfort and satisfaction

Personal control

- 5 of the 23 (22%) health symptoms are impacted by personal control
- The most occurring symptom is:
    - impact on perceived comfort and satisfaction

An answer can be given on the three questions that were asked at the beginning of this part were:

1. What are the characteristics of user health in office buildings?
    - Larsson (1999): User health is a very broad term which is hard to describe unambiguously. describes four major conceptual models of health, of which the WHO model is the most comprehensive: *"State of complete physical, mental and social well-being and not merely the absence of disease or infirmity".*
    - Bluyssen (2014): The human body and mind respond to external stressors, that can be both physical and psychosocial. This can lead to immediate or later effects and responses
    - Colenberg et al. (2020) ; Bluyssen (2014): The focus of this research is on external stressors (building features) that can be steered by building owners. Based on the literature these are (1) air quality, (2) lighting, (3) noise and (4) personal control
    -
2. Which health features can be identified and what are their health effects?
    - Air, Light, Noise and Personal control. See figure 2.2 for related health effects
3. How can user health be structured in an applicable framework?
    - See figure 2.2. This is the theoretical overview based on the literature study

PART II - Green leases

2.5 Origins and definitions of commercial green leases

Green Leases are inevitably linked to sustainability in buildings. Therefore some background information on building sustainability in the context of this literature review is important. Sustainable buildings are often described as green buildings. In both literature and practice several definitions are used for green buildings. Although these definitions vary from one another, they are often related to green building certificates.

Green leases (What?)

A common definition of green buildings is that they are designed, constructed and operated in way to minimize the impact on the environment (WorldGBC, 2016). Energy, water, waste management but also health and well-being are characteristics of green buildings. Not every building owner is allowed to call their assets 'green buildings'. The Dutch government laid down regulations and guidelines for this. Building owners must follow these methods in order to achieve a green building status (Rijksoverheid, 2017).

In literature there are no general accepted definitions of green buildings in literature. However, a comparison of various definitions gives the following similarities (Robichaud and Anantatmula, 2010): (1) minimize environmental impact, (2) improve health and well-being of users, (3) produce returns for owners (developers) and users and (4) integrate these strategies throughout the building life cycle. Health and Well-being plays a major role in this.

Green building certificates, such as BREEAM-NL, assess and rate green buildings. Globally there are many certificates with different assessment criteria developed. All these green building certificates are used to assess the sustainability performance of building characteristics (Steenkamp, 2018). Two different types of certificates are described by Cole and Valdebenito (2013), (1) the assessment system consisting of a set of criteria to measure the sustainability performance and (2) the certification system with verification by a third party on performance rating of green buildings.

These criteria and ratings are sometimes laid down in special lease contracts, the green lease. Green leases were first introduced in Australia. The concept was originally initiated by tenants and later picked up and stimulated by the government (Power, 2004 ; Roussac, 2004). In the Dutch real estate market the introduction of green leases is something of the last ten years (Quispel and Heemskerk, 2011).

In literature green leases are described in various ways. A definition is required to understand the mechanisms and characteristics of these leases. The fact that there is not a standard definition of the term mainly has to do with the fact that the term is quite new in the real estate market (Bright et al., 2014). Despite this, several researchers have attempted to define green leases and the characteristics behind the concept.

Sayce et al (2009), argue that a green lease is an addition to standard legal contracts between landlord and tenants(s). Furthermore the green lease provides a mutual obligation for both parties to improve environmental performance of a building in a collaborative way. Woodford (2007), states that green leases not only benefit the environment. They can also create financial benefits for landlords and tenants.

Quispel and Heemskerk (2011), describe green leases as follows: "a green lease is a performance oriented lease agreement in which the lessor (landlord) and the tenant (lessee) make agreements about the sustainable use and sustainable exploitation of a building". Besides that the authors argue that a green lease agreement contains agreements with the objective of energy savings and environmental improvements. Mutual

responsibilities and incentives are characteristic for a green lease. Finally the agreements must be quantifiable, in that way verification of objective achievement can take place.

West and Smith (2013), state that a green lease is an arrangement between landlord and tenant that offers benefits in terms of effective collaboration on energy and environmental issues. Furthermore the authors argue that green leases are being referred to as best practice leases. This is because environmental performance and engagement conditions become the new norm for leasing.

Janda et al (2016), write the following: "green leasing refers to the environmental processes, engagement and practices adopted by landlords and tenants in relation to the building." In addition to that the authors state that these so-called 'green practices' change the formulation of traditional contracts and the relationship between landlord and tenant.

An often cited definition is defined by the 'Better Buildings Partnership' (BBP), a British building owners cooperation. The BBP has developed a Green Lease Toolkit, to enable building owners and tenants of commercial buildings to work together in order to reduce the environmental impact of their buildings. In the Green Lease Toolkit a green lease is defined as 'a standard form lease with additional clauses included which provide for the management and improvement of the Environmental Performance of a building by both owner and occupier(s). Such a document is legally binding and its provisions remain in place for the duration of the term' (Bugden et al.,2013).

Despite the above mentioned definitions of green leases and leasing, Janda et al (2016), state that there is no international standard definition of a green lease and what it should be or do. On the other hand, Quispel and Heemskerk (2011), argue that the definition as stated in their paper is internationally accepted.

There can be concluded that there is no generally used definition of green leases. On the other hand in all definitions described above recurring items are:

- Improvement of sustainability / environmental performance of a building
- Collaboration between landlord and tenant
- Shared costs and benefits (responsibilities and incentives)
- Applicable in various forms, as addendum to a lease or as separate document

2.6 Applicability of Green leases (why?)

Quispel and Bausch (2011), give two main reasons for choosing a green lease instead of a traditional contract. The first is the positive contribution to the environment. The second, are the financial advantages for both landlord and tenant. The built environment is a major contributor to global warming. 32% of all primary energy is consumed by buildings, causing 19% of energy related GHG-emissions worldwide (IPCC, 2014). Foreseen population growth, increasing levels of wealth and migration to cities, increased energy use and related emissions could double or even triple by 2050 (McKinsey, 2016). The main energy consumers in offices are climate installations and lighting, respectively 43% and 22% of total. Reducing those energy costs by means of a green lease, can be an important financial benefit for tenants and sustainability improvement for the building (Quispel and Bausch, 2011). This makes the building more valuable, which is in the interest of the building owner.

In addition to the environmental and financial benefits, Quispel and Bausch (2011) mention that tenants also can benefit from green leases in terms of: productivity increase, corporate branding and corporate risks and opportunities. Productivity increase of employees contributes positively to the organizations performance. A green lease can contribute to the corporate branding of an organization towards their

stakeholders (employees, clients, financiers) and the increasing importance of Corporate Social Responsibility (CSR). Furthermore a green lease can reduce reputation risk and provide opportunities as it comes to attracting clients, finance and governmental subsidies.

From the perspective of the landlord, a sustainable building has more quality than a conventional building and therefore, in a normal situation, a higher value than the latter. In general the operational costs of sustainable building are higher than their conventional counterpart. However, in the long run these costs can be earned back by the sustainable buildings. The value increase is caused by the following factors (Quispel and Bausch, 2011):

- A sustainable building has higher rent levels, due to higher willingness to pay by tenants
- There is less risk of vacancy in green buildings, due to larger demand
- It is likely that the demand for sustainable office buildings increases in the upcoming years
- Lower energy costs in the future (more future proof), results in a higher residual value
- Fiscal benefits such as government subsidies
- Lower maintenance costs, due to higher efficiency of installations

West and Smith (2013), give the following possible effects of green leases:

- improved environmental performance
- greater engagement between tenant(s) and landlord
- improved productivity and comfort of users
- support of corporate sustainability objectives
- alignment of financial incentives
- greater transparency

Overcome split incentive

An important reason to strive for green leases is to overcome the so-called split incentive. From literature some important drivers can be identified to strive for sustainable offices. Firstly, it is interesting from a cost perspective on the long-term. In general can be concluded that sustainable buildings have lower energy costs than non-sustainable buildings (Quispel and Bausch, 2011; Baas, 2013). Furthermore on the tenant side higher productivity can be achieved which can be regarded as a financial benefit (Eichholtz et al. 2009; Fisk and Rosenfeld, 1997). Secondly, sustainable building comply more often with (new) governmental rules and regulations (de Vries, 2013). Thirdly, there as increasing demand for sustainable building from the real estate market (Quispel and Bausch, 2011). Finally, sustainable building generally have lower vacancy rates and longer leases on average compared to non-sustainable buildings (Sayce et al., 2009).

Nevertheless are investments on sustainability often postponed by building owner because the actual benefits or return on investments are not clear. Furthermore the extra investments on the owner side result often in lower costs for the tenant but not necessarily for the building owners. This is a split incentive. A green lease tries to overcome this split incentive by creating agreements with shared responsibilities and targets. Furthermore costs and benefits will be shared between owner and tenant(s). Instead of split incentive a mutual incentive is advocated in green leases (Quispel and Bausch, 2011).

Breaking down the circle of blame

The vicious circle of blame was developed by Cadman (2000) and illustrates a situation in the real estate market where the various stakeholders talk about the implementation of sustainability, but nobody wants to take the initiative. They are finger pointing at each other without anything to happen. Figure 2.3 illustrates this.

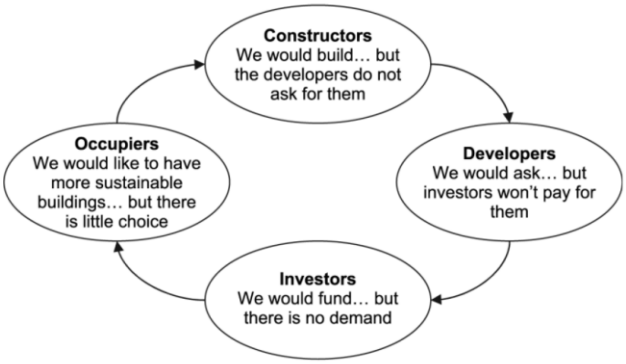

Figure 2.3 Vicious circle of blame (source: Kahsyup et al. 2008)

By agreeing on mutual incentives in green leases, e.g. shared environmental targets and shared costs and benefits this circle of blame can be broken down. Nevertheless this remains a challenge in practice. Investors want to know their (short-term) additional return on investment to minimize risk and tenants do not always want to pay extra rent in return for lower energy costs (Lorenz and Hartenberger, 2008). In addition to this investors often have a short-term planning and investment horizon, which makes it unattractive for them to invest in sustainability measures (Quispel and Heemskerk, 2011).

2.7 How are green leases structured

In this paragraph the structure of traditional leases will be compared with the structure of green leases. By doing this, the characteristic components of a green lease can be determined which is valuable input for the structure of a healthy lease.

The standard used lease contract in the Dutch office market is drawn up the 'Raad Onroerende Zaken' (ROZ). This lease describes standard provisions and regulations based on the Dutch Civil Code (ROZ, 2015). Literature shows that these traditional leases form an obstacle in the implementation of sustainability in office buildings (Hinnells et al., 2008). According to Quispel and Heemskerk (2011) the relationship between owner and tenant(s) is traditionally characterized by limited communication and little or no incentives to invest in the building during the lease term. As explained in the previous paragraphs the split incentive problem is a characteristic of traditional leases which is tried to be diminished in green leases.

In terms of design, various methods can be considered when drafting a green lease. This is partly dependent on the nature of the agreements. Less strict agreements can be captured in a letter of intent between landlord and tenant. More binding agreements can be drafted in an allonge, or a new lease agreements between both parties (Quispel & Heemskerk, 2011).

Janda et al (2016), state that green leases are based on green clauses. These clauses have the objective to account for energy efficiency and other sustainability goals. Furthermore, the authors argue that traditional contracts generally ignore environmental considerations and can be seen as a barrier for energy upgrades. Green leases can be a solution for this problem. Besides that green leasing can be an evolving form of inter-organizational environmental governance (Janda et al., 2016). In addition to that the authors also state that traditional leases often are characterized by distant and distrustful relationships between the stakeholders. Green leases could contribute to a better collaboration between landlords and tenants.

According to Quispel and Bausch (2011), the ultimate form of a green lease consist of at least the following parts:

- It is a performance contract with (predefined) agreements on sustainable use and exploitation of a building.
- Agreements with mutual responsibility, aimed at achieving energy-saving and environmental technical objectives.
- Agreements on proportionally distributing costs, benefits and risks for ensuring sustainable use and sustainable exploitation.
- There must be a mutual incentive. Both the landlord and tenant are held responsible for the efficient use of materials and resources, resulting in lower costs for both parties.

Below a schematic overview is presented of traditional leases and green leases. The most important difference between a traditional lease and a green lease is the mutual goal to improve the sustainable performance of a building. This is done by applying mutual incentives, e.g. shared costs and benefits, in a green lease.

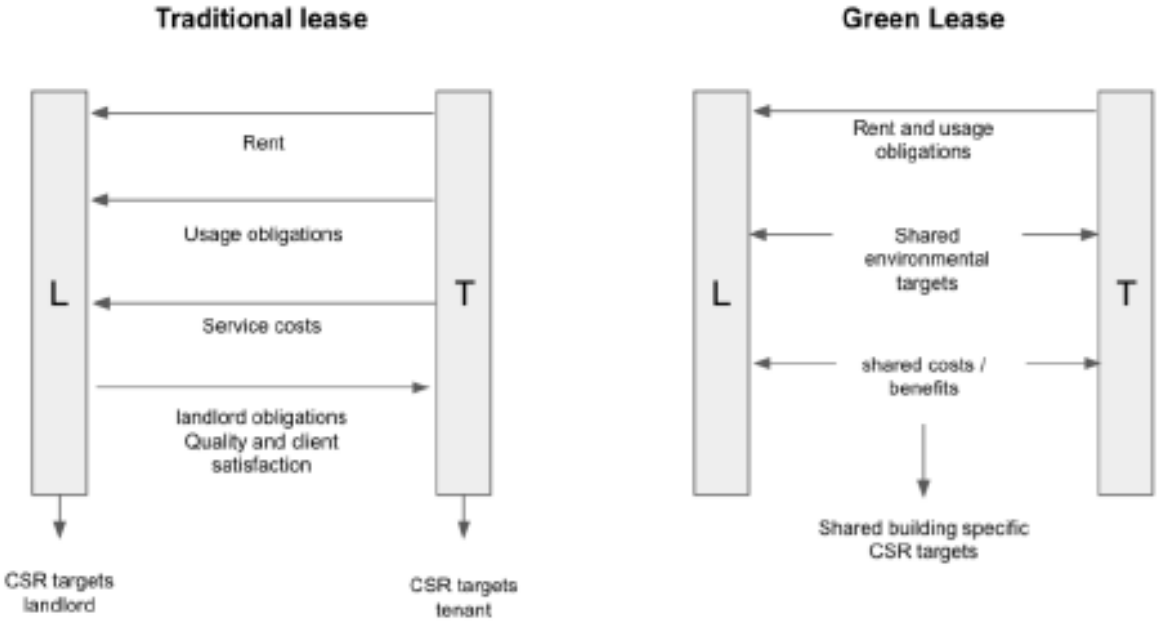

Figure 2.4 Schematic overview of Green lease vs. Traditional lease (own figure, adapted from Quispel & Bausch,
2011).

Important starting points of a green lease are the amount of tenants in a building, e.g. single- or multi-tenant office buildings and newly constructed buildings versus existing buildings (Quispel and Heemskerk, 2011). In a multi-tenant building multiple interests should be taken into account. Ideally all tenants have the same green lease in order to coordinate the overall exploitation of the building optimally. The basis of the green leases can be the same but specific agreements can be laid down from tenant to tenant depending on the wishes and demands of their organization. Also the difference between new and existing buildings plays an important role in drafting green leases. In an existing building improvements are made within an already existing context of (technical) characteristics of the building. In an newly developed building there is the possibility to include the wishes of both stakeholders in an early (design) stage.

In literature several components of a green lease are described. The table below gives an overview of these components that are described in two different studies. The different components are clustered in main themes in the last column.

Components (Quispel and Bausch, 2011)	Components (Bugden et al., 2013)	Main Theme
• **Landlord-tenant meetings** - Regular meetings between landlord and tenant to discuss the responsibilities on usage and performance of the building from a sustainability perspective	• **Co-operation obligation** - Setting out the shared aim of landlord and tenant to improve sustainability in the building. Agreement to cooperate with each other to accomplish this • **Building Management Group** - A platform/forum to discuss sustainable related issues and strategies on a regular basis with each other	**Communication**
• **Certification and reduction measures** - Agreement with regard to a (minimum) achievable certificate in the building	• **Energy performance certificate (EPCs) and Certificate** - Agreement with regard to the obligation to have a (minimum) achievable certificate in the building	**Labels and Certificates**
• **Building usage** - Adding a usage manual on the correct use of the building from a sustainability perspective	• **Landlord's rights to do works (or not)** - Agreements to extend or restrict rights to carry out works that potentially have impact on the sustainable performance of the building • **Tenant's rights to do works (or not)** - Agreements to extend or restrict rights to carry out works that potentially have impact on the sustainable performance of the building • **Reinstatement obligation tenant** - Agreement on reinstatement obligation of the leased space (fit-out) by the tenant. Some items may contribute to the sustainable performance of the building, others may not	**Workplace**
• **Energy usage and monitoring** - The energy usage of the building is measured by placing meters and sensors. Agreements on the energy usage are laid down • **Reporting** - Agreement to report the results of the monitoring of energy usage on a regular basis	• **Data sharing and metering** - Sharing and monitoring data with respect to the sustainable performance of the building. This is done a regular basis. • **Threshold guarantees –** Applying Threshold guarantees (by landlord) to ensure the performance and safety of the indoor environment.	**Data sharing and Monitoring**
• **Comply with rules and regulations** - Agreement to comply with (new) rules and regulations with respect to sustainability. In the standard ROZ agreement this is standard included	-	**Rules and Regulations**

• **(Dispute) settlement** - Agreement on potential penalties or consequences when certain agreements are not met. The other way around benefits must be divided between landlord and tenant	• **Dispute Resolution** - Agreement which describes to which extent remedies/consequences are applied when parties are in breach	**(Dispute) settlements**

Figure 2.5 Overview and clustering of components green leases (own illustration)

Based on the above, this research focuses on the components described by the BBP (2013), as they are more elaborated. The component on rules and regulations is considered as a standard in all leases and therefore not identified as specific characteristic for a green lease by the BBP (2013). The components are clustered in main themes. In the following paragraph the conclusions on green leases are described.

2.8 Conclusion green leases

Based on the above the three questions drafted in the beginning of this part can be answered.

1. What are the origins and definitions of green leases?

    - Green leases were first introduced in Australia. The concept was originally initiated by tenants and later picked up and stimulated by the government (Power, 2004 ; Roussac, 2004). In the Dutch real estate market the introduction of green leases is something of the last ten years (Quispel and Heemskerk, 2011).
    - A green lease is a performance oriented lease agreement in which the building owner and the tenant make agreements about the sustainable use and sustainable exploitation of a building (Quispel and Heemskerk, 2011)

2. Why are green leases applied in commercial real estate?

    - Two major reasons for applying green lease are: (1) the positive contribution to the environment and (2) the financial advantages for both landlord and tenant (Quispel and Bausch, 2011 ; West and Smith, 2013)
    - More engagement between landlords and tenants and more transparency (West and Smith, 2013)
    - Overcome the split-incentive between landlord and tenant (Quispel and Bausch, 2011)
    - Breaking down the circle of blame (Lorenz and Hartenberger, 2008 ; Quispel and Heemskerk, 2011)

3. How are green leases structured in commercial real estate (mechanisms)?

    - See figure 2.3.1
    - The identified main themes in green leases are (see figure 2.3.2)
        - Communication
        - Labels and certificates
        - Workplace
        - Data sharing and monitoring
        - Rules and regulations
        - (Dispute) settlements

From the main themes, Rules and Regulations will not be further discussed in this research as it is considered as a standard characteristic for all leases. The other five main themes and accompanying nine sub-themes will be used as the guidelines and basis of a healthy lease and will be further explored in the empirical research.

2.9 Conclusions and synthesis with empirical research

The main findings of the theoretical framework are summarized below:

User health

- The four external stressors (building features) used in this research are (Bluyssen, 2014 ; Colenberg et al., 2020):
    - Air quality (Ventilation)
    - Light
    - Noise
    - Personal control

- Air quality has the most impact on health symptoms. Most occurring symptoms are:
    - headache
    - breathing difficulty
    - SBS symptoms (overall)

- Light has the second most impact on health symptoms. Most occuring symptoms are:
    - irritated eyes
    - lethargy
    - musculoskeletal symptoms
    - impact on perceived comfort

- Noise impacts mostly on:
    - stress
    - perceived comfort and satisfaction

- Personal Control impacts mostly on:
    - perceived comfort and satisfaction

Green leases

- A green lease is a performance oriented lease agreement in which the landlord (lessor) and the tenant (lessee) make agreements about the sustainable use and sustainable exploitation of a building (Quispel and Heemskerk, 2011)

Main reasons for applying for green leases are:

- Two major reasons: (1) the positive contribution to the environment and (2) the financial advantages for both landlord and tenant (Quispel and Bausch, 2011 ; West and Smith, 2013)
- More engagement between landlords and tenants and more transparency (West and Smith, 2013)
- Overcome the split-incentive between landlord and tenant (Quispel and Bausch, 2011)
- Breaking down the circle of blame (Lorenz and Hartenberger, 2008 ; Quispel and Heemskerk, 2011)

Identified characteristic green lease themes from literature are (Bugden et al., 2013):

1. **Cooperation obligation** - *Setting out the shared aim of landlord and tenant to improve sustainability in the building. Agreement to cooperate with each other to accomplish this.*

2. **Building Management Group** - *A platform/forum to discuss sustainable related issues and strategies on a regular basis with each other.*

3. **Data Sharing** - *Sharing and monitoring data with respect to the sustainable performance of the building. This is done a regular basis.*

4. **Threshold guarantees** – *Applying Threshold guarantees (by landlord) to ensure the performance and safety of the indoor environment.*

5. **Landlord's right to do works** - *Agreements to extend or restrict rights to carry out works that potentially have impact on the sustainable performance of the building*

6. **Tenant's right to do works** - *Agreements to extend or restrict rights to carry out works that potentially have impact on the sustainable performance of the building*

7. **Reinstatement obligation tenant -** *Agreement on reinstatement obligation of the leased space (fit-out) by the tenant at the end of a lease term*

8. **Label and Certificate obligation -** *Agreement with regard to the obligation to have a (minimum) achievable certificate in the building*

9. **Dispute Settlement** - *Agreement which describes to which extent remedies/consequences are applied when parties are in breach*

The nine components (sub-themes) above are clustered in five main themes:

- Communication : sub-themes 1 and 2
- Data sharing & Monitoring : sub-themes 3 and 4
- Workspace : sub-themes 5,6 and 7
- Labels and Certificates : sub-theme 8
- Dispute Settlement : sub-theme 9

The main themes and accompanying sub-themes are used as a basis / starting point for a healthy lease. In the empirical research the different stakeholder interests and potentials of these themes are explored. The outcome of part I (user health) is mostly integrated in main theme 3, Data Sharing and Monitoring. Air quality, lighting and noise can be measured by placing sensors. Personal control of this features allows office users to control them to a certain extent.

The empirical research is following the Delphi method to explore the different themes of a healthy lease. This method is further explained in the next chapter. Based on the outcome of the stakeholder interviews in the empirical research, conclusions will be presented on the potentials of healthy leases in office buildings in the Netherlands.

Chapter 3. Empirical Research

The applicability of the theoretical framework is tested through empirical research. A twofold case study is done to gather empirical evidence from office buildings and relevant stakeholders. This chapter starts with the case study method, followed by a description of the case studies and case study reports. The chapter concludes with a case comparison describing the major findings.

3.1 Delphi Method

The data collection in this chapter is based on the Delphi method. Delphi has its origins in the 1950s and was first used by the US army within a military project. Nowadays it is widely applied in all kinds of research fields (Skulmolski et al. 2007).

In the 1970s Linstone and Turoff (1975) wrote a book solely dedicated to the Delphi method. They describe the Delphi method as a method to structure group communication processes around complex problems. Structured communication is achieved by providing feedback to the participants in different rounds throughout the process.

Skulmoski et al. (2007) describe the method as an iterative process, consisting of multiple questionnaires, to collect opinions from experts on a certain problem. The questions of each following round are based on the results and feedback of the previous round. This process stops when the main research question is answered or when consensus is achieved among the participants. A generalized overview of a three-round Delphi method is presented below. This overview is applied by Skulmoski et al. (2007) and based on previous studies like the one from Linstone and Turoff (1975).

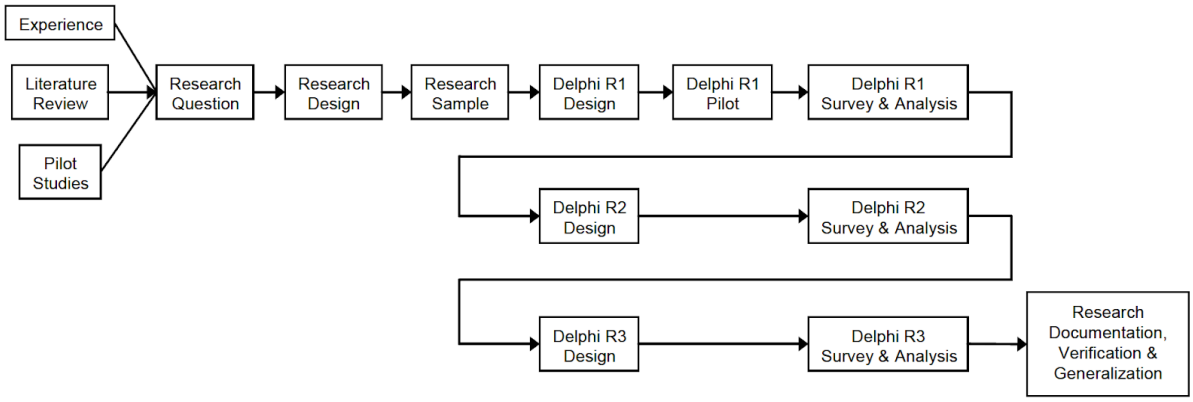

Figure 3.1 Schematic overview three-round Delphi method. Source: Skulmolski et al. (2007)

Based on a literature review, a research question, design and sample are defined. Based on this the design for round 1 (R1) is developed and tested before conducting the R1 survey. The outcome of the R1 survey forms input for the R2 design and so on. The process concludes with research documentation, verification and generalization.

An overview of the Delphi method applied in this thesis is presented below. This overview is based on the schematic overview by Skulmolski et al (2007).

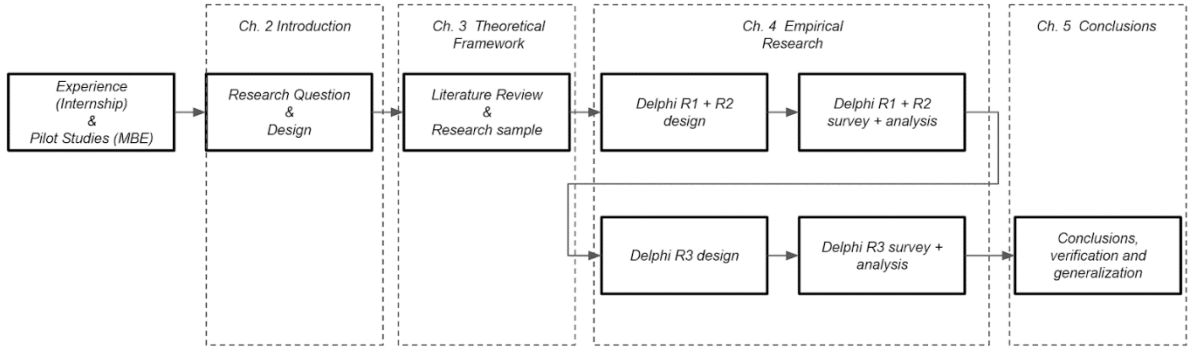

Figure 4.1.1: Schematic overview Delphi Method in this research. Source: adapted from Skulmolski et al. (2007)

The first round consists of open questions based on the identified healthy lease themes in chapter 3. In round 2 the interviewee is asked to rate all themes on a Likert scale from 'not important at all' to 'highly important'. The last round is a validation round and will be organized as a group discussion of the interviewees and potential other experts such as a lawyer. This validation round will be organized some weeks after the first and second round. In a group discussion the outcome of the first and second round will be discussed. This is done by combining all answers of round one and two and share this with the interviewees prior to round three. The group discussion will be attended by a real estate lawyer and a property manager as external experts, aside from the landlords and tenants. The external experts can share their opinion and vision towards a healthy lease. It is expected that this will positively feed the debate on the previous rounds in this validation round.

This chapter explores the applicability of the healthy lease model in practice by defining the interests of the several stakeholders. This is done through case studies in two buildings. Yin (2014), defines a case study research as a method to describe the presence of a phenomenon within its real life context. In this case the phenomenon of a healthy lease model within the real life context of its stakeholders in two office buildings in the Netherlands. The main question is, what are the different interests and potentials of the different stakeholders in a healthy lease. Stakeholders in two office buildings, a multi-tenant and a single tenant building, are interviewed. This is done by:

- Short Analysis of each project (building characteristics, stakeholders)
- Explore potentials and interests of the different stakeholders in the Healthy Lease Model Articles identified in the Theoretical Framework
- Discuss and evaluate the different interests and potentials in an ex post group discussion (validation round)

Overview of the case studies

The case studies selected for the interviews are a multi-tenant office building in Hoofddorp, named Pharos and a single-tenant office building in Utrecht. Both buildings are existing buildings which will be or are recently modernized from the inside. In Pharos the new interior should facilitate and stimulate a healthy community and workplace for its tenants. This concept makes this building and the involved stakeholders an interesting case study with respect to their interests in a healthy lease. The single-tenant Utrecht building is occupied by one government related tenant. The interior of the building will be modernized in 2021 as part of a new long-term lease extension with the tenant. The tenant is active in the healthcare sector and also wants to facilitate a healthy workplace for their employees. The case studies are chosen due to their difference in single and multi-tenant configuration, different lease length (average length of 5-7 years in Pharos and long-term lease of 15 years plus in Utrecht) and a difference between tenant background (more

corporate oriented in Pharos versus governmental in Utrecht). In each case study separate interviews are conducted with the relevant stakeholders.

For each building the interviews are conducted separately with a tenant and landlord (investor). The goal of the interviews is on the one hand exploring the potential expectations of the stakeholders regarding a Healthy Lease Model, based on the model articles presented. On the other hand the interviews are used to evaluate the different interests of the stakeholders which can be used as insights for a healthy lease.

At the beginning of the interviews the interviewees are provided with a (digital) introduction document. This document helps structuring the interview, gives some background information on the topic and stimulates interviewees to answer the questions. As most interviews are conducted digitally and the time is limited, it gives a good feeling of the remaining length of the interview. All interviews will be recorded which makes it possible to trace back and listen to the interviews at a later stage when processing the information. Each interviewee will be asked for approval upfront to use the information of the interviews for this research. As the interviews are conducted with individuals and the focus is on the organization behind this individual, interviewees will be asked to substantiate their answers with reference to organization policies and documents where possible.

Case study report

Two case study reports will be written, for each case study one. The case study reports give a short description of the buildings and analyse the outcome of the interviews. Each case study report concludes with a summarizing table of the major findings in relation to the theoretical framework.

3.2 Case study I - Pharos building

The first case study is the Pharos building in Hoofddorp. It is a multi-tenant office building which is fully renovated in 2019 and 2020. Interviews are held with the building owner and three tenants.

3.2.1 Project Analysis

figure 4.2.1: The Pharos Building in Hoofddorp. Source: own database

Building information

Location	: Hoofddorp
Address	: -
LFA	: 25.000 sqm
Construction year	: Fully renovated in 2019 and 2020. Construction year is 2004
Single / Multi tenant	: Multi-tenant office building
Sustainability label(s)	: EPC label A, BREEAM excellent
Average lease lengths	: 3 – 5 years
Investor (landlord)	: Confidential
Tenant(s)	: Confidential

Project description

The Pharos building is a multi-tenant office building located next to the train station in Hoofddorp. The building consists of a high-rise part of 19 floors and a low-rise part of 6 floors. It is well-known in the business district of Hoofddorp as it is one of the highest buildings in the neighborhood. It can be seen from the A4 highway between Amsterdam and The Hague. The building originally was designed and developed by Kohn Pedersen Fox commissioned by NS Vastgoed. The new owner fully redeveloped the building from both the inside and partly the outside. The aim was to create a healthy working environment for their tenants where shared facilities and community feeling play a major role.

Stakeholders

Each of the interviewed stakeholders are shortly described. This is done anonymously but it will give an idea of the different types of stakeholders.

Landlord 1

The landlord in Pharos is an Amsterdam based investor and developer. The investor is only active in the Dutch real estate market but across different asset types (offices, retail, logistics, etcetera). Investing in value-add opportunities is one of their core strategies. Buying properties, which are outdated or have vacancy. Redevelop these properties and fill up the vacancy to then resell them to another investor. Generally with a holding period of three to five years.

Tenant 1

Tenant 1 is active in the Dutch real estate sector. It is a growing organization and they advocate the health and wellbeing focus of the last years. Within their organization facilitating health and wellbeing for their employees becomes more and more important. The concept of Pharos fits well with this strategy. This and the excellent location and accessibility of Pharos are the main reasons for relocating to the building in 2019. This type of tenant can be characterized as an early adopter of health and wellbeing.

Tenant 2

Tenant 2 is active in the oil and gas industry in Western Europe. Their industry is currently in a transition phase and sustainability is an important aspect in the sector and thus in their organization. They choose to relocate to Pharos because the concept of Pharos suits their future workplace strategies. The organization admits that they are still quite traditionally orientated. The focus on health and wellbeing is therefore new for them and something they are currently exploring. This tenant can be characterized as a more conservative tenant towards health and wellbeing.

Tenant 3

Tenant 3 is active in the tech industry. They choose to relocate to Pharos because the concept of Pharos suits their future workplace strategies. The organization has grown considerably during the last years and it is expected that this growth will continue in the coming years.

3.3 Case study II - Utrecht building

The second case study is located in Utrecht. It is a single tenant office building which will be fully renovated from the inside (interior and technical installations) in the course of 2021 as part of a new long-term lease extension between landlord and tenant. Interviews are held with the building owner and the tenant.

3.3.1. Project Analysis

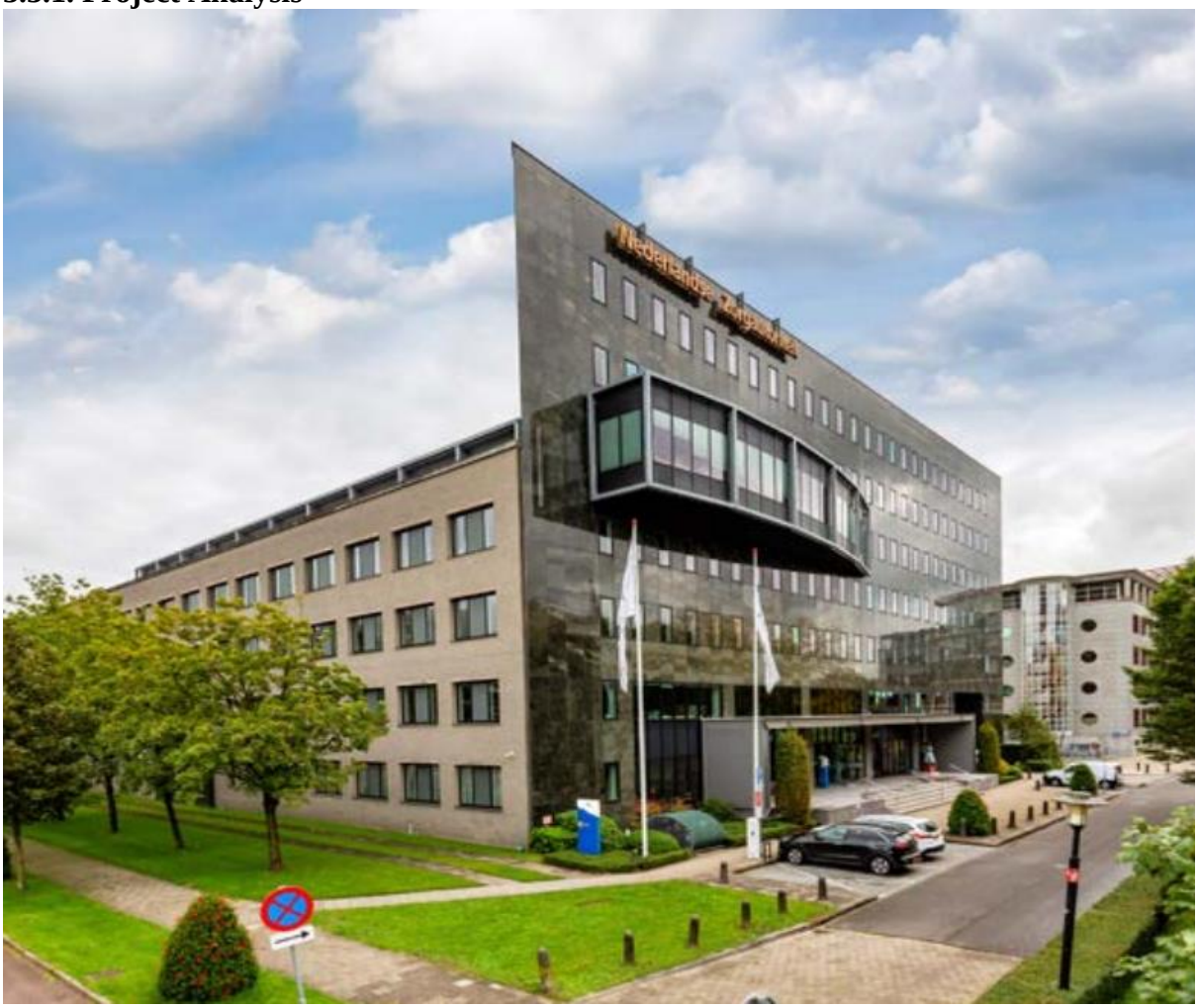

figure 4.3.1 - Single tenant Utrecht building. (Source: own database)

Building information

Location	: Utrecht
Address	: -
LFA	: 6.449 sqm
Construction year	: Interior + installations fully renovated in 2021. Construction year is 1992
Single / Multi tenant	: Single tenant office building
Sustainability label(s)	: BREEAM ‘very good’ and EPC label A
Lease length	: > 15 years
Investor (landlord)	: Confidential
Tenant(s)	: Confidential

Project description
The building is located on the east side of the city in the area called Rijnsweerd. It is a single tenant office building located near the ring road of Utrecht and direct connections to Utrecht CS. The building consists of two parts with 4 or 6 floor levels. The current building owner reached an agreement with the tenant for an exceptionally long lease term of 17 years. Part of this lease extension is a full renovation of the interior and technical installations. The renovation works will be carried out in the course of 2021.

Stakeholders
Each of the interviewed stakeholders are shortly described. This is done anonymously but it will give an idea of the background of the stakeholders.

Landlord 2
The landlord is a Swiss based real estate investor, with investment all across Europe. For the commercial management of the building a Dutch asset manager is assigned. The Swiss investor is not an institutional investor and has an average holding period of their assets of approximately 3-5 years.

Tenant 4
The tenant is a large governmental organization active in the healthcare sector. As of 2007 they are a tenant in the building and will extend their lease with an additional 17 years as of 2021. Such a long lease term is quite extraordinary. It gives the tenant the opportunity to fully adjust the interior to their organization's requirements.

Chapter 4. Results and Discussion

4.1 Interviews Case study I - round 1

In case study I four interviews were conducted. One with the building owner (landlord) and three interviews with current tenants in the building. The outcome of these interviews will be described in the next paragraphs. This will be done based on the main themes and accompanied sub-themes of a health lease that were identified in the previous chapter. Afterwards a table will be presented with an overview of the main findings and conclusions.

Theme 1 - Communication

- Cooperation obligation
- Building Management Group

Communication Advantages

Communication is perceived as an important theme within a healthy lease. Especially in a multi-tenant building like Pharos with the aim to have a healthy workplace community. It enables the landlord to proactively steer on complaints and wishes from the tenants. Furthermore it increases the long-term quality of the building for both tenants and potential buyers (investors market) from a branding perspective.

"Good and regular communication positively contributes to the healthy workplace community and indirectly also to the branding of the building towards tenants and investors. In addition to that potential problems, complaints and wishes from tenants can be identified and resolved in an early stage. In general, tenants are happier when they are heard. In addition to this, it fits within the philosophy of our organization to create high quality buildings in all aspects throughout their portfolio. Not only visually outstanding but also from an operational point of view best in class. Creating healthy workplaces play a major role in this and will become more and more important in the future. Proper and regular communication is essential to achieve this" – Landlord 1

Furthermore communication is closely related to data sharing and monitoring. The data provides the essential input during these communication moments. Especially during the current Covid pandemic, regular communication and information on the level of safety of the building is perceived as highly important. As stated by the tenant:

"We as management of the organization want to reassure our employees that the office environment is safe and remains safe in the future. Especially air quality is a hot topic during the pandemic and the employees need the comfort that the ventilation is on an adequate level. Good communication with the landlord, with ideally hard data as proof is key to get this done. Installing extra sensors in the building could contribute to this." – tenant 1

Furthermore early stage communication in a healthy lease is desirable, as this enhances tenant's trust in the building and landlord as well as it enables both parties to make tailor made agreements within a healthy lease that fits best to tenant's needs and wishes.

"Due to the fact that we had good contact with the landlord already during the negotiations and before drafting and signing the lease, the landlord knew our organization's needs and wishes and we were able to agree upon some tailor made agreements in our current lease. For example the lighting in our leased space is programmed to go on very early as some of their employees start working early in the morning. The amount of lux early in the morning is designed to give a feeling that is the middle of the day, which increases

the energy of the employees. In a healthy lease these kind of tailor made solutions are highly valuable and desired" – tenant 1

In addition to this communication moments should occur more frequently in a healthy lease. A building management group (BMG) could be a good platform to do so. During the BMG the health performance of the building must be discussed. This not only concerns the commons areas, but also the leased space of the tenants. Especially during the current Covid pandemic, regular communication on the health and safety level of the building is desirable. Combining organization initiatives (HR + facility management tenant) with building initiatives (landlord) will contribute to implementation of health and well-being strategies in the building.

"At this moment there is communication on a regular basis, but it not always concerns sustainability. In a healthy lease there should more often be communication between us as a tenant and the landlord. At this moment health related topics are focused on the common areas in the building and not our leased space. For example health impacting features like air quality and temperature with respect to Covid in our leased space. In a healthy lease this should be discussed on a regular basis, this can be done in a building management group (BMG. At this moment the Pharos community can be regarded as a potential BMG. However this is more focused on the operational things within the building and not so much on developing health improvement strategies for Pharos. Such a BMG on health performance would be attended by our HR (Human Resources) manager, facility manager but also our HSE (Health, Safety and Environment) manager" – tenant 2

Finally, communication and cooperation between landlord and tenant is perceived as too open-ended. This should be more strict in a healthy lease and take place during the whole lease term. A program of requirements (PoR) can be used as a handhold during meetings (BMG) on the health performance of a building. Data on the health performance of the building can be generated by sensors. Both the PoR and the data form the input for the BMG's.

"A cooperation obligation on sustainability is often part of a lease contract but hardly is applied, aside from the regular tenant meetings. In a healthy lease this should be strictly applied. A program of requirements (PoR) can be used as guideline for meetings on the health performance of the building. At this moment there is a PoR applicable in Pharos which is checked in the beginning of a lease, but not during the lease term. In a healthy lease continuous feedback and communication during the lease term is essential. The health performance of the building should be measured by placing sensors and collecting data. Together with the PoR this data can also function as input for the BMG's" – tenant 3

Potential downside(s) of communication

There are also potential downsides to increased communication. Operational costs for the landlord can increase as problems are identified during BMG's. These investments do not always have an immediate return as they are for the longer term. This potentially discourages potential buyers. It illustrates that some landlords tend to focus on short-term (monetary) benefits instead of more sustainable long-term solutions.

"A potential downside of regular communication is that you might end up having higher general operational costs by implementing newly proposed things for the building which do not have an immediate return on investment". The question a building owner asks to himself is: "does this investment increase the overall value of the building?" Of course the tenants might be happy with the implementation but it will not always result in immediate higher rents, take up of existing vacancy or increased building value. Another concern of the landlord is that cooperation obligations and building management groups might discourage some potential new buyers. They might think the meeting obligations are too time consuming and difficult, as they are looking for a simple plain lease"

The viewing point of the landlord is one of the reasons why the circle of blame is kept in place. As long as the landlord is not willing to let go of short-term (monetary) benefits, it is hard to break down this circle. Investments in a healthy lease will not all have immediate (monetary) returns. A landlord should acknowledge this in a healthy lease.

Theme 2 - Data Sharing and Monitoring

- Data sharing and reporting
- Threshold guarantees

Proactive problem steering and increased trust

Data sharing makes it possible to proactively steer on problems relating to health and well-being of the building and subsequently might result in less complaints from tenants.

"One of the most important benefits of data sharing is the simple fact that: measuring is knowing. This makes it able to proactively steer on potential problems and malfunctions which are related to the health performance of the building and the leased space of tenants. In addition to that it probably will result in less complaints from the tenants. A good example was that one of the tenants in Pharos reached out us as their employees had lots of complaints about the indoor climate. After placing sensors throughout the leased space, these complaints were resolved as the data of the sensors can prove that the indoor conditions are on a proper level. In a healthy lease placing sensors should become the standard for all tenants." – landlord 1

In addition to this data sharing and thresholds increase trust on the health performance of the building and ensures the safety of the workplace. Especially in the light of the Covid pandemic. Furthermore the ongoing communication process between landlord and tenants is facilitated.

"Certain soft values as air quality and light quality become tangible this gives us comfort and control over our workspace, especially now with the Covid pandemic. Sharing data on these values can be used as valuable input for communication between landlord and tenant." – tenant 1

"Applying thresholds are highly important in our opinion. Especially during these times of Covid. But also in the future. It is the responsibility for us, the management, to create a safe work environment for our employees. In a healthy lease such thresholds are very desirable to incorporate to ensure safety of the workplace. Nevertheless personal preferences remain a challenge to such thresholds in a healthy lease." – tenant 2

"Data sharing makes it possible to proactively steer on problems with respect to the indoor environment. Moreover due to Covid the focus on a safe workplace will increase enormously. Data sharing and applying thresholds make this visible and provide assurance for us as tenants. If a landlord has the confidence to guarantee certain thresholds in a building, you have the holy grail for a healthy lease." – tenant 3

Incorporation of sensors and thresholds in PoR

In addition to the above it was found that sensors should be applied throughout the whole building, for all tenants by incorporate this in the PoR.

"At this moment there aren't sensors installed for every tenant in the building. However the landlord explained that a detailed program of requirements (PoR) was drafted when redeveloping the building (interior). This program of requirements describes the performance of the technical installations and often

also the applicable thresholds of certain building features like ventilation rates, temperature and noise levels. Each tenant must use this program of requirements when installing or adjusting their fit-out. Adding sensors to this (PoR) makes it possible to constantly steer and communicate on these levels. Improvement of the indoor environment will become easier. The combination of a PoR and placing sensors is therefore desirable in a healthy lease." – landlord 1

"Data sharing and monitoring is an essential item in a healthy lease and undisputed in the near future in our opinion. It makes it possible to verify and steer on items that are laid down in the PoR or healthy lease. Placing sensors should therefore be included in the PoR. In a multi-tenant building like Pharos, this is challenging (more than in a single-tenant building)." – tenant 3

In addition to that there should be a settlement routine or agreement if thresholds are not met in the building. There must be identified who is responsible for not meeting the targets and this settlement procedure must be laid down in the PoR or healthy lease.

"If the threshold targets are not met, a penalty or discount on the rent should be applicable. There should be identified who is to blame for not meeting certain thresholds? This can be twofold, either the landlord or the tenant. The next question is, how do you put this in writing in a healthy lease? For example, a rent discount can be applied if it turns out that the landlord is responsible for not meeting the threshold targets." – tenant 1

Downsides: Potential effect on marketability and privacy issues

Applying thresholds might discourage potential buyers and potentially has effect on the marketability of the building. However this might differ amongst different type of investors. Certain investment strategies like holding period of the assets can play a role in this. A value add investor generally has a shorter holding period of their assets compared to institutional investors. This his could be an excellent topic for further research.

"You put a lot of pressure to perform to those levels and moreover a potential new investor (buyer) has to take over these responsibilities. This might deter them in buying the building and has therefore potential effect on the marketability of the asset. We can be classified as a so-called value add investor. We buy real estate, add value by redeveloping it or fill up vacancy and sell it within a holding period of two to five years. This is differs from institutional investors who generally invest in standing assets, with little or no vacancy and for a longer holding period. It could be that these type investors have a different idea on taking over leases with responsibilities as data sharing in it. They might prefer it as they have the assets for a longer holding period than value add investors." – landlord 1

Furthermore privacy of employees plays an important role in applying data sharing and monitoring. Not every person will appreciate the sharing of data. Clear agreements should be made with respect to the type of data that will be shared. Organizations should specifically be asked if they approve this. This can be done in an article in the healthy lease. By signing the lease contract, the organization agrees to this. The organization is responsible to discuss this upfront with their employees before signing the healthy lease.

"We think there should be a clear mutual understanding on the use of this data in relation with privacy. Privacy is an important item in our organization and for our employees. Also in our current activities and programmes we sometimes have employees who do not want to share personal information with respect to their privacy." – tenant 2

Theme 3 - Workplace

- Landlord's right to do works
- Tenant's right to make alterations to the leased space
- Tenant's reinstatement obligation

PoR as guideline for doing works

A PoR can be included in healthy lease as guideline for doing works in the building and the leased space. It structures the process and improves communication. During BMG's potential works can be discussed and assessed based on the PoR and approval can be given by both parties this should be done on reasonable grounds and in consultation with both parties. Furthermore the degree of strictness of a PoR can differ in a healthy lease but must be equal for all tenants in a multi-tenant building.

"We have drafted a program of requirements (PoR) with rules and guidelines for doing alterations in the leased space by a tenant. We do a final delivery, but afterwards it will be out of our responsibility. A tenant is more or less free to do what he wants, within the boundaries of this PoR. Often approval must be given by us, this enables us to monitor the works and somehow stay in control. The tenants must ask approval for adjusting interior features like: floors, ceiling, partitioning walls and sanitary spaces. This PoR can also be applied in a healthy lease. It can be used as a guideline for both the tenant and landlord and used during BMG's. Approval on conducting certain works should be given on reasonable grounds. For example if a tenant wants to put in a type of ceiling which is less expensive but also less sound absorbing, this should be open for discussion. It will not be restricted as long as it has no influence on other tenants and the consequences are on the account of the tenant. In a healthy lease this could be applied in different degrees must be the same for all tenants in a multi-tenant building like Pharos." – landlord 1

In Pharos there currently is a PoR. It can be seen as a demarcation list at the beginning of the lease with certain conditions laid down in advance. In addition to that the landlord must be notified or asked for approval before we carry out these alterations. We do not think the program of requirement is a bad thing. We see it more as a guideline. For the installation and design of our fit-out a specialized consultant was assigned, the approval of the landlord was seen as a double check and verification that the works were in line with the agreements. In a healthy lease such a PoR should contain agreements on health performance related works in the building." – tenant 1

"The current PoR in Pharos is considered as an extra guideline to comply with sustainability in the building. This can be the same in a healthy lease. Clear, predefined agreements on works should not be seen as a limitation, but as a stimulation to increase and maintain the health performance of the building and the leased space." – tenant 3

Differentiation in type of works

In a healthy lease differentiation must be made between standard works and health promoting works. This can be added to the PoR and discussed during BMG's. By discussing this during a BMG and add this to the existing PoR, better choices can be made with respect to the health performance of the building.

"A differentiation should be made between standard, operational works related to the building and works that have potential impact on the health performance of the building. Standard, operational works from both landlord and tenant must be executed without asking approval for everything, this is not efficient and not desirable. The health performance related works can be incorporated in the PoR and discussed during BMG's." – tenant 2

"In our opinion clear agreements should be made with respect to restricting or extending rights to do works. A differentiation can be made in standard operational works and health improving works. This can

be laid down in a healthy lease. There should be a certain amount of freedom to carry out works for both landlord and tenant. However clear, predefined agreements should not necessary harm this freedom." – tenant 3

Reinstatement obligation essential in a healthy lease?
Reinstatement obligation for tenants is not perceived as essential in a healthy lease. It can be considered from case to case and depends on several factors, such as the quality of the fit-out and the size of the tenant.

"We consider reinstatement obligation not as an essential item to include in a healthy lease. It is also applied in the standard ROZ lease and we do not mind taking out our fit-out. – tenant 1

"With respect to reinstatement obligations, this should be included in a healthy lease but considered from case to case as it depends, amongst others, on the state of the fit-out and the size of the tenant" – tenant 2

"A reinstatement obligation in a healthy lease should be considered from case to case. For example the size of a tenant and the quality of their fit-out play a role in this. Nevertheless agreements can be made, together with the rights to do works, where recycling of materials is obliged. For example: as a tenant we are free to choose and built our fit-out, but it should comply with the PoR or agreements in a healthy lease. Materials may not contain certain substances which are health impacting and all materials should be re-usable (in the building or elsewhere). Again this possible when it is laid down properly and discussed from time to time in BMG's. External (technical) advisors should also play a role in this process." – tenant 3

"we think this is not an essential item to include in a healthy lease as it depends per case on how to deal with this. Sometimes it more sustainable to leave the fit-out and in another case it is better to remove it completely." – landlord 1

Theme 4 - Sustainability labels and certificates

- requirement to have a (healthy) label (or not)

Labels and certificates as starting point for health strategies
Labels and certificates can be a good starting point of health and well-being strategies in a healthy lease. The certificate can provide the basis for more detailed agreements between tenant and landlord.

"Certificates and labels can be a good starting point from where agreements can be more specified from tenant to tenant." – landlord 1

"Labels and certificates are important to include in a healthy lease. They provide a good handhold and can form a good basis for health and well-being agreements between the landlord and tenants." – tenant 3

Tailor made agreements versus labels and certificates
It is found that some interviewees prefer to have tailor made agreements instead of label or certificate, which is often more standardized. Tailor made agreements can have more effect as they are more aligned with the wishes of the tenant and the possibilities within the building.

"Tailor made solution regarding health and well-being should be made following the label or certificate. In the end these kind of agreements will be most effective and more valuable for tenants." – landlord 1

"For us it is not essential to have a label or certificate in place in a healthy lease. It is much more desirable to make tailor made agreements that are aligned with the organization's wishes and demands." – tenant 1

"Labels are not essential for us as an organization. Much more valuable are direct agreements with a landlord that fits our organizations wishes and activities. A case to case approach in a healthy lease will be more effective than a general certificate or label." – tenant 2

Labels and certificates as branding tool

Finally labels and certificates are used as a branding tool. A label has a positive effect on the marketability of the building for landlords. In addition to this a label can contribute positively to the corporate image of both tenants and landlords.

"One of the main reasons we add sustainability labels on our buildings is for branding purposes. Pharos does have a BREEAM excellent label but another branding tool is the healthy workplace community. The combination of both is what attracted most tenants. Labels and certificates continue to play a role in the branding and value of buildings in the future." – landlord 1

"A label of certificate in the building contributes positively to the organizations corporate image from a CSR perspective. If we indicate we are leasing office space in an A labeled, BREEAM excellent office building where health and wellbeing is actively promoted and integrated, it has a positive effect on our corporate (CSR) image". – tenant 3

4.1.1 Overview Round 1 & Round 2 (Case study I)

	***Landlord 1** (value add)*	***Tenant 1** (real estate)*	***Tenant 2** (conventional)*	***Tenant 3** (tech)*
Communication	**Co-operation (obligation)** • **Important** • communication should be increased in a healthy lease • communication and cooperation increases tenant satisfaction and decreases tenant complaints • Indirect (positive) effect on branding **Building management group** • **Important** • currently there are regular (tenant) meetings (quarterly). • in these meetings the focus is mostly on the day to day operation of the building • interesting to put extra focus on long-term strategies regarding the healthy community in Pharos • *downsides:* • extra operational costs • might scare of new investors in taking over the building including all responsibilities in the leases • focus on short-term (monetary) benefits	**Co-operation obligation** • **Highly important** • goes hand in hand with data sharing and monitoring in a healthy lease • extra desirable during the Covid pandemic • proper communication on building features give comfort and assurance on the safety of the workspace **Building management group** • **Neutral** • tenant meetings can be transformed into a BMG in a healthy lease • the early stage communication and tailor made solutions are appreciated. This is not common practice • it is advocated to put more focus on long-term health and well-being in a BMG as part of a healthy lease	**Co-operation obligation** • **Important** • communication should be increased in a healthy lease, compared to current situation • more focus on health strategies rather than day to day issues **Building management group** • **Important** • health strategies should not only concern common areas but also leased space of tenants. A BMG can facilitate discussion on this • a BMG can stimulate the combination of organizations initiatives and building initiatives	**Co-operation obligation** • **Important** • Cooperation and communication is currently too open-ended. • should be more strict in a healthy lease • **Building management group** • **Important** • In a healthy lease a PoR and Data from sensors can be used as guideline and input for BMG meetings
Data sharing & monitoring	**Data sharing** • **Highly important** • measuring is knowing • proactive problem solving • PoR should be supplemented with placing sensors in a healthy lease • *downsides:* • pressure on the landlord to do something with this data • potential new investors might be discouraged by these responsibilities and potential extra costs **Threshold targets** • **Important** • see above on downsides of applying thresholds • potential differentiation between different type of investors	**Data sharing** • **Highly important** • gives comfort and health performance of the building as well as the safety (Covid related) • Facilitates the ongoing communication process on health improvement strategies **Threshold targets** • **Highly important** • provide comfort on the health performance of the building • If thresholds are not met in a healthy lease, it should be clear who is responsible for this • A procedure for this should be laid down in a healthy lease	**Data sharing** • **Important** • Data sharing can be an added value in a healthy lease • Privacy is an important item to consider and should be guaranteed in a healthy lease **Threshold targets** • **Highly important** • ensure a healthy and safe workplace • Covid will most likely increase this demand for safe and healthy workplaces (now and in the future) • Threshold targets can account for this	**Data Sharing** • **Highly important** • essential item to include in a healthy lease • makes it possible to steer on building features • will be more challenging in multi-tenant buildings **Threshold targets** • **Highly important** • would be the ultimate goal to include in a healthy lease with respect to data sharing and monitoring • ensures safety and contributes to better decision making on healthy performance for the organization
Workplace	**Alterations by landlord** • **Neutral** • a PoR can function as a guideline for doing works in the building and leased space in a healthy lease • a PoR structures this process and facilitates communication during BMG's • degree of strictness of a PoR can differ in healthy lease but must be equal for all tenants in a multi-tenant building **Alterations by tenant** • **Neutral** • see above **Reinstatement obligations tenant** • **Neutral** • not perceived as essential for a healthy lease • differs from case to case	**Alterations by landlord** • **Important** • the PoR applied in Pharos is not perceived as restrictive • a PoR can be included in a healthy lease as a guideline for doing works in the leased space **Alterations by tenant** • **Important** • see above **Reinstatement obligations tenant** • **not important at all** • not perceived as important for a healthy lease	**Alterations by landlord** • **Important** • differentiation must be made between standard works and health promoting works • in a healthy lease this differentiation can be added to the PoR and discussed during BMG's **Alterations by tenant** • **Important** • see above **Reinstatement obligations tenant** • **Neutral** • should be included in a healthy lease, but considered from case to case depending on the status of the fit-out	**Alterations by landlord** • **Neutral** • works should be categorized in standard works and health performance works • can be included in a PoR • this will stimulate the health performance of the building **Alterations by tenant** • **Neutral** • see above **Reinstatement obligations tenant** • **Neutral** • should be included in a healthy lease, but considered from case to case depending on the status of the fit-out
Labels and Certificates	**Applicability of labels & certificates** • **Highly important** • Important in a healthy lease • contribute positively to overall branding of the building • tailormade solutions regarding health and well-being are more valuable and effective • labels and certificates can be a good starting point of health and well-being strategies in a healthy lease	**Applicability of labels & certificates** • **Low importance** • are not essential to apply in a healthy lease • tailormade agreements aligned with the organizations wishes and demands are more valuable	**Applicability of labels & certificates** • **Neutral** • are not essential to apply in a healthy lease • tailor made agreements are more desirable in a healthy lease	**Applicability of labels & certificates** • **Important** • form a good basis for health and well-being agreements in a healthy lease • contribute positively to the organizations corporate image (CSR)

figure 4.1 – Case study I: Overview round 1 and 2 (source: own illustration)

4.1.2 Conclusions case study I - Round 1 & 2

The following paragraph discusses the major findings from the first two rounds.

Communication

- All interviewees rated both; cooperation obligation and BMG as important
- Only tenant 1 rated cooperation obligation highly important and BMG neutral
- There can be concluded that Communication is considered as important in a healthy lease by the interviewees from case study I
- Only tenant 1 has a neutral opinion regarding the added value of a BMG in a healthy lease

Data sharing and monitoring

- All stakeholders rated this theme as important or highly important
- There can be concluded that Data sharing and monitoring is considered as essential in a healthy lease by the interviewees from case study I

Workspace

- There are different opinions with respect to this theme and the sub-themes
- Workspace alterations by landlord or tenant are rated as important by tenant 1 and 2
- The landlord and tenant 3 rated these sub-themes as neutral
- Reinstatement obligation is rated neutral (3x) and not important at all (tenant 1)
- There can be concluded that there is not yet consensus on the added value of this main theme amongst the stakeholders
- This will therefore be further discussed and evaluated in round 3

Labels and certificates

- All stakeholders rated this theme differently (highly important to low importance)
- There can be concluded that there is not yet consensus on the added value of this main theme amongst the stakeholders
- This will therefore be further discussed and evaluated in round 3

4.2 Interviews Case study II - round 1

Theme 1 - Communication

- Cooperation obligation
- Building Management Group

Increased and early stage communication in a healthy lease

In a healthy lease communication between landlord and tenant should be increased compared to the current situation. At this moment communication is often too open-ended and not structured in frequent meetings. In a healthy lease early stage communication is advocated. This should than be maintained throughout the whole lease term.

"At this moment the communication article in the ROZ agreement is too open-ended. Also in the lease in Utrecht this standard article is included. However with respect to the renovation works a separate, realization agreement has been drafted. This agreement can be seen as a program of requirements for the works and accompanied rules and guidelines. This realization agreement is only focused on the beginning of the lease, the renovation works. Communication on sustainability (health and wellbeing) in the remaining lease term is only captured in the standard ROZ article, which is not very forcing. In a healthy lease communication obligation should be more stringent applied throughout the lease term. In an ideal situation communication already starts before signing a lease, by means of a realization agreement." – landlord 2

"Communication can be improved in the current situation. In a healthy lease the frequency of communication must be higher. Also in the light of Covid and the potential impact in the future, e.g. change of office use, communication is important to incorporate." – tenant 4

Building Management Group as platform

A BMG can be used as a platform for frequent communication on the health performance strategies of a building. Aside from the landlord and the tenant, the property manager and potentially some main technical suppliers of the building can attend these meetings. Organization of such a platform in a multi-tenant building should be the responsibility of the landlord, otherwise it will not happen. In a single tenant situation, like Utrecht, this responsibility could also be for the tenant.

"A Building Management Group (BMG) is not applied at this moment but could be an excellent platform for communication. However it seems more suitable for a multi-tenant building. In a single tenant building, like here in Utrecht, you have to deal with only one tenant. Nevertheless the standard tenant meetings can be supplemented with a BMG that occurs every half year and I think the property manager should also attend these meetings. The focus in a BMG should be on long-term sustainability aspects." – landlord 2

"A Building Management Group would be a good instrument to apply in a healthy lease. This should be organized with the landlord but also with the property manager and some service providers. By having different stakeholders aboard, better decisions can be made with respect to the health performance of our building." – tenant 4

Theme 2 - Data Sharing and Monitoring

- Data sharing
- Threshold guarantees

Data sharing and monitoring as added value in a healthy lease.

Data sharing and monitoring is essential to include in a healthy lease. It generates valuable information which can be used for making healthy performance strategies. In addition to that, thresholds can function as a guarantee from the landlord that the building is safe and compliant with rules and regulations. Especially during the current Covid pandemic this is valuable. Applying thresholds and extensive monitoring in a multi-tenant building is a great challenge. In a single tenant building it will be easier to apply this.

"The importance of data sharing is a no brainer. Some features like light , temperature and air quality can be measured and quantified very accurately. In an ultimate healthy lease thresholds are applied as a guarantee from the landlord. We as a landlord must make really strict agreements with his technical suppliers. If certain levels are not met a penalty can be applicable. The tenant however must be able to demonstrate that it is not caused by them." – landlord 2

"Data sharing and monitoring would be an important item to include in a healthy lease. Especially now with Covid it will be an extra important item. It gives assurance on the safety of the workplace. At this moment it is also uncertain how Covid will impact the future office use. Our organization is discussing the future of our way of working. We went from 500 people working in an office building to 500 people working from home. It might be that working from home will remain to a certain extent. Data sharing and monitoring can help with the decision making in this discussion." – tenant 4

Data sharing and monitoring as a branding tool

Thresholds in a healthy lease can be a good branding tool, especially in the light of Covid-19. Tenant might choose earlier for a building where the safety and quality of the indoor environment is measured and guaranteed by thresholds targets.

"Threshold guarantees could be a very good branding tool. This will only be more during these times of the Covid pandemic. If tenants get the written confirmation that certain features like air quality are constantly monitored and on a sufficient level, the building becomes more attractive for them compared to other buildings." – landlord 2

"Applying thresholds in a healthy lease, would be the ideal situation. If the landlord is able to guarantee certain indoor levels in the building, it would give us an organization much more confidence and trust to work there. This is even more relevant and important due to the current Covid pandemic." – tenant 4

Personal control should be combined with data sharing and monitoring

Data sharing and monitoring should be combined with personal control. It is very to apply certain thresholds to overall perceived comfort of office workers, as each person has other preferences.

"Personal control is potentially as important as applying thresholds. If people personally can adjust some settings of the office environment they often have less complaints and have a higher perceived comfort level." – landlord 2

"A large challenge of data sharing is to translate the information to standard values where every individual has different preferences. Communication in an early stage is very important, preferable before a lease and

agreements have been laid down. It should be clear what will be measured and what will be done with the information. Our organization is to a certain extent afraid of the outcome of this monitoring as it might result in necessary changes and related costs." – tenant 4

Downsides: Privacy and potential extra costs
Privacy of employees is perceived as a potential downside of data sharing and monitoring. Clear agreements should be made on this between the organization and their employees and subsequently between the organization and the building owner.

"Privacy also will be an issue to discuss and lay down in such an agreement. Not every employee agrees to the fact that the workplace will be monitored. A clear division should be made of workplace monitoring and employee monitoring for example." – tenant 4

In addition to that placing sensors and gathering data can be costly. Not every tenant is willing to invest in this.

"Our situation with a long-term lease agreement in place would be suitable to add sensors and share data to continuously improve the indoor workplace over time. As a governmental organization we are dependent on allocated budgets, this makes it difficult to invest in sensors but also in solving potential issues forthcoming of monitoring. This is why our management might be hesitative to apply data sharing and monitoring." – tenant 4

Theme 3 – Workplace

- Landlord's right to do works
- Tenant's right to make alterations to the leased space
- Tenant's reinstatement obligation

More partnership on this theme in a healthy lease is advocated
It was found that there should be more partnership and communication on these themes in a healthy lease. This can be done by sharing and aligning the maintenance budgets of both landlord and tenant. By doing this strategic choices can be made as it comes to health performance and costs can be shared. In a healthy lease, a clear demarcation can be made between the works and the responsible stakeholder.

"We advocate a partnership on this between landlord and tenant in a healthy lease. At this moment the landlord has an own agenda and budget for maintenance and works and we have the same. By sharing these budgets and plans, strategic decisions can be made as it comes the health performance of the building. Also the split of costs can be discussed. Our experience is that a new owner (new landlord) is not always aware of the situation on sight. A plan is made often without consultation of us. But we as a tenant know the situation, the issues and our personal preferences. In a partnership these works and budgets can be adjusted in a positive way for both landlord and tenant. A clear demarcation should be made of works and the responsible stakeholder. By add this in a healthy lease this will not result in unnecessary discussions. This was experienced by the tenant with a former owner of the building." – tenant 4

Workplace themes essential in a healthy lease?
This theme might not be essential to include in a healthy lease. Especially reinstatement obligation is perceived a non-essential by the participants. Certain works of the landlord must not be restricted. These are the (daily) operational works, which are not always health promoting. For example legislation or insurance related works. In a healthy lease this should be clearly laid down between both parties.

"I do not see the direct added value of the workplace articles in a healthy lease. Will you attract extra tenants by adding these articles? Will you brand your building better by adding these articles? It is unlikely. Reinstatement obligations should be assessed case by case. It differs per building, per tenant and per market cycle. In an upswing market tenants have more budget for a new fit-out compared to a downswing market. Therefore it is also considered as not important for a healthy lease." – landlord 4

***"**Reinstatement obligations is not perceived as essential for a healthy lease to our opinion. It should be considered from case to case." - Tenant 4*

Theme 4 - Sustainability labels and certificates

- requirement to have a (healthy) label (or not)

Contribute to overall branding

It was found that certificates have a positive effect on the overall branding of a building. Certified buildings are often perceived as more attractive by investors in the real estate sector. It is likely that this will be the same for buildings with a specific health label like WELL, now or in the near the future.

"We have a BREEAM very good label in Utrecht. Having this label in place increases the attractiveness of our asset for both tenants and investors as it is often commonly known within the market." – landlord 2

Labels and certificates as starting point for health strategies

Labels and certificates can be a good starting point for implementing health and well-being strategies in a healthy lease. The certificate can provide the basis for more detailed agreements between tenant and landlord.

"A standard like a label or certificate will not be harmful and could be a good starting point or minimum requirement in a healthy lease to discuss healthy performance strategies. Together with tailor made agreements they can form the perfect basis for a healthy lease." – tenant 4

4.2.1 Interviews – Overview Round 1 & Round 2

	***Landlord 2** (international)*	***Tenant 4** (governmental)*
Communication	**Co-operation (obligation)** • Important • Too open-ended at this moment • In a healthy lease communication should be increased and applied throughout the whole lease term • Good communication must be enforced in a healthy lease and must be written down more strict and mandatory. **Building management group** • Highly important • A differentiation must be made between single and multi tenant buildings. • In a multi-tenant building setting up a BMG will be a bigger challenge. • In Utrecht, with one tenant, this should be easier. • Not only landlord and tenant should participate in this BMG but also the PM • Long-term strategies with respect to the health performance of the building must be starting point for a BMG	**Co-operation obligation** • Highly important • In a healthy lease communication between landlord and tenant should occur more frequent (on regular basis) • Currently this is not the case • In the light of the Covid pandemic it is even more relevant and important to incorporate in a healthy lease **Building management group** • Important • A BMG would be good tool to increase the communication in a healthy lease • The situation in Utrecht makes it possible to set up a BMG relatively easy as it is a single-tenant building • In the BMG not only landlord and tenant should participate but also the PM and some important (technica) service providers • More stakeholders (experts) aboard will most likely result in better decisions with respect to the health performance of the building
Data sharing & monitoring	**Data sharing** • Important • The potential benefits of data sharing are evident. It increases steering opportunities and control of the indoor environment • It is a challenge to generalize this for all individuals. • Personal control plays an important role as addition to data sharing **Threshold targets** • Important • Applying thresholds can be a good branding tool for a building and landlord (especially with Covid) • Clear agreements should be made in a healthy lease when targets are not met (who is responsible?) • The landlord must also make very strict agreements with technical suppliers on the backside, who are responsible for installations, sensors	**Data sharing** • Neutral • Can be definitely of added value in a healthy lease • Due to Covid the organization is extra aware of health and safety in the building. Monitoring can be a good way to ensure safety • Privacy is an important item to consider in this article. Some employees might not accept (personal) data sharing • The situation in Utrecht, with a long-term lease in place, is suitable to apply data sharing and monitoring over a longer period **Threshold targets** • Important • applying thresholds ilease would be the ideal form of a healthy lease as it comes to data sharing and monitoring. Especially in the light of
Workplace	**Alterations by landlord** • Not important at all • not perceived as important in a healthy lease • a landlord should be free to do necessary works in the building • what is the added value of these themes for a healthy lease? • it is unlikely that it contributes to the branding and attractiveness of the building **Alterations by tenant** • Not important at all • not perceived as important in a healthy lease • a tenant should be free to do necessary works in the eased space • what is the added value of these themes for a healthy lease? • it is unlikely that it contributes to the branding and attractiveness of the building **Reinstatement obligations tenant** • Not important at all • not perceived as important for a healthy lease • should be considered from case to case (dependent on buildings, tenant, market cyclus, fit-out quality etc)	**Alterations by landlord** • Highly important • more partnership and transparency on this is desirable • maintenance budgets of tenant and landlord should be aligned with respect to decision making on health performance • costs can potentially be shared • works must be demarcated (divided between landlord and tenant) **Alterations by tenant** • Highly important • more partnership and transparency on this is desirable • maintenance budgets of tenant and landlord should be aligned with respect to decision making on health performance • costs can potentially be shared • works must be demarcated (divided between landlord and tenant) **Reinstatement obligations tenant** • Low importance • potential downsides of communication obligations are: • extra operational costs • might scare of new investors in taking over the building including all responsibilities in the leases
Labels & Certificates	**Applicability of labels & certificates** • Important • Contribute positively to the branding and attractiveness of the building towards tenants and investors	**Applicability of labels & certificates** • Highly important • could be a good starting point in a healthy lease for implementing health performance strategies • tailor made agreements should follow from this in order create the perfect basis for a healthy lease

figure 4.2 – Case study II: Overview round 1 and (source: own illustration)

4.2.2 Conclusions case study II - Round 1 & 2

Communication

- Both interviewees rated cooperation obligation and BMG as important or highly important
- In a healthy lease communication should more strictly be applied
- A BMG should include also a property manager and suppliers. Focus on long-term health performance strategies
- There can be concluded that Communication is considered as important in a healthy lease by the interviewees from case study II

Data sharing and monitoring

- Both stakeholders rated this theme as important. Only the tenant rated data sharing as neutral
- Privacy of workers should be taken into account when applying data sharing in a healthy lease
- Better steering on problems and ensuring the safety of the workspace
- There can be concluded that Data sharing and monitoring is considered as important in a healthy lease by the interviewees from case study I. The privacy issue will be discussed in round 3 together with the real estate lawyer

Workspace

- There are different/conflicting opinions with respect to this theme and the sub-themes
- Workspace alterations by landlord or tenant are rated as not important at all by the landlord and highly important by the tenant
- Reinstatement obligation is not important at all (landlord) and low importance (tenant)
- The landlord does not see the potential added value (branding of the building) of these sub-themes and the landlord advocates for more partnership and transparency between the parties on this
- There can be concluded that there is not yet consensus on the added value of this main theme amongst the stakeholders.
- This will therefore be further discussed and validated in round 3

Labels and certificates

- Both stakeholders rated this theme as important (landlord) or highly important (tenant)
- Labels and certificates contribute to the branding and attractiveness of the building and can function as a starting point for more tailor made agreements on health performance in a healthy lease
- There can be concluded that there is consensus on the added value of this main theme amongst the stakeholders in case study II. However the ratings differ from case study I.
- This theme will therefore be further discussed and validated in round 3.

4.3 Round 3 (Evaluation and Validation round)

The third round was set up as a validation round for the previous rounds. Unfortunately not every interviewee was able to join this round. The participants of this round were both the landlords and tenants 1 and 3 from case study I. In addition to that the property manager of case II participated in the validation round. Prior to this round the outcome of both case studies and rounds 1 and 2 was shared with the participants.

The aim of the third round was to reach consensus on the themes where this is not yet the case (Labels & Certificates and Workspace) and to validate the other themes including the proposed schematic overview of a healthy lease. The third round took approximately one hour and was held via a group video meeting.

Evaluation Labels and Certificates
The opinions on the added value of labels and certificates were scattered after round 1 and 2. On the one hand interviewees indicated that labels and certificates contribute to the overall branding of a building and increase attractiveness in the investors market. On the other hand it was indicated that tailor made agreements between landlord and tenant are much more valuable than a generally applied label.

The validation round confirmed that labels and certificates are perceived as added value for the overall branding of the building. In addition to this they can form a good starting point for tailor made agreements on health performance strategies between landlords and tenants. As stated by the landlords:

"As stated before certificates can positively contribute to the overall branding of a building. Looking at the investors market, certified buildings are often perceived as more attractive. In a sense it can be regarded as a guarantee on certain sustainability levels. In a healthy lease such a label can be used as a starting point for implementing specific health performance strategies as it provides a good base case."
– Landlord 2 (Case 2)

"I acknowledge the fact that one of the main reasons of having certificates in place, is for branding purposes. In addition to that the other main reasons is of course to stimulate and increase the sustainable performance of our assets. A certificate increases the attractiveness of the building on the market for both tenants looking for office space and other investors. However, as mentioned in round 1, in Pharos it is the health workplace community supported by a BREEAM excellent label that attracted most tenants. Taking this into account, I agree that labels and certificates could be an excellent starting point in a healthy lease."
– Landlord 1 (Case 1)

Complementary to this it was found that labels and certificates alone are not sufficient in a healthy lease. They should be applied in combination with specific agreements between landlord and tenant on health performance. Solely having a certificate in place is not enough in a healthy lease. This is due to the fact that certificates often are laid down in generalized form.

"In round 1 I've stated that it is not essential for us to have a (healthy) label or certificate in place in a healthy lease. As it is much more desirable to make tailor made agreements that are aligned with our organization's wishes and demands. However I agree to the argument that a certificate can be a good starting point for making those agreements. Nevertheless I want to emphasize that solely a certificate is not sufficient. It should go hand in hand." – tenant 1

"Labels and certificates are important to include in a healthy lease as they could be a good basis for health and well-being agreements between the landlord and tenants. In addition to this and also indicated during round 1, a label of certificate in the building positively contributes to our organizations corporate image from a CSR point of view." – tenant 3

In practice you see that every building and moreover every tenant is different. Tenants have different wishes and not every sustainable measure can easily be applied in all buildings. In a healthy lease the aim should be to agree to specific solutions that can be implemented in the specific building. A label or certificate can form a good basis for such a discussion." – property manager (case II)

Evaluation Workspace

Similar as for labels and certificates, the opinions on the added value of workspace were scattered after round 1 and 2. However in the validation round a consensus was reached on the implementation of the workspace themes, 1) alterations by landlord and 2) alterations by tenant. It was concluded that these workspace alterations should be laid down in a program of requirements (PoR). Such a PoR should be drafted at the beginning of a (healthy) lease. In addition to this a distinction can be made between standard operational works and health performance works. Day to day, operational works are not to be included or laid down in a healthy lease. The PoR must focus on health performance strategies and related works.

"As said during the interview in round 1, we have drafted a program of requirements (PoR) with rules and guidelines for doing alterations in the leased space by a tenant. A tenant is more or less free to do what he wants, within the boundaries of this PoR. Often approval must be given by us, this enables us to monitor the works and somehow stay in control. Such a PoR should also be applied in a healthy lease and should not only focus on the tenant but also on us as a landlord. The aim is to create and maintain constant awareness on the implementation of healthy improving strategies in the building. Finally approval should be given on reasonable grounds from tenant to landlord and the other way around." – Landlord 1 (Case I)

"This remains a difficult topic for me. As said earlier, restricting certain works of the landlord is not desirable at all. From our perspective we should be free to do non health promoting works on the building without prior approval of tenants. Nevertheless I think it is reasonable and good to make a distinction between the type of works. On the hand you have the standard operational works and on the other the health performance related works. If this is laid down in a proper PoR, it will can be of added value in an healthy lease I guess." – Landlord 2 (Case II)

I can make an overview of all the (standard) operational works. This can be added to the PoR and used as a handhold during the lease term of a healthy lease." Property manager (case II)

With respect to reinstatement obligation, it was concluded that this is not an essential item in a healthy lease. It should be considered from case to case. All participants agreed to this. However there should be kept in mind that not all interviewees from round 1 and 2 participated in this third round. The property manager confirmed that this is simply dependent on too many different variables.

Evaluation Communication
In the previous rounds it was found that communication was perceived and rated as important or highly important by all stakeholders. Especially during the current Covid pandemic the need for regular communication is high. A BMG can be a platform to facilitate this, now and in the future. Tenant 1 in case study II rated a BMG neutral. He stated the following during round 3:

I have rated this neutral as I did not know exactly what to expect from a BMG. Now that I know that a BMG can be used as a platform to discuss health performance strategies the added value is more evident. Especially now and in the aftermath of Covid-19 a BMG would be the ideal platform to centrally discuss and align strategies on this." – tenant 1

Furthermore it was agreed by all participants of round 3 that communication in a healthy lease should be focusing on long-term health performance strategies in the building, rather than day to day management. In addition to this not only the landlord and tenant should participate in a BMG, but also the property manager and important (technical) suppliers. The property manager stated the following:

"Participating in a BMG as a property manager would definitely be a good idea. I do think that my technical knowledge of the building will be very valuable. As a property manager we also are the first line of contact with the technical suppliers of the building. Getting us as stakeholders aboard of such meetings will bring a lot of extra insight in the technical state and opportunities of the building." – property manager (case II)

Finally communication landlord 1 (case I) stated that a lot of communication obligations in a healthy lease might discourage potential buyers and affects the marketability of the building. This was not supported by landlord 2 during the discussion in round 3. The other participants did not have an opinion on this.

Evaluation Data sharing and Monitoring
In the previous rounds data sharing and reporting was rated as important or highly important by all stakeholders. Only tenant 4 in case study II rated data sharing as neutral. Unfortunately tenant did not participate in round 3. All the participants of round 3 remained with their previous standing points.

Data sharing makes it possible to proactively steer on health and well-being problems in the building. In addition to that data sharing and monitoring facilitates and feeds the ongoing communication process between the stakeholders with respect to the healthy performance of a building. It is expected that data sharing and monitoring is easier to implement in a single-tenant building than in a multi-tenant building, as there are more stakeholders involved in a multi-tenant building. Furthermore, personal control might be as important to include in a healthy lease as thresholds.

Some important items to consider within this theme are privacy of workers and potential effect on marketability of an asset. The privacy issue would have been discussed with the real estate lawyer but unfortunately she could not participate in this round. Other participants agreed to the fact that this is a sensitive issue in a healthy lease. With respect to the impact on marketability, both landlords agreed to this. Applying thresholds might increase the risk for a landlord in not meeting certain agreements. Nevertheless they stated that it is an important to include in a healthy lease. Finally data sharing and monitoring is expected to be more effective in a longer lease as there is a longer period to evaluate and monitor.

4.4 Cross-case findings

Comparing the outcomes of all rounds from both case studies gives the following conclusions with respect to the different themes. Based on the combined conclusions a schematic overview will be drafted of a healthy lease.

Communication

In both cases communication was rated as important or highly important by all stakeholders. Communication in a healthy lease should be focusing on long-term health performance strategies in the building, rather than day to day management. A BMG can be an excellent platform to do facilitate this.

In the light of the Covid pandemic, regular communication on safety of the workspace is multiple times mentioned in both cases by tenants and should definitely be touched on in a healthy lease. Not only the landlord and tenant should be in a BMG, but also the property manager and important (technical) suppliers. Finally communication is closely related to data sharing and monitoring as this functions as the input for the meetings (BMG's) on health performance strategies.

Finally, communication obligations in a healthy lease might discourage potential buyers and affects the marketability of the building. However no consensus was reached on this between both landlords. Overall can be concluded that communication is considered as (highly) important to include in a healthy lease.

Data sharing and monitoring

In both cases data sharing and reporting was rated as important or highly important by all stakeholders. Only tenant 4 in case study II rated data sharing as neutral. Data sharing makes it possible to proactively steer on health and well-being problems in the building. Furthermore data sharing and thresholds gives assurance to tenants that the workplace is safe, this is especially important during the current Covid pandemic. It facilitates and feeds the ongoing communication process between the stakeholders with respect to the healthy performance of a building. Privacy of workers should be taken into account when applying data sharing and monitoring in a healthy lease.

Furthermore it is expected that data sharing and monitoring is easier to implement in a single-tenant building than in a multi-tenant building, due to the simple fact that there are more stakeholders involved in the latter. In addition to this data sharing and monitoring can be more effective in a longer lease as there is a longer period to evaluate and monitor. It should be considered that the application of thresholds in a healthy lease might discourage potential buyers and affects the marketability of the building.

Finally, personal control might be as important to include in a healthy lease as thresholds. Overall can be concluded that data sharing is considered as (highly) important to include in a healthy lease.

Workplace

Ratings on workspace sub-themes differ among the stakeholders in both cases. After round 3 there can be concluded that reinstatement obligations is not essential to include in a healthy lease. If it is included in a healthy lease, it should be considered from case to case.

In the validation round a consensus was reached on the implementation of the workspace themes, 1) alterations by landlord and 2) alterations by tenant. There can be concluded that workspace alterations should be laid down in a program of requirements (PoR). Such a PoR should be drafted at the beginning of a (healthy) lease. Furthermore a distinction must be made between standard operational works and health performance works. Day to day, operational works are not to be included or laid down in a healthy lease. The PoR must focus on health performance strategies and related works.

Labels and certificates

Labels and certificates are perceived as added value for the overall branding of the building. In addition to this they can form a good starting point for tailor made agreements on health performance strategies between landlords and tenants. However labels and certificates alone are not sufficient in a healthy lease. The aim should be to combine them with specific agreements between landlord and tenant on health performance. Solely having a certificate in place is not enough in a healthy lease as these often are laid down in generalized form.

A healthy lease is defined as a lease contract between landlord and tenant in which health promoting strategies have a central role. These strategies are made based on four main themes: 1) Labels and certificates, 2) Workspace, 3) Data sharing and monitoring and 4) Communication. A fifth potential theme, Dispute settlement is not included in this thesis. In a healthy lease the aim of the landlord and tenant is to create and maintain a healthy indoor environment for office users throughout out the lease term. This can result in mutual benefits for both stakeholders, like increased branding, ensurance of a safe workplace and cost sharing.

A schematic overview of a healthy lease is designed and presented in figure 4.3.It starts with placing the landlord and tenant next to each other instead of opposed. This indicates the importance of cooperation between both stakeholders. A label of certificate can function as a general starting point for tailor made agreements on health and well-being. Subsequently these tailor made agreements are laid down in a program of requirements (PoR). The PoR is expanded with a demarcation of operational works and health promoting works including the responsible stakeholder for these works. During BMG's the input from data sharing and the PoR are being discussed and evaluated on a regular basis throughout the lease term. Eventually this should result in improved health performance of the building and positively affects both stakeholders in terms of increased (corporate) branding, the ensurance of safe workplace and the potential of sharing costs.

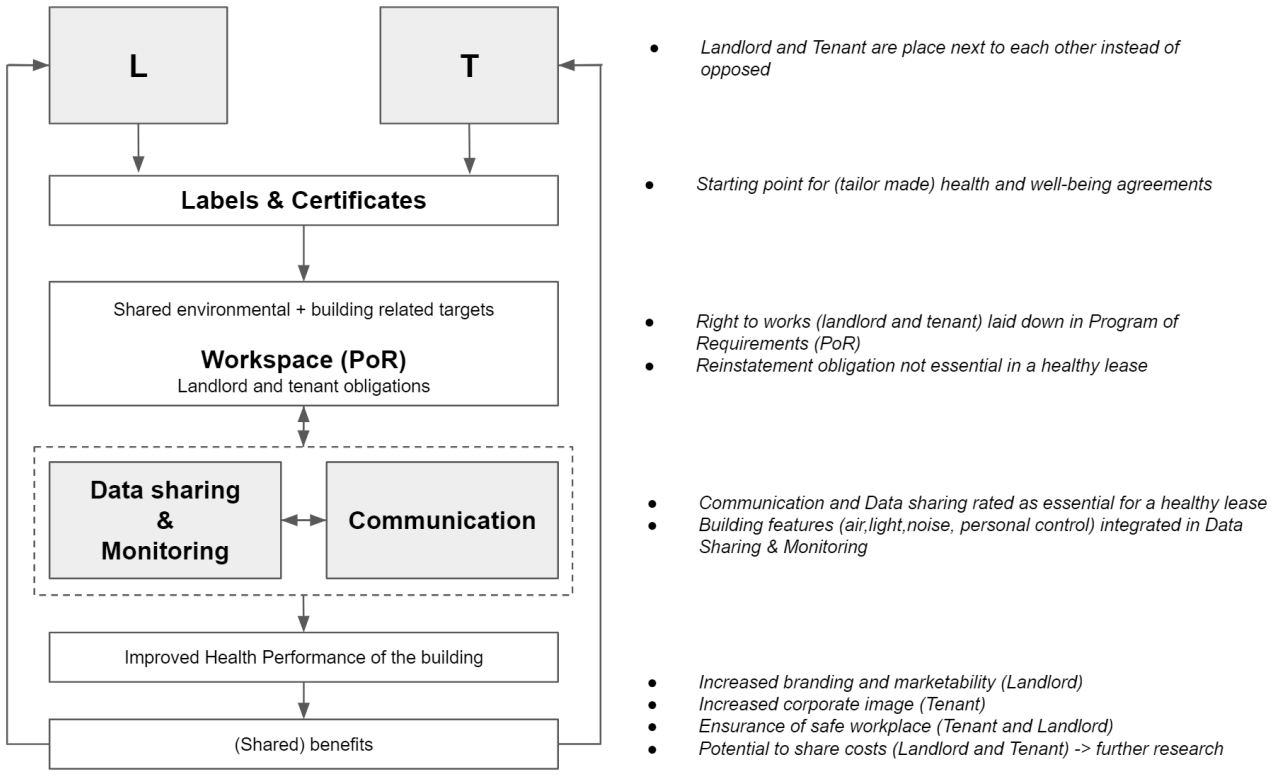

Figure 4.3 – schematic overview healthy lease (source: own illustration)

4.5 Discussion and recommendations

The aim of this research was to explore and develop guidelines for a new type of lease agreement in office buildings in office buildings, the healthy lease. The main research question was:

"What are the different stakeholder interests and potentials of a healthy lease model which can be applied in office buildings in the Netherlands?"

To answer this research question the thesis was structured in three phases;

- Phase 1 - Analyse the concept of user health in office buildings
- Phase 2 - Understanding the mechanisms of green leases
- Phase 3 - Develop and explore the potentials of a health lease

Phase 1 - Analyse the concept of user health in office buildings

This phase was focused on analyzing the concept of user health in office buildings. This was done in the first part of chapter 3, the theoretical framework. Literature on user health in office buildings was reviewed and a theoretical framework of building related health features and health symptoms was designed. From the literature review can be concluded that:

- There are generally four major conceptual health models applied in literature: 1) WHO model, 2) Medical model, 3) Wellness model, 4) Environmental model (Larson, 1999).
- External (physical) stressors can affect the human body this can result in several symptoms (physical, mental) (Bluyssen, 2016)
- The seven most identified external features are (Bluyssen, 2016) and (Colenberg et al., 2020):
    - Air (Ventilation)
    - Light
    - Noise
    - Layout
    - Furniture
    - Greenery
    - Personal Control (Temperature, Light, Ventilation)
- Layout, furniture and greenery fall outside the steering capability of the building owner and were therefore not included in this research
- From the four health features air and noise have most relations with health symptoms. Light and personal control have less relations with health symptoms. Personal control does not relate directly to health symptoms but increases users' power to control different settings.
- Most common health symptoms in the framework are (1) eye irritation, (2) lethargy and (3) headache

Phase 2 - Understanding the mechanisms of green leases

In Phase 2 the mechanisms and concepts of green leases were analysed. This was done in the second part of chapter 3, the theoretical framework. The main findings of this phase are:

- A green lease is a performance oriented lease agreement in which the landlord (lessor) and the tenant (lessee) make agreements about the sustainable use and sustainable exploitation of a building (Quispel and Heemskerk, 2011).
- Mutual responsibility and mutual incentive for both landlord and tenant from a sustainability perspective within the building.
- Identified green lease themes are (BBP, 2016) and (Quispel and Heemskerk, 2011):
    - cooperation and planned meetings
    - building management group
    - data information sharing

    - applying threshold targets
    - landlord rights to (not) do works
    - tenant rights to (not) do works
    - reinstatement obligation at the end of the lease (tenant)
    - EPC and sustainability labels / certificates
    - Dispute Settlement
- These themes are categorized in five main themes:
    - Communication
    - Data sharing and monitoring
    - Workspace
    - Labels and certificates
    - Dispute settlement

The findings in phase 1 and 2, the theoretical framework and 4 main themes were used to develop and evaluate the concept of a healthy lease in phase 3. This was done in chapter 3 and 4.

Phase 3 - Develop and explore the potentials of a health lease

- Communication is perceived as an important item by all stakeholders
    - Regular communication should be laid down in a healthy lease and must be more mandatory compared to the current (standard) leases
    - Added value is sharing knowledge and increased transparency between landlord and tenant. This might result in better decision making with respect to the health performance of a building
    - A Building management group is perceived as added value in a healthy lease
    - BMG can be used to discuss (long-term) strategies on the healthy performance
    - Applicability of a BMG is more challenging in a multi-tenant building compared to a single-tenant building
    - Not only landlord and tenant should be part of a BMG but also a property manager and important (technical) suppliers
- Data sharing and monitoring is also perceived as an important item by almost all stakeholders
    - Data sharing provides better understanding and steering capabilities in the indoor environment. This benefits positively to the health performance of a building
    - Data sharing and applying thresholds provide guarantees on the safety of the building. Especially in the light of the Covid pandemic this is perceived as an important item to include in healthy leases
- Opinions on workspace alterations and reinstatement obligations varied amongst the stakeholders
    - Reinstatement obligations of a tenant is not perceived as essential in a healthy lease by both landlords and tenants
    - Rules with respect to workspace alterations should be laid down in a PoR and distinction must be between operational works and healthy performance related works
- Labels and certificates in a healthy lease should be applied as a starting point in a healthy lease
    - Good tool to brand your building (landlord and to lesser extent tenant)
    - A label can be a minimum requirement and starting point to lay down healthy performance agreements
- The case study findings did confirm that the vicious circle of blame is still present to a certain extent. Especially from the side of the landlord (landlord 1). The focus is more on short-term benefits (return on investment) rather than long-term benefits

4.5.1 Practical implications

The applicability of a healthy lease should not only be considered in the operational phase of a building. Already in the design phase the link with a health and wellbeing of users and thus healthy leases can be made. It is expected that this type of sustainability, which focuses on user health will gain terrain in the coming years. Similar as sustainability on energy performance of building, architects and designers should be educated on the implementation of this in their designs.

At the renowned university MIT in the United Stated there is a specific course that focuses on designing comfortable indoor environments. This is done by giving education on the scientific principles of the underlying phenomena and technologies with respect to the indoor environment.

At our faculty in Delft students are educated based on six main modules, of which technology is one. This module tends to focus on construction and climate design and can be expanded with a course on indoor environments and the design principles of this. This enables students to apply this knowledge already in an early design phase of buildings, regardless if it concerns newly constructed buildings or transformation of existing building stock.

4.5.2 Limitations & Future Research

- This research has studied a limited (2) amount of cases. Case study findings are based on interviews with 2 landlords and 4 tenants. Statistical findings are therefore only applicable for the cases that have been studied. However the focus of this research is on analytical generalization rather than statistical generalization.
- A first recommendation for further research is to confirm the findings of this research, by conducting more case studies in different buildings and with different stakeholders.
- A second recommendation for further research is to focus on different type of investors and their interest in health and well-being, and more specific healthy lease. A differentiation can be made between short-term investors (added value) and long-term investors (institutional). Both type of investors have different drivers as it comes to sustainability (health and well-being) in office buildings.

Chapter 5. Conclusion

This chapter describes and synthesizes the results from the previous chapters. An answer is given on the main research question. In addition to that the discussion paragraph evaluates and describes the validity and potential limitations of this research as well as providing recommendations for further research.

5.1 Conclusion

This research explored the different stakeholder interests and potentials of new type of lease, the healthy lease. The main research question was: **"What are the different stakeholder interests and potentials of a healthy lease model which can be applied in office buildings in the Netherlands?"**

The answer to this question follows based on the conclusions of the empirical research and conclusions. This is summarized below.

- The case study findings did confirm the added value of Communication in healthy leases. Both, landlords and tenants replied that communication should be increased compared to the current situation and should focus on (long-term) health performance strategies of the building. A Building Management Group can be an excellent platform to facilitate this. This is in line with the literature findings. (Bugden et al., 2013 ; Quispel and Bausch, 2011).
- The case study findings did confirm the added value of Data Sharing & Monitoring in healthy leases. According to the stakeholders this theme is closely related to Communication, as it forms the input for discussions. Furthermore applying threshold guarantees, in particular on air quality, were perceived as assurance on the safety of the workspace, especially in the light of the current Covid pandemic this was rated as highly important. This is in line with the literature findings of the theoretical framework on user health and other literature (BBP, 2016 ; Quispel and Heemskerk, 2011)
- The cases study findings did confirm the added value of Labels and Certificates in a healthy lease. Labels and certificates can function as a general starting point in a healthy lease from which tailor made agreements on health performance can be made between landlord and tenants
- The cases study findings did not confirm the added value of reinstatement obligation in a healthy lease as it was perceived as non-essential in a healthy lease. On the sub-themes alterations to the workspace by landlord and tenant a consensus was reached. It is concluded that these alterations should be laid down in a PoR and added to a healthy lease.
- The case study findings did confirm that the vicious circle of blame is still present to a certain extent. Especially from the side of the landlord (landlord 1). It was found that landlords are aware of the added value of a healthy lease and accompanying themes, but tend to link this to short-term benefits (return on investment). Potential obligations forthcoming of a healthy lease can be perceived as 'too much responsibility' and 'hassle' by potential buyers, who are focused on quick and easy investments and returns. In order for a healthy lease to succeed, there must be a mindset change of building owners.
- The case studies did confirm the difference between multi-tenant and single-tenant buildings as mentioned by Quispel and Heemskerk (2011). Implementing Communication (BMGs) and Data sharing in multi-tenant buildings will be more challenging than in a single-tenant building due to the simple fact that there are more stakeholder involved.
- The case studies did confirm that a healthy lease, and in specific Communication and Data Sharing can contribute to the overall branding of a building and marketability of a building (Quispel and Bausch, 2011).

A healthy lease is defined as a lease contract between landlord and tenant in which health promoting strategies have a central role. These strategies are made based on four main themes: 1) Labels and certificates, 2) Workspace, 3) Data sharing and monitoring and 4) Communication. A fifth potential theme, Dispute settlement is not included in this thesis. In a healthy lease the aim of the landlord and tenant is to create and maintain a healthy indoor environment for office users throughout out the lease term. This can result in mutual benefits for both stakeholders, like increased branding, ensurance of a safe workplace and cost sharing.

The outcome of the empirical research is visualized in the figure below. It starts with placing the landlord and tenant next to each other instead of opposed. This indicates the importance of cooperation between both stakeholders. A label of certificate can function as a general starting point for tailor made agreements on health and well-being. Subsequently these tailor made agreements are laid down in a program of requirements (PoR). The PoR is expanded with a demarcation of operational works and health promoting works including the responsible stakeholder for these works. During BMG's the input from data sharing and the PoR are being discussed and evaluated on a regular basis throughout the lease term. Eventually this should result in improved health performance of the building and positively affects both stakeholders in terms of increased (corporate) branding, the ensurance of safe workplace and the potential of sharing costs.

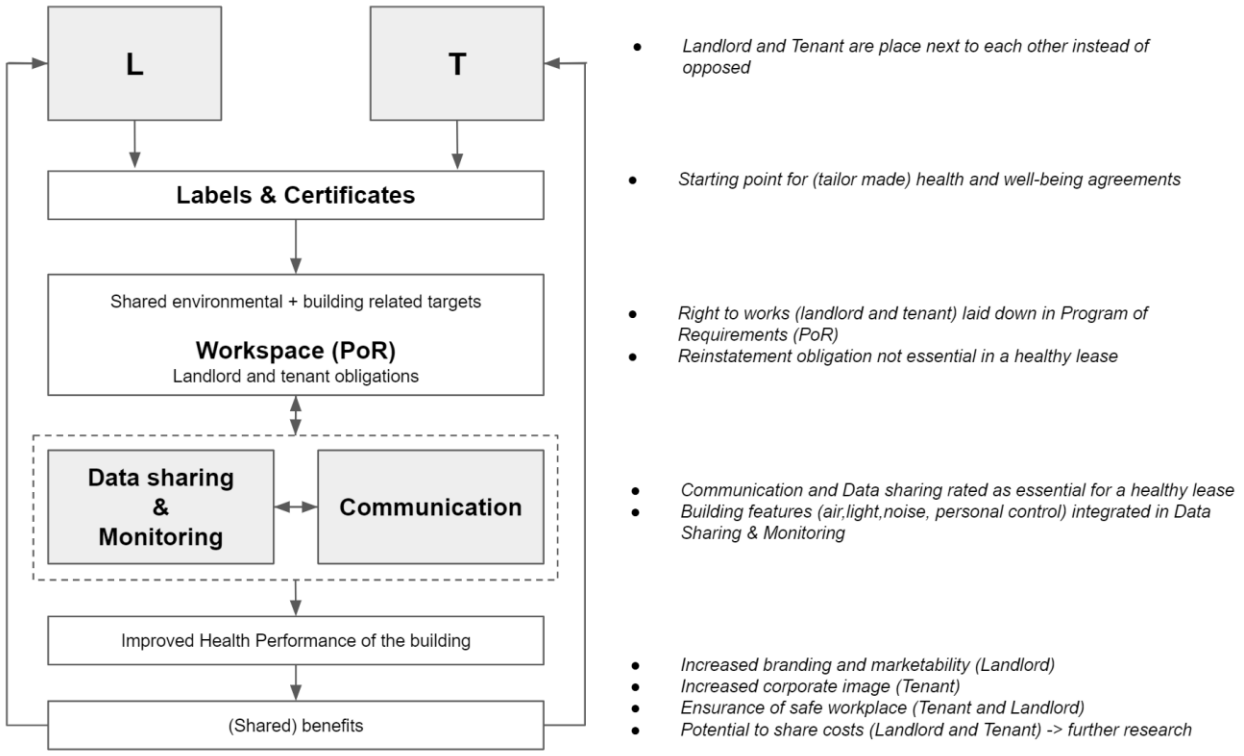

Figure 5.1 – schematic overview healthy lease (source: own illustration)

5.2 Reflection

This paragraph reflects upon the conducted research, the used methods, processing of the results and the relevance in both the scientific field but also in the broader practical context. Furthermore some limitations of the research are described.

ASPECT 1: Research approach

A qualitative research approach was chosen for this research. As the research aims to explore potential interests to a relatively new concept it is difficult to do that on a quantifiable basis.. Furthermore user health is related to individuals and each individual has his or her own preferences. Nevertheless sufficient literature was found on the relationships between interior office space and user health as well as green leases. By drafting a theoretical framework with a demarcation on features that can be steered by building owners, a clear scope was set for the basis of a healthy lease. Together with the literature review on the green lease mechanisms this resulted in proper demarcated input for the basis of a healthy lease.

The explorative character of this research aligns well with the qualitative approach. The outcome of the literature review was used to explore the different stakeholder potentials in the empirical part. This was done by conducting semi-structured interviews held with stakeholders from two different office buildings in the Netherlands. The two case studies selected for the empirical research were chosen based on several characteristics and differences compared to each other. Both buildings were somehow linked to health and wellbeing, either via healthy community ambitions (case 1) or via their core activities (case 2). In addition to that both buildings were renovating (or recently finished) their interior taking into account health and wellbeing of their users. Interesting differences were the amount of tenants, single-tenant (case 2) versus multi-tenant (case 1) and the lease length. This was normal (3-5 years) in case 1 and long (more than 15 years) in case 2.

The interviews consisted of different rounds following the Delphi Method. This method turned out to be a strong basis in conducting the empirical research. The semi-structured interviews in the first round were combined with the ratings in the second round. This was mainly done due to the fact that there was a limited amount of time to conduct the interviews and a lot of the interviewees worked from home due to the Covid pandemic. The interview introduction, which were shared upfront with the interviewees, were perceived as efficient in structuring the interviews and the data collection. Round 3, the validation round, will be organized on 17 December 2020. In this round the themes will be validated and some themes will be further discussed with the aim to reach a consensus on those.

ASPECT 2: Position of research within the Master track (MBE)

The research is carried out within the graduation laboratory “Corporate Real Estate Management” (CREM). The focus on sustainability and more specific health and well-being in office buildings. Sustainability in general can be regarded as a key topic within the Master track. The focus on health and wellbeing in real estate is quite new and is a trending topic. This research builds, amongst others, on a study conducted by Colenberg et al (2020), associated with the MBE department. This study is a systematic literature review on the relationship between interior office space and health and well-being of office users. Based on the knowledge on user health in office buildings and green leases this research aims to develop the basis of a new lease form, a healthy lease. This is, so far as we know, a non-existing phenomenon in both practice as in literature. By exploring the different stakeholder interests and potentials in a healthy lease, a new research direction is employed. This thesis contributes to the knowledge on user health in office buildings, green leases and the potential development of a new lease form, healthy leases.

ASPECT 3: Scientific relevance

In scientific literature extensive research is done on user health in general (Basch, 1990 ; Larson, 1999 ; WHO, 2006 ; Huber et al., 2011). Furthermore a substantial and also a growing number of health related researches focusing on the possible relation(s) between user health and office buildings. Despite all this research it is still hard to give unilateral answers on the impact of offices on user health. One reason for this is that a lot of other factors can have influence on user health and wellbeing. Another reason is that individual perception can differ amongst people. As mentioned earlier, sustainability is one of the key topics in the real estate research field. Within the people, planet and prosperity theory of Elkington (1994), this research focuses on people sustainability. This becomes more and more important. The focus on health and wellbeing in the real estate sector will even more increase due to the Covid pandemic. It is expected that the real estate market but also governments adjust rules and regulations concerning health standards in office buildings. Scientific research on the user health and stimulation of this in the sector is necessary. This research contributes to this demand by exploring the stakeholders potentials of a healthy lease.

ASPECT 4: Practical relevance

Government regulations on sustainability are constantly changing and adjusted to the current time frame since the introduction of the first subsidy for energy efficiency measures by the VROM (VROM, 2002). After the introduction of several sustainability certificates in 1990s and 2000s, the Dutch government restricted all building owners to have an energy label in place for their buildings in 2009. Pushed by European and global directives, the Dutch government constantly sets out new national sustainability policies. The last years this not only focuses on energy performance but also on health and well-being of (office) users. Espund the Covid-19 pandemic, it can be expected that in the coming years rules and regulations on health and well-being will be reformulated and tightened.

The large Dutch Banks, ING, RABOBANK and ABN AMRO tend to focus more on sustainable projects as it comes to real estate financing. In the recent years requirements for (re)financing have been expanded. Clients (building owners) often need to have a sustainability plan or idea in place to apply for (re)financing (Steenkamp, 2018).

Based on the above mentioned building owners should find ways to keep up with the changing demands from governments, banks and tenants. Sustainability is more than only reducing the energy consumption of the building stock. The new focus on health and well-being in real estate, fueled by the Covid-19 pandemic, will become as important or even more important in the coming years. A lease contract that is focusing on health and wellbeing aspects in office buildings can contribute to this. For organizations this is desirable to prevent absenteeism, increase engagement and facilitate and meet the demands of their employees with respect to safety.. For landlords, such as building owners, a healthy lease contract can increase tenant satisfaction and perceived quality and value of their assets within the real estate sector and the changing societal demands.

ASPECT 5: Dilemmas / Ethical issues

User health is a trending topic in the real estate sector. An often heard dilemma as it comes to health is how to deal with privacy of individuals. Not everybody appreciates it if health related information is publicly available. The discussion on the Corona-app is a perfect example of the sensitivity around this topic. New technologies, like sensors and metering, bring a lot of innovation potential but also raises the question, where does this information overload stops? For some people reality start feels more and more like an ‘Orwellian’ world as described in his novel 1984.

Personal Reflection

During my academic career at the faculty of Architecture in Delft, my interest always focused more on the commercial side of the built environment. However I did not know this immediately. After finishing my Bachelor, I decided to start with the MSc Transport, Infrastructure and Logistics at the Civil Engineering faculty. I did enjoy a large part of these courses, but along the way I felt that it was not my real passion and interest and I missed the link with the built environment and more important, people. Switching back to the faculty of Architecture was one the best choices I have made. The MSc Management in the Built Environment was much better aligned with my personal interest fields. Then the graduation project started… As of the start of the graduation phase I knew I wanted to do something with health and well-being in office buildings. This was fueled by my internship at an Amsterdam based real estate investor, Cairn. In many ways this process had ups and really deep downs. At the end of 2018 I decided to stop with the project permanently, struggling with the project but moreover with myself. As of the summer of 2020, I picked up my pen and decided to give it one more chance. I very much appreciate the fact that my first mentor Tuuli Jylhä allowed me to do so.

Overall I have experienced the graduation process as very intensive. However the last months were, despite Covid, quite satisfying. I became more and more enthusiastic and dedicated to my research in these months. Something I had not felt in the last 1.5 year. Completing this process, would mean so much to me. It is hard to describe this in words. I encountered many challenges. On a personal level I learned a lot about myself during this process.

COVID-19
We all are in an extraordinary situation at this moment. The Covid pandemic heavily influences our day to day lives. Also in the last part of this research the impact of this pandemic was noted. As of March I was forced to work from home. My employer and also the university followed the guidelines of the Dutch Government. Working from home has benefits but also some major downsides. For me it is easier to focus on this thesis. You are not distracted by other work or colleagues. A major downside is the fact that you hardly speak to your colleagues but also fellow students and mentors at the university. Everything is digital and planned. Discussing the thesis with other people and receiving feedback on this was therefore a great challenge as well as planning and conducting the interviews in the empirical part. Nevertheless I really appreciate the feedback I have got from my mentors during the last three months. It helped me a lot in structuring and framing this research towards the P4 presentation. In the last weeks towards the P5 presentation governmental rules and regulations were sharpened and a curfew was implemented by the Dutch government. This was quit demotivating in the last weeks as it affected my mood. Due to Covid, some participants were not able to join the interviews (round 3) as they were sick or had to look after their young kids and did not have time to participate. This was a major challenge during in finalizing this thesis.

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Appendixes

Appendix I: Interview format (round 1 and 2)

Interview - Healthy Lease Model
Date:
Stakeholder:

Dear Interviewee,

Thank you for participating in this interview.
The aim of this interview is to get more insight in the potentials of a new type of lease contract, the health lease.

Background of research
In the real estate sector sustainability is often solely related to energy efficiency of buildings. Agreements on sustainability aspects can be laid down in lease contracts between building owners (landlords) and tenants. This is done by specific articles, an addendum to the lease or in a separate lease document, a so-called green lease. In a green lease landlord and tenant lay down agreements on mutual sustainability targets and costs and benefits are shared between the contract holders.

The last few years the focus shifts towards health and wellbeing of office users, rather than reducing the energy consumption (green buildings) of buildings. In 2014 the WELL Building Standard was introduced. This is the first building certificate that primarily focuses on health and wellbeing of office users. With (user) health in a more prominent role, it is interesting to examine in what ways landlords and tenants can make legal agreements relating to health and wellbeing in office building, a so-called healthy lease.

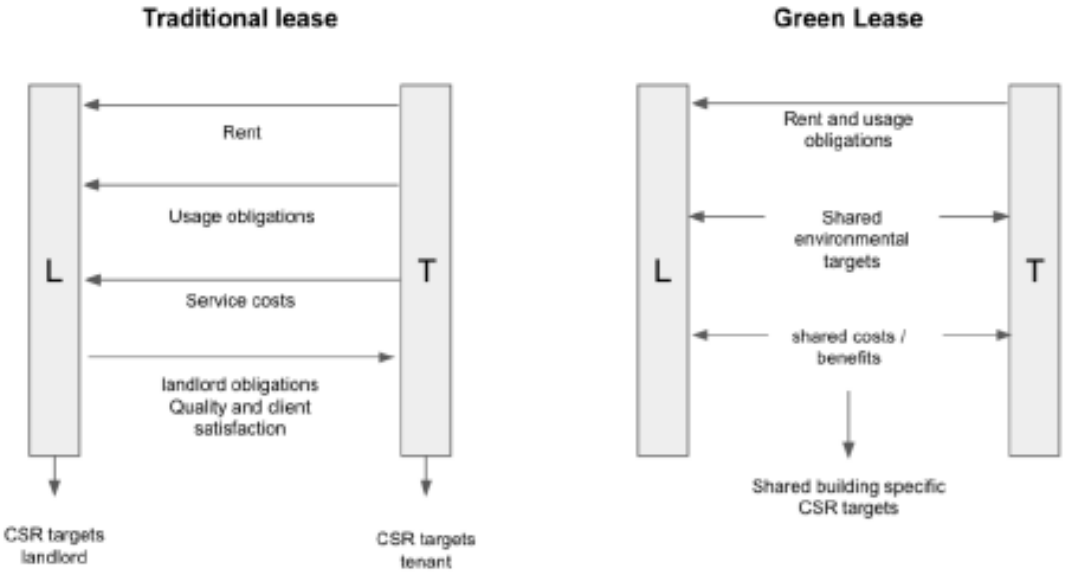
The aim of this research is to explore and develop guidelines for a new type of lease agreement in office buildings in office buildings, the healthy lease. The main research question is: ***"What are the different stakeholder potentials of a healthy lease model which can be applied in office buildings in the Netherlands?"*** This thesis consists of three phases:

1. analyse the concept of user health in office building and define the relevant health features
2. understanding the mechanisms of green lease contracts
3. combining the knowledge from the previous phases to develop and explore the potentials of a healthy lease.

Phase 1
Relevant health features in office buildings that have effect on user's health and can be steered by a landlord are:

- Air quality (ventilation)
- Light quality (natural / artificial)
- Noise
- Personal control (air, light, noise and temperature)

Phase 2
Mechanisms of green lease are shown below in a schematic overview.



Phase 3
Based on green leases, 4 main themes are identified which can function as a basis for the healthy lease:

- Communication : Cooperation obligation & Building management group
- Data sharing : Monitoring of air, light, noise, temperature, personal control
- Workspace : Right (not) to do works, alterations to leased space/building
- Labels ,certificates : Requirement to have a (health) label in place

This interview will be anonymously and consists of three different rounds.
Each round will be a follow up of the previous round.

In round 1 you will be asked to elaborate on each of the 4 themes, divided over 8 sub-themes (model articles of a Health Lease). The answers will be provided to you afterwards as feedback.

In round 2 you will be asked to rate each theme, based on the received feedback from round 1. You will be provided with the feedback (overall score) of all themes by all participants after this round.

In the last round we will reflect on the feedback of the previous rounds. You will be asked to rate the themes again by reflecting on the knowledge of the previous rounds.
ROUND 1

Could you indicate for each healthy lease theme (model article) below how it is or could be applicable for your organization and why? If not, please explain why not. It is highly appreciated if you substantiate your answers where possible with references to your organization's policies or other documents.

Co-operation obligation (COMMUNICATION)
Landlord and Tenant confirm that they wish to promote the health performance of the building. As well as to cooperate with each other in good faith to improve the health performance

Building management group (COMMUNICATION)
Landlord will provide a platform for the improvement of health performance and communication
This platform is used for health performance strategies, reviews and data sharing

Data sharing (DATA SHARING & MONITORING)
Landlord and Tenant will share data relating to health performance of the building
Data is used for monitoring, improving and measuring of agreed threshold targets

Threshold targets + Personal Control (DATA SHARING & MONITORING)
The Landlord guarantees predetermined threshold guarantees in the building on:
1 Air Quality, 2 Light quality, 3. Temperature and 4. Noise

Extend/Restrict right to do works by Landlord (WORKSPACE)
Landlord will not carry out works that adversely affect the health performance after obtaining (written) consent of the tenant on those works

Alterations by tenant (WORKSPACE)
Tenant will not carry out works that adversely affect the health performance after obtaining (written) consent of the landlord on those works

Reinstatement obligations (WORKSPACE)
Tenant is obliged to reinstate any alterations in the lease space at the end of the lease that have adversely effect on the health performance of the building

Sustainability labels (CERTIFICATES)
Landlord will make sure the building has a health certificate (minimum requirement) in place during the lease term. Landlord and Tenant will not carry out any works that adversely affect this label and/or certificate without mutual consent

ROUND 2

Could you rate each healthy lease theme based on the feedback you've received from round 1. Please also briefly explain why by referring to organization policies and round 1 feedback

Co-operation obligation

Not important at all	Low importance	Neutral	Important	Highly important
☐	☐	☐	☐	☐

Building management group

Not important at all	Low importance	Neutral	Important	Highly important
☐	☐	☐	☐	☐

Data sharing

Not important at all	Low importance	Neutral	Important	Highly important
☐	☐	☐	☐	☐

Threshold targets

Not important at all	Low importance	Neutral	Important	Highly important
☐	☐	☐	☐	☐

Extend/Restrict right to do works by Landlord

Not important at all	Low importance	Neutral	Important	Highly important
☐	☐	☐	☐	☐

Alterations by tenant

Not important at all	Low importance	Neutral	Important	Highly important
☐	☐	☐	☐	☐

Sustainability labels

Not important at all	Low importance	Neutral	Important	Highly important
☐	☐	☐	☐	☐

Reinstatement obligations

Not important at all	Low importance	Neutral	Important	Highly important
☐	☐	☐	☐	☐

Appendix II: Interview structure (round 3, validation and evaluation round)

Opening (minute 0-10)

- The stakeholders of both cases and external experts will briefly be introduced to each other
- The feedback of both rounds and cases will be summarized and stakeholders have the chance to ask questions.
- Based on the feedback the aim and structure of the third round is briefly explained

Discuss theme Labels and Certificates (minute 10-25)

- Discuss the pro's and con's for labels and certificates and try to reach consensus
- Pro: a label can be a good starting point to discuss tailor made agreements on health and well-being
- Pro: labels and certificates contribute positively to the branding of a building (landlords)
- Con: labels and certificates are to general. Tailor made agreements are more valuable in a healthy lease (tenants 1 and 2, case I).
- Potential questions for lawyer:
    - How should tailor made agreements be written down from a legal perspective?
    - Does it make sense to make a direct link with labels and certificates (examples from practice?)
    - Further recommendations?
- Potential question for property manager:
    - What are (technical) examples which can be included in a healthy lease (practical solutions)
    - Further recommendations?

Discuss theme Workplace (minute 25-40)

- Discuss the pro's and con's for workspace and try to reach consensus
- Pro: agreements on executing works can be laid down in a PoR and describes landlord and tenant obligations.
- Pro: agreements on executing works are not a limitation, but a stimulation to increase the health performance of a building within a healthy lease (shared building + environmental targets)
- Pro: a differentiation should be made between standard operational and health performance related works. This can be laid down and explained in PoR.
- Con: a stakeholder should be free to do necessary works in the building, without communication obligation
- Potential questions for lawyer:
    - Is there a legal a structure/form for a PoR? If yes, how does it look like (in the basis)?
    - Further recommendations?
- Potential question for property manager:
    - What are generally the standard operational works in a building?
    - Further recommendations?
- Validate the outcome of the sub-theme reinstatement obligation. Is it still perceived as not essential to include in a healthy lease?

Discuss themes Data sharing & Monitoring and Communication and Dispute Settlement (minute 40-55)

- Validate the outcome of these themes (and sub-themes). Are they still perceived as essential to include in a healthy lease?
- What are potential further recommendations from landlords and tenants?
- Potential questions for lawyer:
    - Is privacy of workers an issue as it comes to data sharing and monitoring?

    - How can these be written down in a healthy lease agreement?
    - Dispute settlement when targets are not met?
    - Further recommendations?
- Potential question for property manager:
    - How are tenant meetings structured at this moment? What necessary steps should be taken to shape this into a BMG (for discussing long-term health performance strategies)
    - Further recommendations?

Closing (minute 55-55)

- Briefly summarize main outcome of this round (per theme).
- Opportunity to ask final question per stakeholder or from my side
- Closing

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