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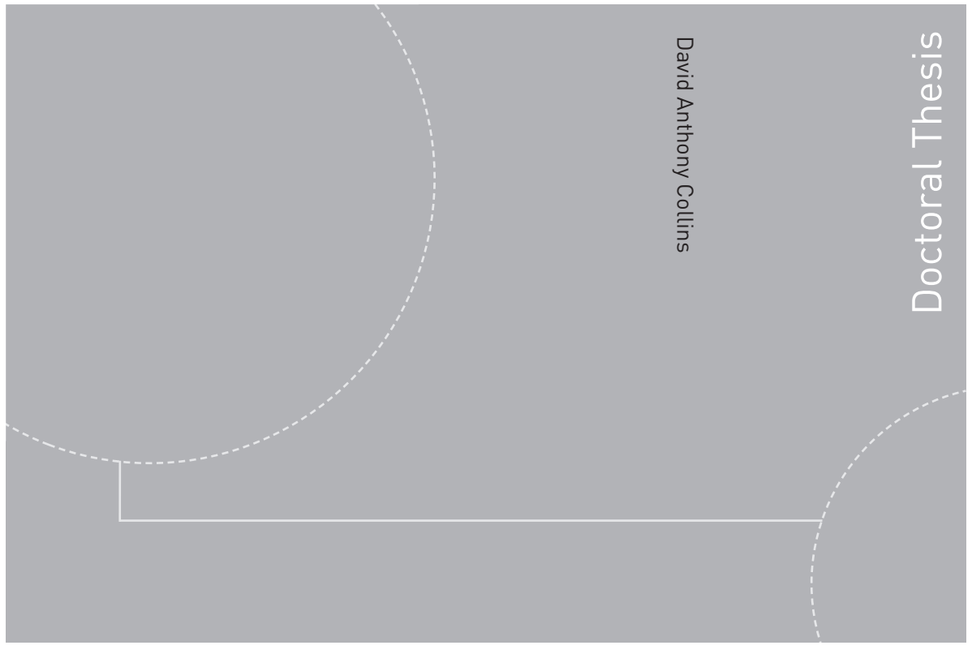

Doctoral theses at NTNU, 2019:150

David Anthony Collins

Green Leasing

A Study of the Barriers and Drivers for Green Leased Offices in Norway

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Thesis for the degree of Philosophiae Doctor

Trondheim, May, 2019

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Preface

The completion of this thesis project is the culmination of a journey of discovery where in many respects I found out as many new things about myself as I did about Green Leasing. I remember very clearly the warm Summer's afternoon in 2007 when I first considered doing a Doctorate. I was a student at Cardiff University, trying to study, but procrastinating and I began thinking that "*it would be a nice idea someday".* It seemed to be an impossible goal at the time that I did not pursue this thought any further. At this time, I was engaged in a very different discipline politics. If someone had told me in 2007 that in 2014, I would start a PhD in Sustainable Facilities Management, I would not have believed it and probably have asked "*what is facilities management?*". Whilst in the intervening decade or more the discipline has changed, my motivation for doing a Doctorate has not. That motivation is to satisfy the obsessive pursuit of knowledge which started when I was a child, and to pursue this knowledge in a way which would be useful to others and not just me. In this regard, I feel that this project has met my personal objectives, and hopefully other more extrovert ones.

The road to this topic has been long and complex, and I will not outline it '*blow for blow*' here. After graduating from Cardiff University I worked for a British Member of Parliament for nearly 5 years, before moving to Norway in 2012. I began a Masters degree at NTNU in Globalisation, Global Politics and Culture, a qualification I thought would strengthen my political competencies. By happy accident, this took a drastic change of direction in 2013. My degree mandated that I have a one-semester internship, and I chose SINTEF's Technology and Society division as my placement. They had no current political projects, but asked if I would be willing to apply my skills to a project on office productivity. Over the course of the next 6 months, I jumped out of politics and into studies of the built environment. I never looked back. By the end of 2013, I was actively searching for a PhD position where I could pursue research concerning sustainability in this context.

The position as PhD Fellow in Sustainable Facilities Management came up at the perfect time and began a few weeks after I completed my Master thesis. When preparing for the application, I brainstormed numerous social sciences orientated research proposals. However, in conversation with my friend and colleague Professor Thomas Berker, he suggested I look into Green Leases, as this encompassed the vast majority of my ideas. From then on, I have pursued Green Leasing research with the same levels of enthusiasm that I had previously experienced with politics.

The scope of this project has changed significantly since the beginning. The emphasis on 'Green Leases' eventually morphed into 'Green Leasing', as I felt there was more untrodden territory with the latter, it capitalised on my skills, and it found the subject more interesting. Whilst the scope has changed, this happened organically. Studies have informed other studies, and offered each stage of the process the time needed to both mature as science, and grow in my mind. This is also one of the rationales for writing an article based thesis (the other being the good advice I was given by my supervisors), as it allowed for the more natural development of the research in stages, with the added bonus of making my results available before the completion of the project in a format more easily accessible to the community.

I have many ambitions for the legacy of this work, and hopefully as few as possible of these are purely self-serving. I think the aim of all PhD projects, is that they have a tangible impact on their field, and mine is no different. I hope that the term '*Green Leasing*' can jump out of my thesis and into the long list of terminology in our field. I also plan that it doesn't stop there, and that this term continues to develop beyond the work I have conducted here. I also hope that the industry can take something from this research, particularly in the context of making sustainable buildings and Green Leasing more attractive and less challenging. I do not claim to have solved or even illuminated all of the problems associated with these issues. I hope however to have found out some we have not known about before, and maybe encourage others to take it even further. I aim to remain on an academic career for as long as I am permitted, and I hope that this thesis will be the springboard for me staying in this topic and be one of the people I mentioned earlier who will keep moving these issues forward. I want this thesis to be a coma, not a full stop.

In terms of a more self-serving objective, I hope I have proved to myself my doubts about my ability to get a PhD were unfounded. I didn't think I would become a PhD student, and I certainly felt concerned that I might not be a good one. I hope that in 30 years when I am an older, wiser and more established academic that I can take this document off my bookshelf, wipe off the dust and remember some of the happiest years of my life, and remind myself that I should always try to be brave.

I will end this preface with a quote from Steward Brand from the 'Whole Earth Catalogue' that should be a guide to common sense for everyone:

"Stay Hungry. Stay Foolish"

Abstract

This thesis discusses Green Leasing in office buildings, and the drivers and barriers associated with its development and implementation, with a particular research focus on Norway. The research for this project was funded by NTNU, more specifically the Centre for Real Estate and Facilities Management at the Department of Architecture and Planning in the Faculty of Architecture and Design. The aim of this thesis was to explore Green Leasing and related topics (such as Green Leases) in the context of their potential (both currently and prospectively) in the context of the built environment. This project is a three-phase study using mixed methods and is for the most part exploratory, containing a combination of interviews, a survey and literature research. The end objective was to better understand the state of current research and terminological penetration, the drivers and barriers for the development of Green Leasing in offices, as well as the current situation and future possibilities for facilities management in this context. The results of these studies are presented in the thesis as well as the attachment of eight articles, seven of which have undergone full peer review and acceptance for publication in their respective journal or conference at the time of this thesis publication.

The focus of this research has been Green Leasing in office buildings in both the private and public sectors. Whilst the main weight of focus has been on offices in Norway, two of the three studies in this thesis have also been international in nature, containing data from the United Kingdom and the United States of America. To achieve the objectives of this thesis, the project presents three research questions in order to focus the research. 1) An overview of the current level of attention and research in Green Leasing at present, as well as an investigation into terminological consistency. 2) An investigation of the barriers and drivers for the development and lease up of Green Leased offices from the perspective of owners and tenants. 3) A look into the challenges for facilities management in the context of the development of sustainable buildings. It is hoped that these research questions will create some clarity regarding the emerging term of 'Green Leasing', lift the lid from the challenges and opportunities for the development and occupancy for the building in which they would be employed, as well as looking at the challenges and opportunities this would present for facilities management support services.

Chapter 1 presents an overview of the problem statement, the scope of the research and the research questions. In terms of the problem statement, there is currently a gap in knowledge concerning what 'Green Leasing' is, and the degree to which it is recognised and understood

in academia and practice. For the most part, Green Leasing needs a Green Building. There is also a gap in knowledge in this regard, as (in the case of Norway) there is very little information concerning the barriers and drives for developing these buildings. Thirdly, the types of facilities management and the challenges they face are also a relatively under-researched topic in Norway. These are important aspects to address in order for Green Leasing to enjoy more a more productive upward momentum both in Norway and beyond. In terms of scope, this project focuses primarily on Norway due to the resources and geographical location of the researcher, however international data has also been obtained to support these findings. The thesis will also focus on non-residential buildings, specifically offices from both the private and public sector.

Chapter 2 is the chapter concerned with establishing the theoretical frameworks of the project. In this chapter terminology such as '*Facilities Management*' and '*Sustainable Facilities Management*' is defined, as well as a preliminary definition of '*Green Leasing*'. This section also looks at the most common sustainable building certifications, as well as theories on the sustainable built environment. The chapter then moves on to more general theoretical framework concerning sustainability and buildings such as the '*Triple Bottom Line*', as well as social science orientated theories such as '*Split Incentives*' and even business theories such as '*Corporate Social Responsibility*'.

Chapter 3 contains the methodology and research design for this project. The research design for this project was a mixed method study, containing both qualitative and quantitative elements. This was to allow for comparable quantitative data to be accumulated, but also allow for a more narrative and exploratory approach through qualitative questioning. The research design was divided into three separate studies. 1) Qualitative interviews with expert witnesses in sustainability in the built environment. The aim of these interviews was to establish the state of the art and purpose of a need for the larger doctoral project. 2) Qualitative interviews with quantitative elements with the owners and tenants of BREEAM and LEED-certified office buildings. The interviews were conducted with respondents from Norway, the United Kingdom and the United States of America with the aim of establishing the barriers and drivers for the development and occupancy of their respective building. 3) A quantitative survey with qualitative elements with the owners and tenants of sustainable office buildings in Norway. This study addresses the same barriers and drivers questions as the previous interviews, however this also addresses Green Leases in these buildings and the types of Sustainable Facilities Management they employ.

Chapter 4 is the presentation of the findings in a '*paper by paper*' format. These papers establish that coverage of Green Leasing (and Green Leases) in academia and practice is patchy, but that there is an increase in their research and implementation. There is no universally acknowledged definition of Green Leasing at present, so the researcher has attempted to establish one. There are also little to no pan-country or pan-sector drivers and barriers for sustainable building development established by this research, although limited synergy does exist in some quarters. Sustainable Facilities Management is becoming increasingly widespread in Norway, however, most of this facilities management is technical in nature and focuses on energy management. Green Leases are also becoming more prominent; however, there is a significant difference in penetration and awareness of the concept in both the private and public sectors.

Chapter 5 illustrates the integration of the research findings with the research questions. each research question is addressed in turn, 1) Research is currently mixed in terms of scope and coverage, but it is increasing. There is also a terminological deficit which this thesis has attempted to address. 2) The barriers and drivers are broad in scope and lack total synergy. However, broadly speaking '*Costs*' is one of the more important drivers, whilst in term of barriers, there was a degree of agreement that these were related to technical challenges in earlier lifecycle phases. 3) Many of the buildings studies featured Sustainable Facilities Management, with a primary focus on energy management. Whilst other aspects (such as waste management) were not entirely ignored, they were of lesser importance to the respondents. The changes to the facilities management industry also result in numerous challenges. New skills and competencies are required in order to meet the needs of increasingly advanced buildings, and innovations to support technologies and involve facilities managers more significantly in the design of sustainable buildings and Green Leasing infrastructure.

Chapter 6 is the concluding chapter. This chapter features what the researcher feels are his contributions to new knowledge, as well as recommendations for future research. One of the more prominent contributions is the establishment of a more solidified definition of the term *'Green Leasing*'. The author of this thesis has tried to fulfil the need for such a term in the lexicon of facilities management and the study of the built environment. This thesis has also demonstrated that there is only limited synergy in the barriers and drivers for owners and tenants, both in Norway and internationally, which is something that owners, governments and interested institutional entities should be made aware of. The final major contribution is a

demonstration that facilities management is a core part of Green Leasing implementation. This presents challenges and new skills, resources and technologies are needed in order to make this happen. This thesis also makes recommendations for future research. Further research is needed beyond this thesis in order to better establish Green Leasing as a term, both to keep this term 'live' and in order to expand its scope. There is a need for further research on the barriers and drivers using data from a larger country and personnel sample. Whilst this thesis established limited synergy in terms of the barriers and drivers, this finding could change in a larger study. Finally, educational and technological advances are needed in order for Green Leasing to be applied and to be successful. Also, more attractive incentives must be created in order to move the facilities management scope beyond a heavy focus simply on energy management.

Sammendrag

Denne oppgaven diskuterer Grønn utleie i kontorbygg, driverne og barrierer knyttet til utvikling og implementering, med et spesielt forskningsfokus på Norge. Forskningen til dette prosjektet ble finansiert av NTNU, nærmere bestemt Senter for eiendomsutvikling- og forvaltning, ved Institutt for arkitektur og planlegging, Fakultetet for arkitektur og design. Formålet med denne avhandlingen var å utforske Grønn utleie og relaterte emner (for eksempel Grønne leieavtaler) i sammenheng med deres potensial (både for tiden og prospektivt) i sammenheng med det bygde miljøet. Prosjektet besto av en tre - faset studie av blandede metoder, og er for det meste utforskende, og inneholder en kombinasjon av intervjuer, spørreundersøkelse og litteraturforskning. Målet var å bedre forstå tilstanden av nåværende forskning og terminologisk inntrengning, driverne og barrierer for utviklingen av Grønn utleie på kontorer, samt dagens situasjon og fremtidige muligheter for administrasjon i denne sammenheng. Resultatene av disse studiene presenteres i avhandlingen, samt vedlegg av åtte artikler, hvorav sju har gjennomgått full 'peer review' og aksept for publisering i deres respektive tidskrift og konferanse på tidspunktet for denne avhandlingen.

Fokuset på denne undersøkelsen har vært Grønn utleie i kontorbygg, både i privat og offentlig sektor. Mens fokusvekten har vært på kontorer i Norge, har to av de tre studiene i denne avhandlingen også vært internasjonale, og inneholder data fra Storbritannia og USA. For å oppnå målene med denne avhandlingen, presenterer prosjektet tre forskningsspørsmål. 1) En oversikt over dagens nivå av oppmerksomhet og forskning på Grønn utleie, samt en undersøkelse av terminologisk konsistens. 2) En undersøkelse av barrierer og drivere for utvikling og utleie av kontorer med Grønne leieavtaler, ut fra eiers og leietakers perspektiv. 3) Se på utfordringene for forvaltning i sammenheng med utviklingen av bærekraftige bygninger. Håpet er at disse forskningsmessige spørsmålene vil skape klarhet om det nye begrepet "Grønn utleiebelyse utfordringene og mulighetene for utvikling, og utleiegraden for bygningen der de skulle bli ansatt, samt se på utfordringene og muligheter dette vil presentere for service management tjenester.

Kapittel 1 presenterer en oversikt over problemstillingen, omfanget av forskningen og forskningsspørsmålene. Når det gjelder problemstillingen, er det for tiden et gap i kunnskap om hva "Grønne utleie" er, og i hvilken grad det blir anerkjent og forstått i akademia og praksis. Først og fremst trenger Grønn utleie en Grønn bygning. Det er også et gap når det gjelder kunnskap i denne sammenhengen (i dette tilfelle Norge) da det både er lite

informasjon om barrierer og drivkrefter for å utvikle disse bygningene. For det tredje er Facilities Management og utfordringene det møter, et tema det er forsket relativt lite på i Norge, ogdette er viktig å få gjort for at Grønn utleie skal kunne økes både Norge og utlandet . Når det gjelder omfang, fokuserer dette prosjektet primært på Norge på grunn av ressurser og geografisk plassering av forskeren, men internasjonale data er også innhentet for å støtte disse funnene. Avhandlingen vil også fokusere på rene kontorbygg, fra både privat og offentlig sektor.

Kapittel 2 omhandler oppretting av prosjektets teoretiske rammer. I dette kapitlet defineres også terminologier som " Facility Management " og " Sustainable Facilities Management ", samten foreløpig definisjon av "Grønn utleie ". Denne delen ser også på de vanligste bærekraftig byggesertifiseringene, samt teorier om bærekraftig byggemiljø. Kapittelet går da videre til mer generelle teoretiske rammer om bærekraft og bygninger som " Triple Bottom Line ", samt flere samfunnsvitenskapelige orienterte teorier som " Split Incentives " og til og med forretningsteorier som " Corporate Social Responsibility ".

Kapittel 3 inneholder metodikk og forskningsdesign for dette prosjektet. Forskningsdesignet for dette prosjektet var en studie med blandet metodebruk, som inneholdt både kvalitative og kvantitative elementer . Årsaken var at sammenlignbare kvantitative data kunne akkumuleres, men også muliggjøre en mer narrativ og utforskende tilnærming gjennom kvalitative spørsmål.Forskningsdesignet ble delt inn i tre separate studier. 1) Kvalitative intervjuer med sakkyndige vitner om bærekraft i det bygde miljøet. Formålet med disse intervjuene var å stadfeste betydningen og behovet for det store doktorgradsarbeidet. 2) Kvalitative intervjuer med kvantitative elementer sommed eiere og leietakere av BREEAM og LEED - sertifiserte kontorbygg. Intervjuene ble gjennomført med respondenter fra Norge, Storbritannia og USA med sikte på å kartlegge barrierer og drivere for utvikling av deres respektive bygg. 3) En kvantitativ undersøkelse med kvalitative elementer med eiere og leietakere av bærekraftige kontorbygg i Norge. Denne studien omhandler de samme barriere- og drivere-spørsmål som de foregående intervjuene, men tar også hensyn til grønne leieavtaler i disse bygningene og hvilke typer bærekraftig forvaltning de benytter.

Kapittel 4 er presentasjonen av funnene i et papirformat. Disse dokumentene fastslår at utbredelsen av Grønne utleie (og Grønne leieavtalers i akademia og praksis er ujevn, men at forskningen og implementeringen øker. Det er ingen anerkjent definisjon av Grønn utleie for

tiden, så forskeren har forsøkt å etablere en. Det er også lite eller ingen verdensomspennende eller multisektor drivere og barrierer for bærekraftig bygningsutvikling etablert av denne undersøkelsen, selv om det er begrenset synergi i noen omrader. Bærekraftig Facilities Management øker stadig i Norge, selv om det i hovedsak er av teknisk karakter og fokuserer på energistyring. Grønne Leieavtaler blir også stadig mer fremtredende, men det er en betydelig forskjell i utbredelse og bevissthet om konseptet mellom både privat og offentlig sektor.

Kapittel 5 er integrering av forskningsresultatene med forskningsspørsmålene. Hvert forskningsspørsmål besvares, 1) Forskningen for tiden er blandet når det gjelder omfang og utbredelse, men den øker. Det er også et underskudd når det gjelder terminologi, som denne oppgaven har forsøkt å ta opp. 2) Barrierer og drivere er brede i omfang, og mangler en total synergi. Imidlertid er det kostnader som er en av de viktigste driverne, mens når det gjelder barrierer, var det en enighet om at de var knyttet til tekniske utfordringer i tidlig livssyklusfase. 3) Mange av bygningsstudiene inneholdt bærekraftig fasilitetsstyring, med hovedfokus på energiledelse. Mens andre aspekter (som avfallshåndtering) ikke ble fullstendig ignorert, men opplagt var av mindre betydning for respondentene. Endringene i Facilities Management næringen resulterer også i en rekke utfordringer. Nye ferdigheter og kompetanse kreves for å møte behovene til stadig mer avanserte bygninger, samt behovet for å innføre støttende teknologier og involvere forvaltere betydelig mer i utformingen av bærekraftige bygninger og infrastruktur for Grønn utleie.

Kapittel 6 er det avsluttende kapitlet. Dette kapitlet inneholder hva forskeren mener er hans bidrag til ny kunnskap, samt anbefalinger for fremtidig forskning. En av de mer fremtredende bidragene er etableringen av en mer solidifisert/sikker definisjon av begrepet "Grønn utleie ". Det var et behov for et slikt begrep i vokabularet for fasilitetsstyring og studiet av det bygde miljøet, som denne oppgaven har forsøkt å fylle. Denne oppgaven har også vist at det bare er begrenset synergi i barrierer og drivere for eiere og leietakere, både i Norge og internasjonalt, noe som eiere, regjering og interesserte organisasjoner bør bli oppmerksom på. Det viktigste bidraget er at fasilitetsstyring er nødvendig ved implementering av Grønn utleie, men utfordringen vil være behovet for nye ferdigheter, ressurser og teknologier som må koordineres for å få dette til å skje. Denne oppgaven har også anbefalinger for fremtidig forskning. Videre forskning er nødvendig utover dette avhandlingen for å få etablert Grønn utleie som et begrep, både når det gjelder å få det inn i dagligtalen og å utvide omfanget. Det er også behov for mer forskning på barrierer og drivere i et større perspektiv med flere land

og forskjellig personell. Mens denne oppgaven avdekket begrenset synergi med hensyn til barrierer og drivere, kan dette endres i en større studie. Avslutningsvis kan det sies å været behov for pedagogiske og teknologiske fremskritt for at Grønn utleie skal brukes og bli vellykket, samt at mer attraktive insentiver må tilbys for å flytte forvaltningsfokuset utover et sterkt fokus på bare på energistyring.

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Although there is only one name on the front of this thesis, this project would have been impossible to both execute and complete without the help and support of many people and institutions over the course of the more than 4 years it has taken to complete. The research in this project would not have been possible to complete without the cooperation of those I surveyed and interviewed in Norway, the UK and USA. So many people spent much of their valuable time being kind and patient, listening to my questions, filling out a survey online and providing valuable advice that helped form each step of this project. I also want to thank the 'gatekeepers' who provided me with email addresses, phone number and introductions that afforded me the possibility to obtain the data I needed. Thank you so much to Martin Townsend at BREEAM, Kristin Haaland at the NBEF, Katie Kalunzy at the USGBC in Chicago, Anders Solem at Enova and the many others who helped me obtain contacts for my studies.

I could not have brought this project to completion with the help and support of my colleagues at NTNU and SINTEF. It didn't matter whether I asked them to look at my survey for the 50th time, brainstormed ideas, read my papers, provide feedback or even listened to me complain, you never turned me away and always met me with a smile. You are all a credit to the University system and I can't imagine more respectable and understanding colleagues. Amongst the many of these lovely people were Inger Andresen, Geir Hansen, Elin Røsok, May Uran, Anne Kristin Stenersen, Nora Johanne Klungseth, Nils Olsson, Kristin Skog, Ingrid Breivik, Gjertrud Hammeren, Marion Sandnes, Tina Nanina Sørevik and Siri Blakstad. I also want thank Morten Hatling at SINTEF for setting me down the built environment path and for offering me my first proper research position. I also want to thank Thomas Berker for taking the time to look at my research proposal all of those years ago, and for first mentioning the name 'Green Leases' to me. The three heads of the department during my PhD have also been wonderfully supportive of my project, Siri Bakken, Judith Borsboom and Lise Linge. I have three special thank you's for three very special people who have been of immense importance over the course of this journey. Firstly, Christian Aamodt. You started out as the student who fell asleep during my first ever lecture but ended up as a fantastic scientific assistant and wonderful friend. It was a pleasure to teach you, work with you, write with you and to be your friend. I greatly value our chats about video games! The second is Maja Todoroska. As our

PhD coordinator, you were wonderfully talented and very much loved by our PhD community. As a friend I always valued our long (sometimes very long) chats, jokes, scheming and even occasionally, some work. Of particular mention is my proxy big brother Roberto Valle Kinloch. You have always been a wonderful support and help along the way, and a wonderfully fun conference companion.

I also want to thank the many students I have taught since 2014. I have learnt from and been inspired by them far more than they realise.

I was told some time ago that a PhD can be a very lonely experience. I am happy to say that this was never something I ever experienced, as we are a wonderful little PhD community. We have been our own comedians, guidance councillors, and family. We have laughed, cried, and laughed even more. We have shared ideas, dreams, and even the odd disaster. We have supported each others projects, attended each other hearing and so much more. You have all given me some of the golden years of my life, and I will treasure it always. I want to name all of you, but there is no room, so instead for posterity, I will mention my intake of David Smith, Maria Coral Ness, Ray Pritchard and Eszter Nagy. It has been an honour to be your colleagues, friend and board representative.

My wonderful family had an incalculable impact on this work, both before and during this project. I want to thank my wife, Kjersti Hofstad. She was supportive of me doing a PhD long before I had even applied for one. She has had to tolerate me vanishing off to conferences, put up with me talking about Green Leases every day and tolerating all of the grizzles that sometimes come with it. She has never once complained and possesses a level of understanding I do not possess. I have also valued her wonderful brain giving me advice and listening to my ideas. I could not have done it without you. I want to thank my Mother and Father, Kim and Dylan Collins. Throughout the course of this project, they have listened to me, calmed me down, taken an interested in the work I have done, and even offered to come to my conferences! Your love and support have been a keystone of the project for me. I am also endlessly grateful to my mother for spending the better part of a week proofreading my work and showing herculean levels of patience. Whether I will now know the difference between ‘to’ and ‘too’ however remains to be seen! Thank you also to my brother James for our long and interesting chats about real estate and for keeping my practice knowledge grounded. I am also lucky enough to have a second Mum and Dad, Hanne Karlsen and Torbjørn Hofstad. You gave us a place to live when we moved to Norway in 2012, witnessed the tears and laughter that come

with the challenges of moving country and have listened and supported me throughout the PhD. Thank you so much. I also want to thank my Aunt, Elisabeth Rokkones. Our philosophical discussions and non-stop laughs made some very challenging times much less challenging.

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If I have learnt one thing over the course of my PhD, it is that the experience is only as good as the supervisorial team behind. If this is the benchmark by which these things are set, then I couldn't have had a better PhD experience. Thank you for my original main supervisor, Antje Junghans. Thank you for taking a chance on me and letting me fulfil my dream. You always provided incredibly valuable, deep and detailed feedback, and always pushed me hard to make me a better scholar. Even after your move to Zurich you still took time to look at my work, for which I am very grateful. Thank you to my main supervisor, Tore Haugen. Your kindness, patience and wisdom have left an impact on me that will never go away. You have encouraged me to take on new challenges, responsibilities and most importantly, always encouraged me to believe in my work. If someday I can be half the Professor you are, I will consider my academic career a success. Thank you also to my second supervisor Carmel Lindkvist. You were only on the team for the last year, but you were instrumental in the completion of this project. You have been a wonderful collaborator and friend, and I have valued all of your feedback from our shared social sciences background and for being a wonderful procrastination partner when I needed it!

This thesis is dedicated to my Grandfather, John (Tony) Anthony Jandrell (1927-2011). My only sadness during this adventure is that I was not able to share this journey with him, and I know he would have been happy that all of his encouragement and belief in me was not unfounded. Grandad, you were right.

List of Papers and Authors Contribution to Papers

Paper I

Collins, D. and A. Junghans (2015). The Users Impact on Buildings' Sustainability - A Qualitative Approach. *14th EuroFM Research Symposium. Glasgow, Scotland, EuroFm.*

The author initiated and wrote the paper and conducted the data collection and analysis.

Paper II

Collins, D. and A. Junghans (2015). "Sustainable Facilities Management and Green Leasing: The Company Strategic Approach." *Procedia Economics and Finance 21: 128-136.*

The author initiated and wrote the paper and conducted the data collection and analysis.

Paper III

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Paper IV

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Paper V

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Paper VIII

Collins, D., Haugen, T., & Aamodt, C. (2017). *BRIDGING THE GAP BETWEEN SUSTAINABLE FM AND SUSTAINABLE BUILDINGS: An exploratory study of six public buildings in Norway*. Paper presented at the International Research Conference 2017, University of Salford.

Collins, D., Haugen, T., Lindkvist, C., & Aamodt, C. (2019). *BRIDGING THE GAP BETWEEN SUSTAINABLE FM AND SUSTAINABLE BUILDINGS: An exploratory study of six public buildings in Norway*. *Facilities.* Currently in 'Earlycite'

The author of this paper was responsible along with the other authors for initiating the paper and had joint responsibility for writing the paper, and analysis. Data collection was completed by students.

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List of Abbreviations

BBP	Better Buildings Partnership
BIFM	British Institute of Facilities Management
BREEAM	Building Research Establishment Environmental Assessment Method
BMS	Building Management System
CAFM	Computer Aided Facilities Management
CEN	European Committee for Standardisation
CBD	Central Business District (Oslo)
CRC	Carbon Reduction Commitment
CRE	Corporate Real Estate
CSR	Corporate Social Responsibility
EFMC	European Facilities Management Conference
EPC	Energy Performance Certificate
EU	European Union
EuroFM	European Facilities Management Network
FM	Facilities Management
FM's	Facilities Managers
ZEN	Research Centre for Zero Emission Neighbourhoods in Smart Cities
IFMA	International Facilities Management Association
ISS	Integrated Service Solutions (FM Company)
kWh	Kilowatt Hours
LEED	Leadership in Energy and Environmental Design

MINDER	Methodologies for Improvement of Non-Residential Buildings' Daily Energy Efficiency Reliability
MOU	Memorandum of Understanding
NBEF	Norges bygg og eiendomsforening ('Norway's Building and Real Estate Association')
NE	Norsk Eiendom ('The Norwegian Property Association')
NGBC	Norwegian Green Building Council
NTNU	Norwegian University of Science and Technology
NSO	National Scheme Operator (BREEAM)
OM	Organisational Management
RE	Real Estate
SB	Sustainable Building
TBL	Triple Bottom Line
SFM	Sustainable Facilities Management
UK	United Kingdom
UN	United Nations
USA	United States of America
WGBC	World Green Building Council
ZEB	Norwegian Centre for Zero Emission Buildings

1. Introduction

1.1. Statement of the Problem

Whilst attempts to address the sustainability deficit in the built environment is nothing new, *Green Leasing*, referring preliminarily to '*the leasing out of a building in a sustainable manner*', is a relatively new means by which this has been addressed. For many in research and practice, the justification for addressing environmental concerns through Green Leasing or a related means is clear. With 40% of energy consumption and 36% of emissions in Europe coming from buildings ("Buildings," 2017), sustainable development in the context of buildings and their use has great potential to reduce European and global emissions. Whilst sustainable development in the context of the built environment is not new, the potential of building users to contribute to this is only now being realised. The types of engagement that can be positive to a building's sustainability can vary widely in scope from turning off electronics, to having users involved in identifying problems, troubleshooting them, and even finding solutions for sustainability-related and other workplace issues (Bull et al., 2017, p. 312). More specifically, office buildings are an example of a building type that offers considerable potential for emissions reductions, mainly due to their operational practices. An example of this, is an office computer. Consider that an office user has a computer, which they leave turned on permanently, yet they are only in their office for 8 hours a day for five days out of the week. This means that 75% of that devices energy consumption is occurring when not being utilised by the user. This mindfulness on user-based energy consumption is more potent when considering that in a rented office building tenants can be responsible for anything from 14% to 65% of their buildings energy consumption (*Energy Consumption in Office Buildings: a Comparative Study*, 2017, p. 25). This level of potential to improve the sustainable credibility of offices, also attracts research from a range of disciplines which fits within the architectural, built environment, business and facilities management (FM) contexts. These range from the works of FM academics such Elmualim (2009) (Elmualim et al., 2009), to law experts such as Susan Bright (2014) (Bright et al., 2014), and even the social sciences such as the work of Thomas Berker (2017) (Berker, 2017). With a variety of fields working on sustainability issues, there naturally comes a variety of potential solutions.

Whilst Green Leasing is not the only means by which these issues can be challenged, the importance of this approach specifically cannot be dismissed. This thesis deals with Green Leasing issues primarily from the perspective of the Norwegian situation. Whilst the geographical proximity of the researcher is a part of the rationale behind this choice, the emphasis on environmental regulation in the built environment, the move towards the so-called '*Green Shift*' and other related matters were also an influencing factor. This project contains an international element in order to provide a degree of context for the Norwegian situation with regard it placement with other countries. The potential of Green Leasing in the context of the Norwegian case is influenced by the high level of rental in the non-residential sector, which makes Green Leasing a prime mechanism for positive environmental change. International real estate consultants 'Colliers International' state, for example, that real estate in Oslo's central business district had a vacancy rate of only 7.03% for offices in 2018, with a rental income increase of potentially 15% (due to a relative stagnation of new building projects) at the close of 2018 (Colliers, 2018, pp. 12, 32). Based on these types of figures, the importance of including leasing processes as a core part of sustainability planning in offices is demonstrated. With the significance of the scope and potential of the rental office market in Norway, leveraging a leasing based sustainability such as Green Leasing cannot be ignored by interested parties in both academia and practice.

Whilst the figures regarding rent and vacancy rate do not represent a problem, the means of addressing it does. Office users may be considered to be a core aspect of this challenge. In terms of environmentally positive behaviour, the motivations of users to conduct this effectively is often cited in research, as opposed to further contextual factors (Windlinger et al., 2012, p.3). To address this in a focus that can be 'one to one' if necessary, as well be an aspect of sustainability-focused resource management, facilities managers are an essential focus in delivering positive outputs to these challenges (Elmualim et al., 2008, p.3). Sustainable thinking is also an example of a new way of doing business. This is recognised in many industries (not just in buildings) where a greater understanding of the business value of sustainable thinking can lead towards businesses being the leaders in sustainable development, as opposed to government and regulatory bodies in some contexts (Gouldson et al., 2014, p. 2988). Property developers are increasingly keen to capitalise on issues of sustainability, as a part of their corporate social responsibility programs (Myers, 2007, p.5), although the degree to which this motivates landlords to develop sustainable buildings and for tenants to occupy them is still under-researched, particularly in Norway. Green Leasing is

a leasing concept that attempts to meld all three of the aspects: environmental considerations, users and facilities management – and all within the overarching concept of rental offices.

As previously mentioned, Green Leasing is a relatively new concept (and addressed in more detail and defined in section *2.2*). The researcher believes that problems arising from this new concept include substantial knowledge gaps resulting from a lack of attention in academia and practice, and the relatively recent (and ultimately ongoing) development of the term '*Green Leasing*'. The researcher does not claim or endeavour to identify and explain all of the gaps associated with Green Leasing but instead tackles the following ones which they perceive to be the most detrimental to the development of the term and concept. A lack of attention in academia and practice at present, results in fragmented technological standardisation, scope and limited development when compared to the likes of Sustainable Facilities Management. From a more practical perspective, there has been limited (although not entirely absent) research into the barriers and drivers for Green Leasing, as well as the types of FM that exist to support it. limited work has been conducted to link this term to the more commonly cited and more thoroughly researched term '*Green Lease*'. Without an adequate mission to attempt to address many of these aspects, the development of more sustainable leasing options could be denied much-needed momentum.

It is evident in research and practice fields, that a more encompassing approach is needed in order to successfully tackle many of the challenges associated with the development of sustainable building stock. This is commonly referenced in context with the term 'holistic' and is also often linked with such issues in a lifecycle context. From the perspective of industrial standards, the standard of EN15978:2011 on the '*Sustainability of Construction Works*' divides a building into the categories of "*Production, Construction, Use and End of Life*" which provides a detailed roadmap for sustainable optimisation possibilities throughout a buildings lifecycle, particularly in the context of FM (CEN, 2011). Due to the diverse nature of Green Lease and Green Leasing research, and the built environment more generally, a holistic approach is essential. Studies in this area come from a vast array of disciplines, from FM to architecture and beyond. Studies of the built environment also have intrinsic dynamic properties that cover the variety of points of attention that can be found in the whole of a building lifecycle. Therefore, a holistic approach is essential when approaching research into Green Leasing. Practical implementation, has been somewhat fragmented when looking at the likes of sustainable certification methodologies. Europe's leading sustainable certification for buildings the '*Building Research Establishment Environmental Assessment*

Method' (BREEAM) offers certifications for the vast majority of building lifecycle stages, however, this cannot really be considered 'holistic' as these are offered over several separate certifications (BREEAM, 2018b).

In the absence of a truly holistic or 'theory of everything' approach to tackling sustainability in the built environment, solutions that cover as many of these lifecycles phases as possible are considered to be a more workable possibility. Two related solutions straddle a variety of fields, lifecycle considerations and more are Green Leases and Green Leasing. These concepts have the possibility to positively impact emissions and energy consumption through reducing unsustainable behaviour and practices, as well as other means that encourage users to positively impact their office spaces sustainability. Although has been recognised in the academic discussion for slightly more than a decade (in the case of Green Leases), it is still under-researched in academia, particularly in the context of FM. For example, a Google Scholar search for the terms "Facilities Management" and "Green Leasing" together yields only 49 results, 10 of which are either papers written by the researcher or are papers where the researcher of this thesis is cited ("Google Scholar Search for "Facilities Management" and "Green Leasing"," 2018). Whilst a Google Scholar search is not a definitive measurement, it does at least superficially represent a research gap between Green Leasing and FM. Whilst no research has been conducted this, it could be due to numerous factors. As mentioned later in this thesis, Green Leasing is a relatively new term, which as a result means that research and researchers in both initiatives are simply not as well established as related disciplines such as FM and architecture. This could also be due to the momentum in more established disciplines, where elements of the topics (e.g. the role of FM in Green Leasing) are of importance to a field (e.g. FM), but less relevant when thinking of these topics more holistically due to divergent aspects (e.g. the financial case for a BREEAM certification).

The addressing of FM in the context of Green Leasing serves a vital role, primarily due to the importance of facilities managers (FM's) not just to support the technical infrastructure of their building, but also the possibilities to empower and engage with building occupants to support the sustainability goals of the buildings they occupy (Elmualim et al, 2010). Similarly, FM can be considered to relate to issues concerning value management, customer satisfaction and value for money (Enoma, 2005 p. 421). Whilst this is a subject that is becoming increasingly understood in broader scholarship, the added value in the context of Green Leasing is less understood.

Whilst Green Leasing needs effective FM to support it, there also needs to be a better understanding of the opportunities and challenges that exist in developing and letting out the buildings where such leasing is generally employed. This is especially significant when it comes to the potentially differing opportunities and challenges between owner/ developer and tenant. Whilst scholars such as Eichholtz *et al* (2013) (Eichholtz et al, 2013) and Kok *et al* (2012) (Kok et al., 2012) have endeavoured to address these issues, such as resource management and accessibility of sustainability primarily through economic value, as yet, there is no study at the Norwegian national level that looks at opportunities such as Corporate Social Responsibility (CSR), and challenges that relate to market demand. These types of studies are even rarer when considering their impact on FM.

This study contributes to research on Green Leasing by looking at the barriers and drivers for the development and rental of sustainable office buildings in Norway, and the FM which supports these buildings. Norway is are becoming one of the world leaders in addressing issues in practical projects in the context of the sustainable built environment. From its mandatory Passive House regulations in certain buildings, to its own institutionalised initiatives such as Enova, Norway is uniquely placed to conduct research on the sustainable built environment. This placement combined with Norway's high rental level in the non-residential sector (*The Norwegian Commercial Property Market*, 2017, p.6) ensures that tackling sustainable development through the rental and leasing system has a justification of need. Green Leases and Green Leasing are a method by which this can be addressed, as the research associated with these leasing concepts.

The research is primarily from the perspective of the stakeholders of the owner/ developer and the tenant. This study is conducted with a mixed method methodological approach. Particular concluding emphasis can be found in the final quantitative survey in this thesis is where particular concluding emphasis is placed, although all of the phases of this study have contributed to the conclusion.

1.2. Purpose of the Study

This doctoral thesis takes Green Leasing and looks into the barriers and drivers associated with its implementation, as well as the FM which exists in these Green Leased buildings. This thesis will also include recommendations based on the data collected, and the answers to

the research questions. As a young researcher, the author is also keen to make inroads into developing this field further.

This thesis was written partially focusing on FM and Green Leasing from the perspective of the social sciences. One of the reasons for taking this perspective is the social sciences position in the context of the sustainable built environment. This is because (in the context of energy consumption) the user's experience is a part of a 'socio-technical system' where the likes of culture, equipment and systems are altered through interventions (Bedwell et al., 2014,p. 1197), with Green Leasing being one possible intervention. This not only represents a variation on the FM discipline that is different in its academic discipline than much of the literature traditionally found in this field but also represents a different (and ultimately less technical) contextual scope. Furthermore, this thesis will reflect on filling the knowledge gap stated in the research questions and the purpose of the study. In essence, this is to provide an outline as to how Green Lease and Green Leasing issues are currently addressed in academia and practice, what barriers and drivers exist for the implementation and development of Green Leases and Green Leasing, along with the challenges and opportunities this presents for FM.

This study endeavours to achieve three main purposes:

- Firstly, to provide insight into the barriers and drivers for owners/ developers and tenants in Green Leased and Green Leasing operating rental office buildings in Norway and the degree to which these barriers and drivers differ between each stakeholder.
-
- Secondly, to better understand what FM and FM relevant support exist in Green Leased and Green Leasing operating office buildings in Norway what possibilities and challenges exist in FM supporting Green Leasing arrangements.

- Thirdly, to better understand 'Green Leases' and 'Green Leasing' issues in the context of FM, along with a better understanding of the use of both terms within the FM field.

1.3. Research Questions

The research approach is in some senses broad, in order to allow for a more eclectic approach towards the gathering of existing research information, with a more stakeholder centred approach in conducting the empirical elements of the research. The main objective of the thesis is the following:

The aim of this thesis is to identify the barriers and drivers associated with the development and leasing of sustainable rental office buildings in Norway and its associated facilities management. The overall goal is of generating new knowledge in this field in new and existing buildings both the private and public sectors.

Furthermore, the aim is to tackle to following research questions:

RQ1: *To what extent is research and the implementation of Green Leases and Green Leasing being given attention by academia and practice in the context of Sustainable Corporate Real Estate and Facilities Management?*

The first research question aims to address the current state of Green Lease and Green Leasing research with an emphasis on strategic and terminological consistency. The first aim is to provide the reader with a historical and contextual overview of the current state of the art. The second aim is to provide evidence of gaps in existing research, which in turn also provides justification for the needs of this thesis. Theoretical investigations also form a part of this research. Exploratory interviews were conducted with expert witnesses as a part of RQ1 with the aim of understanding current issues and challenges in the context of users in the built environment.

RQ2*: What are the drivers and barriers for the development and lease up of sustainable and Green Leased office buildings from the perspective of owners and tenants?*

The second research question aims to move beyond the existing boundaries of research by looking at the drivers and barriers in a real-world context. This exercise endeavours to draw attention to disjunctions that may exist between theory and the execution of sustainable tenancies. This question is primarily answered from data accrued from building owners and tenants, with a strong emphasis on understanding a building lifecycle narrative. The research is a primarily mixed method and cross-sectional in the form of interviews, with elements of both the quantitative and qualitative. This allows for a compilation of practice-based knowledge of the development of sustainable and Green Leased offices along with the differences in the way this is reflected in the existing research efforts featured in RQ1.

RQ3: *What are the challenges and opportunities for Facilities Management in the context of the development of sustainable office buildings?*

The third research question endeavours to bring together the information and data accumulated in RQ1 and RQ2 to create new knowledge that offers scope to better understand the impact of sustainable offices and Green Leasing on FM. Whilst research into Sustainable Facilities Management (SFM) is not new by any means, there is a need to better understand how SFM would need to operate in both a Green Leased building and one where user intervention is key. The aim of this research question is to provide a better roadmap and develop knowledge that will help SFM cope and innovate in a climate where buildings and their associated tenancies are rapidly changing in the context of sustainable development.

1.4. Scope of Research

In terms of scope with regards to the type of buildings under investigation in this thesis, these can be considered to be office buildings available for rental that are considered be sustainable, either through a recognised methodology or certification such as BREEAM or Passive House, or are considered sustainable in the eyes of the owner/ developer through their materials, technology and practices. In terms of what this means more specifically from the perspective of the researcher, a definition influenced by Berardi (2013) is used. A sustainable building is a building that is a healthy facility and is resource efficient, with this consideration being paramount throughout the lifecycle of the building. These decisions should also have a basis in promoting sustainable community values, ecological principles and building lifecycles quality value (Berardi, 2013, p.76). From a more technical perspective, in this thesis, a sustainable building can be "*the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. Green building is also known as a sustainable or high-performance building*" ("Green Building - Basic Information," 2014).

1.5. Significance of the Work

With an increased emphasis on sustainability throughout the real estate industry, a better understanding as what motivations exist for the development of sustainable buildings as well as what hinders them, is a crucial point of consideration. The generation of new knowledge in

this area will not only provide clarity in this regard but can also influence the positive development of the likes of BREEAM certifications to better support Green Leasing, as well as stimulate the development of new products and services to support it.

From the perspective of SFM, an understanding as to the barriers and drivers will also result in possibilities to further optimise their work as well as re-evaluate how FM fits into the context of a Green Leased building from a wider lifecycle perspective. An investigation into the types of SFM and supporting services in operation in Green Leased buildings will not only be an illustration of an element of Green Leasing success factors, but will also offer possibilities to develop products and services to develop multi-stakeholder incentives to use these services, as well provide greater possibilities to tackle the challenges.

Finally, through terminological and state of the art discussions, this thesis can offer possibilities to further untangle the conundrums associated with a lack of universally accepted definitions. This work also puts together some of the most substantial work yet written in academia on relating Green Lease and Green Leasing issues to those of FM.

Overall the significance of this work offers possibilities for building owners/ developers to make buildings more attractive to the needs and demands of themselves and their customers, as well as stimulate the development of products and services both here and in FM. This work can also provide similar possibilities to further develop sustainable certification methodologies such as BREEAM.

2. Theoretical Frameworks

2.1. Background – The Rental Office Sector in Norway

In this thesis, the Norwegian office rental market is chosen for substantial focus. This is due to the geographical location of the author, as well as access to resources due to the Norwegian University of their employment. The motivation to use the Norwegian rental market, however, is also due to other important relevant factors. In order to 'set the scene' as to the rationale of this thesis and why the Norwegian real estate market is a relevant location for Green Lease and Green Leasing research, a contextual background of the real estate market in Norway is important to state here. The Norwegian real estate market is also interesting. Whilst the building industry and FM are aware of the significance of sustainable development on their industries, there is considerable need for this in offices, particularly on the grounds that since 2000 this has accounted for around 30% of commercial real estate construction in square metres (Hagen, 2016, p.2). The need for this in the rental industry more specifically is also of importance. This is in part due to the level of rental in the office sector, particularly in Norway. In Oslo specifically, the trend in rental has increased in recent years. In Oslo, as of September 2017, 380 companies are in the market for 825,000 square metres of office space. Of the top ten companies (who are looking for 193,500 square metres) 60% are in state or government agencies with leases due to expire in the next 4 years (*The Norwegian Commercial Property Market*, 2017, p.14). The demand for office space in Norway is also increasing, with the vacancy rate in Oslo going from 9% in the Autumn of 2015 to only 8.2% by the end of 2016. This is estimated to improve further with an estimated vacancy rate of 6.1% by the end of 2019 (DNB, 2017, p.5). A trend of low vacancy rates is not just the case in the capital, with Trondheim at the end of 2016 having a vacancy rate of 8.9%, and Stavanger having one of only 11.3% despite the Norwegian oil price recession (DNB, 2017, p.6). According to a leader property company Akerhus Eiendom, a part of the reason for this trend, is an increase in the focus of the effective utilisation of office space, as well as the increase in extra services that are available for these offices, and the fact that there is a market for their tenants to pay for them (*The Norwegian Commercial Property Market*, 2017, p.14). Whilst these market surveys alone cannot be considered to be definitively reflective of the entire market as a whole, this provides information that goes some way

towards justifying the increasing attention that the office rental is receiving from academia and practice.

Building stock by type of building in 2018	
Building Type	*Total Number of Buildings*
In all	4165364
Residential buildings	1545899
Non-residential buildings	2619465
Residential buildings	
Detached house	1167548
House with 2 dwellings	166582
Row house, linked house and house with 3 dwellings or more	166722
Multi-dwelling building	39853
Residence for communities	5194
Non-residential buildings	
Holiday house, garage linked to dwelling etc	1869397
Of which:	
Chalet, summerhouses etc.	431028
Detached houses and farmhouses used as holiday houses	32891
Industrial building	109624
Agricultural and fishery building	499083
Office and business building	38819
Transport and communications building	11788
Hotel and restaurant building	32066
Building used for education, research, public entertainment and religious activities	48125
Hospital and institutional care building	5657
Prison, building for emergency preparedness etc.	4906

Figure 1 – Building stock by type of building ("Building stock by type of building," 2018)

It is not only the size of the rental market in Norway that provides justification for this research, but also with respect to the amount of non-residential buildings in Norway. As shown in *Figure 1* in data from the Norwegian Statistics office known as 'Statistisk Sentralbyrå' (its official English title being '*Statistics Norway*') the total number of buildings in Norway are 4,165,364. According to their categorisation of Norway's buildings stock, 1,545,889 are residential buildings, and 2,619,465 are non-residential buildings, as of February 2018. This means that of all of the building stock in Norway, all non-residential buildings make up 62.88% of all of the buildings. When looking at non-residential buildings by category, of the 2,619,465 non-residential buildings in Norway, 38,819 of these buildings are classed as "*office and business buildings*". This means that this category represents 1.48% of Norway's non-residential buildings stock under this categorisation, as well as 0.93% of all of the buildings of all types and the 5th largest category, with larger categories in order of largest to smallest consisting of '*Agricultural and Fishery Buildings*', '*Chalet, summerhouses etc.*', '*Industrial Buildings*' and '*Buildings used for education, research, public entertainment and religious activities*'. Of these categories decided by Statistics Norway, '*Chalet, summerhouses etc.*' and '*Detached houses and farmhouses used as holiday houses*' could be considered pseudo residential buildings due to the kinds of usage they experience, although these buildings are not used as frequently as residential buildings. Whilst the percentage of offices in Norway is relatively small when considering other building types, this changes somewhat when considering office buildings in terms of energy consumption and as well as a reconsidering as to what constitutes a '*building*' from the perspective of Statistics Norway. Until 2011 the Statistics Norway also provided statistics on energy consumption by building type. The final 2011 statistics can be seen below in *Figure 2*.

Energy use by type of building kWh/m2	2011
	Total
	kWh/m2
Office and business building	228
Hotel and restaurant building	242
Building used for education, public entertainment and religious ativities	190
Hospital and institutional care building	313
Prison, building for emergency preparedness etc.	207

Figure 2 –Average Energy Use by type of building ("Energy consumption in service industries (discontinued), 2011, final figures," 2011)

In this table, Statistics Norway class a '*building*' under the same category names as in *Figure 1* and remove some of the categories in order to differentiate between a '*building*' specifically and the broader '*non-residential building*' categorisation in *Figure 1.* Whilst statistics Norway do not explain why they have made this difference in classification, it could be due to the previously mentioned difference in usage from categories such as '*Chalet, summerhouses etc.*'. In the context of *Figure 2,* these can be considered '*non-residential*' buildings due to the lack of dwellings in the table. With this deeper categorisation of a non-residential building in the context of *Figure* 2 and using the number of buildings from *Figure* 1 (and thus 2018 building numbers), this results in '*office and business buildings*' consisting of 29.95% of non-residential buildings in Norway. When looking at *Figure 2's* energy consumption figures in kWh (kilowatt hours), offices are the third largest consumer of energy in 2011 and constitute 19.32% of the average kHw/ m2 for Norwegian non-residential building in 2011. The scope to improve the sustainability of 20.95% of Norwegian non-residential buildings along with this quota consuming 19.32% of energy in this category in 2011 figures, this makes the category of Norwegian office buildings a significant subject for study.

In terms of sustainable office buildings in Norway, this has also seen substantial growth within the last decade. Although a definition of a sustainable building is a challenging one to classify for this purpose, this can none the less be somewhat explained by looking at the rise and popularity Norwegian BREEAM certifications. Norway adopted the BREEAM certification method (known as 'BREEAM-NOR') in 2011 as a National Scheme Operator

(NSO), allowing them the right to make permitted changes to the scheme to better fit Norwegian needs. As of November 2018, Norway has 215 interim and final BREEAM-NOR certifications of all building types. Of this number, 140 are for offices (BREEAM, 2018a). This is significant rise from just over a year ago in September 2017, when there were 110 BREEAM-NOR final and interim BREEAM certifications of all building types, 73 of which were for offices (Collins et al., 2018, p.248).

2.2. Green Leasing and Green Leases

2.2.1. An Overview

It is important at this stage of this thesis to ensure a clear distinction between '*Green Leasing*' and that of a '*Green Lease*'. This is also representative of a wider issue acknowledged by many, concerning an inconsistent usage of academic, practice and technical terminology. With regards to academic usage, in particular, McKinley (2007) notes that a lack of consistency in the usage of terms and measurements in science risks developing barriers that could stifle the cross-study accumulation of knowledge (McKinley, 2007, p.123). This was an opinion reinforced by Pfeffer (1993), who stated that "*fields can scarcely expect to produce knowledge' without a 'minimal level of consensus*" about what they are talking about (Pfeffer, 1993, p.611). According to Hill *et al*, these problems exist for numerous reasons, ranging from enhancing the academics position, orientating a paper to better fit it's intended publication, attempts to appear 'novel' and trying to differentiate their work from their previous scholarly endeavours (Hill et al., 2012, p. 191). Whilst Green Leasing and Green Leases are separate entities and not necessarily co-dependent, the nature of their implementation necessitates a degree of study in conjunction with both concepts. This co-dependency is described in Axon *et al.,* (2012), who state that tackling sustainability (in this case in form of energy reduction) in commercial tenanted buildings is complex and comes from an interrelationship between the variety of building stock, the number and type of stakeholders (e.g. landlords, tenants, FM's, investors and users), organisational and social practices within these stakeholders, and lease structures and lease language (Axon et al., 2012, p. 462). The idea of using a mechanism (which in this case is Green Leasing) to bring together a network of stakeholders can be considered not just important for pooling skills and resources to further sustainable development in the built environment, but also better orientate sustainably positive behaviour in an organisation (Lutzenhiser et al., 2002, p. 41).

Whilst a '*Green Lease*' is a physical formal and legal lease document, this thesis places its primary (although not exclusive) focus on '*Green leasing*'. Green Leasing refers to the process, decisions, and development that leads to and/or involves itself with the operational stages of the Green Lease (or another lease) documents implementation (Collins, 2018b). This '*leasing*' as a process also means that it straddles all three levels of Akin and Brooks (2015) classification of Organisational Management (OM) (Atkin & Brooks, 2015, p.46). To a greater or lesser extent, this thesis deals with all three of the levels of '*Strategic*', '*Tactical*' and '*Operational*'. At the '*Strategic level*,' this thesis looks at decision making processes, barriers and drivers in the development of sustainable commercial rental offices, both from the perspective of landlord and tenant. At the '*Tactical Level,*' there is research into how these buildings put their sustainable policies into practice, and how tenants are involved in the development of the offices they rent. Finally, at the '*Operational Level*', the research and publications look at how these other two levels influence the operational phase of these Green Leased buildings, and how the likes of FM are affected by a sustainable approach to the running of these buildings. When referring to the term *'Green Leased*', this is a term that is used by the researcher to combine both the terms of '*Green Leasing*' and '*Green Leases*'. In effect, this means that a '*Green Lease*' is a product, whilst '*Green Leasing*' creates a product.

The contextual placing of Green Leases and Green Leasing is also crucial, which is why it is also important not just to look at these terms as concepts, but also as elements assimilated into a buildings lifecycle stages, particularly as sustainability and building performance are considered to be increasingly interlinked (Bartlett et al., 2000, p.316). Life cycle thinking in the context of Green Leases and Green Leasing also can be reflected in a statistic concerning emissions, with worldwide emissions from a lifecycle perspective that includes construction operation and demolition, amounting to 33% of these emissions globally (Forsythe et al., 2015, p.262). *Figure 3* endeavours to describe Green Leases and Green Leasing with the overall context of building lifecycles and organisational management.

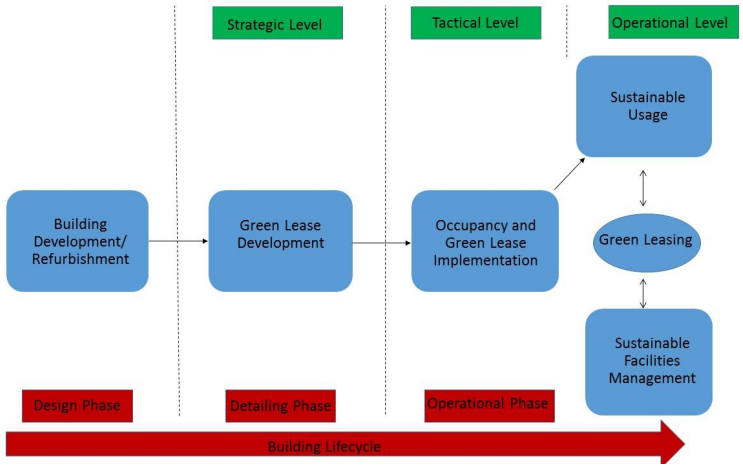

Figure 3 – Green Lease and Green Leasing Contextual Framework

In *Figure 3*, we see that Green Leases as documentation whilst they are enablers to accessing a property and services in the Operational Stage, are Strategic as a policy instrument, but Tactical as an actual document. Green Leasing, however, is not a tangible item, but instead, a process that intermingles with the Operational level considerations associated with both the user based and FM based elements of building operations. Green Lease and Green Leasing initiatives are unlikely to be found in early design stages, although decisions in that part of the lifecycle of a building are likely to result in one or both of these things later in a building lifecycle. The nature of the embeddedness and placements of Green Leases will be dealt with individually in the next sections. Most of the research in this the diagram in *Figure 3* features in the '*Detailing Phase*' and '*Operational Phase*' in the context of this diagram, whilst ultimately straddling all of the levels of Organisational Management with varying degrees of weight. What needs to be stated however is that *Figure 3* represents a linear model of this process, which is not always how this plays out in practice, with processes often featuring a more diverse set of elements and order of process.

2.2.2. Green Leasing

Green Leasing was born out of a shift towards sustainable development of real estate along with the '*Green Shift*' in how companies are doing business. This is a concept that is currently devoid of substantial literature, mostly due to the term being in the main, written

about and defined (although not exclusively) by the researcher. However, a need for such a term to exist, be researched and be established is becoming increasingly important. The development of sustainable certifications such as BREEAM, increasing regulation and a change in commercial practices mean that leasing a building in a green way is becoming of increasing focus, whether this is attached to a Green Lease document or not. What should be firmly established however is as opposed to a document; Green Leasing is the act of letting out a building in a green way. Such a property may or may not have a Green Lease. However, to support a Green Lease, Green Leasing to a greater or lesser degree is a necessity as entirely non-sustainable operational practices are not compatible with the concept of a Green Lease. A definition of '*Leasing*' as it is understood in this thesis was given by the Free Dictionary, who defines the term as "*the hiring out by one firm (the lessor) of an asset… to another firm (the lessee) in return for the payment of an agreed rental*" ("leasing," 2018). The Oxford Learners Dictionary offers a similar definition of leasing, defining it as the "*act of using or letting somebody use something, especially property of equipment, in exchange for rent or a regular payment*" ("leasing (noun)," 2019). This is a reaffirmation that leasing is the activity of leasing the property out, and not the contract itself. Where Green Leasing differs from standard leasing, is that in Green Leasing the building is the letting out to the lessee in a manner that considers the buildings environmental impact. This could take many forms, from recycling, green cleaning practices, more sustainable practices by occupants (such as the mandatory shutting off of electronics), and maybe using a Green Leasing to better regulate, obligate and codify these practices.

Although not a fully-fledged term commonly used outside of the research featured in this thesis, there have been some mentions of it in academia and practice. Janda et al., (2016) for example states that Green Leasing is "*the environmental processes, engagement and practices adopted by landlords and tenants in relation to the building*" (Janda et al., 2016, p.2), affirming the use of the term as an operational process and not a document. Definitions with this contextual bend are incredibly rare in practice. A rare example can be found in a document by Boston based non-for-profit organisation focusing on sustainability in cities called 'A Better City', that notes that slow development in the sustainable development in the built environment is partially due to unfamiliarity "*Green Leasing practices*", as well as a lack of knowledge on how to develop Green Lease themselves ((ABC), 2014).

Whilst an investigation into the some of the more stakeholder level motivations will be discussed in the publications by the researcher, a combination of a Green cultural shift as well

some legislative and regulatory factors have influenced the development of this leasing concept (Collins et al., 2016, p.7). A substantial increase worldwide in the uptake of sustainable building certifications such as BREEAM, and the mostly North American focused Leadership in Energy and Environmental Design (LEED) have also mandated a change in how to approach the sustainability of commercial non-residential (and some residential) real estate, and who and how stakeholders can be involved in this agenda.

Green Leasing also naturally has an impact on SFM services within a building. Green Leasing as a principle requires SFM services to both support and optimise more sustainable leasing initiatives. Hinnells et al., (2008) state that in a Green Leasing arrangement, the FM is as much a part of the efforts to reduce energy as the behaviour of both landlords and tenants (Hinnells et al., 2008, p.543). FM also has an important place in the creation of supporting infrastructure for Green Leasing, such as optimising waste streaming by adopting joint recycling facilities in a building, as opposed to individual facilities for each occupant or tenant (Pivo, 2010, p. 193). In the FM services industry, there have even been moves towards developing services bespoke for Green Lease and Green Leasing initiatives. New Zealand based FM service provider 'Energy TS' provide a Green Lease targeted FM service, whose services are more closely orientated to supporting such a document through Green Leasing a building. Through their own software and FM services, they provide information on whether landlord and tenants are meeting their lease obligations by looking into the degree to which they are operating Green Leasing initiatives such as lowering utility costs and checking the effectiveness of HVAC systems (EnergyTS, 2018).

When relating this to *Figure 3*, we see that Green Leasing is primarily an Operational Level an Operational Phase leasing concept. Despite this, it is dependent on other levels and sections of a building's lifecycle. In the case of Green Leasing where a Green Lease is involved, some or all of the leasing elements will be codified in the Green Lease, which is at the Tactical Level (but still in the buildings operational phase). In the case of a building operating Green Leasing but without a Green Lease, the policy dictating this can also be found at the tactical level, either at a company or building levels of management, with the degree of FM intervention variable depending on how the building is run.

As a body of research, studies in Green Leasing and Green Leases have only caught the attention of academia during the past decade. Existing research is also cross-disciplinary, with published research coming from fields as varied as architecture, law, business studies

and even in behavioural science. Although not mentioning Green Leasing specifically, the work of Gary Pivo and Paul McNamara in 2005 looked in detail at case examples of landlords involving their tenants in various sustainability initiatives such as pooled recycling centres and energy caps (Pivo et al., 2005) , which to all intents and purposes describes activities found in more developed Green Leasing initiatives. It wasn't until 2007 that the word '*Green Lease*' began to enter the real estate research lexicon, with Sharon Christensen and William Duncan's (2007) publication of '*Green Leases: A new era in landlord and tenant co-operation?*' (Christensen et al., 2007) , followed by Michael Brooks work '*Green Leases and Green Buildings*' the following year in 2008 (Brooks, 2008). From 2008 onwards the cross-disciplinary momentum in Green Leasing research has increased, although very little of this was from the field of FM.

2.2.3. Green Leases

Whilst Green Leasing can exit without the need for a Green Lease, in the current theatre of Green Leasing research they are often discussed in conjunction with one another to a greater or lesser degree. Kaplow (2008) in their appropriately titled article '*Does a Green Building Need a Green Lease?*' state that the need for a sustainable building to have a Green Lease is not entirely clear. Writing in 2008, Kaplow state that sustainable buildings will eventually become the "rule" and will inevitably be supported by appropriate legislation, regulation and economic incentives. That being said, a Green Lease can assist in this mission by ensuring that appropriate stakeholders comply with these rules and intentions through the kinds of codification found in Green Lease clauses (Kaplow, 2008, pp 134, 135). This principle underlines the reasons as to why Green Leases are included in this thesis. Whilst the main focus of this thesis is Green Leasing, Green Leases are a mechanism by which to support Green Leasing by allowing for the more codified management of users behaviour and responsibilities, as well as presenting FM with the mean and regulation by which to achieve the buildings sustainability ambitions.

This dictionary definition of what constitutes a 'lease' comes from the Oxford English Dictionary, which defines a lease as a "*contract by which one party conveys land, property, services, etc. to another for a specified time, usually in return for a periodic payment*" ('Definition of 'lease' in English, "2019"), very much defining it as a document. Before defining a Green Lease more specifically, the first obvious step is to define what constitutes a standard lease. Langley et al., (2009) in their work on greening the commercial property sector

explained what they defined as existing lease structures, with a focus on the UK. They state that a lease is "*the method used by organisations providing them with the right to use assets*, and went further to state that a new approach has emerged to better recognise the "*rights and obligations arising from lease contracts"* which better embeds these ideas in to a legal framework (Langley et al., 2009, p. 7). Leases can be of differing lengths and this could potentially impact on the incentives for tenants to be involved in investments associated with the building they are occupying ((GBA), 2013).

The leasing market can be incredibly technical, but there are specific elements that must be illustrated in the context of this thesis. Whilst in many multi-let buildings a landlord is the stakeholder primarily responsible for building operations through service charging, single let properties can operate under what is called '*Full Repair and Insurance*' (FRI) which means that tenants will be responsible for these operating costs instead of the landlord (Langley et al., p.7). Another important point to consider is how utilities can operate in a leasing agreement. In a gross lease, the landlord pays all of the utilities associated with the property, whilst a net lease implies that some or all of the utilities are paid for by the tenant. Therefore in a net lease, there can be more of an incentive for occupants to actively reduce their energy usage ((GBA), 2013). A form of leasing that goes even further is what is often known as a '*Triple Net Lease*' (NNN). This is a leasing agreement where the tenant is entirely responsible for all of the costs related to a building they occupy in addition to the rent they pay, including real estate taxes. The '*Triple*' part of the term refers to the three separate forms of costs mandated by such a lease: real estate taxes, net building insurance and net common area maintenance ("Triple Net Lease," 2015).

In the Norwegian context, the situation is similar with only minor differences that are primarily focused on terminology. The term '*Triple Net Lease*' is not a precise enough term for use on the Norwegian market, so most commonly the term '*bare husleier*' (Bare House Lease) is used instead. This is however not a legal term but is instead descriptive. Similarly to the Triple Net Lease structure, they can be more commonly found in single-tenant properties and mandate the tenant cover all of the operating and maintenance cost of the building with the landlords insurance covered by the tenant as an additional cost, although there are occasions where larger companies may choose to negotiate limitations on common costs with the landlord (Aarvik, 2015).

In *Figure 4* we look at how these lease types are reflected in terms of costs to tenants as a means by which to better understand the obligations of the clauses within them. The categories in this table were in part taken from Colliers International's '*Lease Expense Matrix*' ("Lease Expense Matrix," 2018). The 'X' in the table denotes a cost obligation for the tenant, and a '?' represents a possible cost due to the variances that exist within this lease type.

	Full Repair and Insurance Lease	**Gross Lease**	**Triple Net Lease**	**Green Lease**
Base rent	X	X	X	X
Janitorial	X		X	?
Utilities	X	?		X
Common area maintenance			X	?
Tax and Insurance	X		X	?
Sustainability Clauses			X	X

Figure 4 – Lease Clause Comparison

As can be seen from the table, a Green Lease most often included utility responsibilities on the part of the tenants, as well as base rent obligations and sustainability clauses, all of which are outlined in the 'Green Lease Toolkit' (Bugden et al., 2013). In terms of a comparison of Green Leases to other lease types, a Green Lease (in particular with regards to the 'Sustainability Clauses' alone) can be a 'bolt to on' to any of the other lease types. This means that apart from the previous stated elements, a Green Lease may not have standard elements with regards to tenant obligations, and can feature elements of all other lease types.

In terms of what constitutes a Green Lease from a more practical perspective, this is a standard form lease with clauses and provisions aimed at positively influencing the sustainability and environmental footprint of the building (Bugden et al., 2013, p.2). Such a lease can take many forms in terms of what it mandates of its stakeholders. This could be in

the form of a range of clauses that could mandate users to reduce energy, put regulations on procurement or even mandate a tenant to co-invest alongside the landlord/ owner in improving the sustainable infrastructure of their building. In terms of both a definition standardisation and scope of the leases themselves, there is yet to be a consensus from both academia and practice.

The Better Buildings Partnership (BBP) released in 2009 one of the documents most widely cited about Green Leases by non-academic institutions. Their '*Green Lease Toolkit*' aimed to "*enable owners and occupiers of commercial buildings to work together to reduce the environmental impact of their buildings*" using guidance that is "*non-prescriptive, helping owners and occupiers to agree carbon, energy, waste and water reduction strategies which best fit with the circumstances of individual properties*" ("GREEN LEASE TOOLKIT," 2013). In the toolkit, they cover the definition of many terms associated with Green Leases. For the Green Leases themselves, their definition remains short and in keeping with many of the common factors commonly associated with Green Leases:

"A green lease is 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. Green leases tend to be relevant only in the context of leases of commercial buildings".

(Bugden et al., 2013, p.2)

Theoretical interpretations of the term also exist, with one such definition offered by Brooks (2008). He views Green Leases (and to a small extent '*Green Leasing*') as an opportunity for the traditional landlord and tenant relationship to be "*recast*" in terms of their roles, resulting in the possibility to "*create compulsion, incentive and flexibility for both parties to bring about energy conservation*" (Brook 2008, cited in Christensen et al., 2010, p.3).

With the implementation of, for example, the EU directive on carbon emissions reduction (Sayce et al., 2009, p. 279) , landlords now feel that their tenants need to play a more substantial role to help them fulfil their new legislative obligations as building owners, along with FM's (Piper, 2014, p.16). This, along with CSR and other factors are what are stimulating the implementation and further development of Green Leases.

Despite the incentives to realign the owner and renter sustainability balance, uptake has been low despite efforts by the likes of the BBP and even government-backed guidelines from the Government of Australia (Wheeler et al., 2012, p.15).

The tenant\landlord relationship is not the only factor that needs to be considered when looking at burden sharing in the context of a Green Lease. The FM industry has also begun to account more substantially for sustainability, placing an increasing emphasis on the importance of implementing and moving towards SFM, channelling a research and industrial agenda to further advance this emerging industry. Scandinavia has taken on this challenge with gusto, with the likes of the Technical University of Denmark advocating a common research agenda, and even going as far as to describe it as a '*megatrend*' (Rasmussen et al., 2012, p.69).

With this in mind in the context of *Figure 4,* a Green Lease is primarily a strategic and tactical document, although its clauses directly impact the operational FM practices of the building.

2.2.4. Green Lease Clauses

A hallmark of the Green Lease experience is the Green Lease clauses that feature in such leases. Whilst this thesis gave a brief example of what constituted a Green Lease clause, this is such a crucial element of what constitutes a Green Leases that it warrants further discussion here, particularly with regards to how it compares to a standard non-residential lease without green clauses.

Whilst there is no 'absolute standard' by which to judge what elements are contained in a standard commercial lease, there are certain components that are found in the vast majority which provide both clarity and a good comparative commercial and legal framework by which to develop them. According to Dana Hamson (2015), a freelance writer for the property search engine '42 Floors', commercial properties consist of six main categories of building. These consist of offices, retail, industrial, multi-family, land and other miscellaneous property types (Hamson, 2015). When it comes to offices specifically, Hamson states that brokers subdivide this category into '*Class A*', '*Class B*' and '*Class C*' offices. A '*Class A*' offices is an office that is often new and state of the art in a premium location and professional management infrastructure. They can however also be older buildings that have gone through a significant renovation. A '*Class B*' offices are often considered key properties for investors, as they are buildings that offer the potential for a high return on investment after a renovation. Class B offices are often well maintained and are prime opportunities for investment in improvements.

The final category, a '*Class C*' office is often a poorly maintained building in immediate need of rehabilitation. It is often poorly located and should the building be occupied, it may command relatively low rates of rent due to its poor quality (Hamson, 2015). Whilst these categories alone do not dictate the rate of rent, investment or possibilities of employing a Green Lease or Green Leasing, they may dictate the possibilities for moving in this direction by building owners.

After establishing the possibilities and opportunities moving forward that may be offered by this classification system, a lease will be developed in order to facilitate occupancy. According to property lawyer Stuart Darlington (2013) in his book titled '*A Tenant's Practical Guide to Commercial Leases*', commercial leases can be considered to consist of several core sections – '*Parties and Security*', '*Premises*', '*Rent*', '*Service Charges*', '*Insurance*' and '*Use and Rights*', '*Parting with the Lease*', '*Alterations and Signage*', '*Term*', '*Repair*', '*Decoration and Complying with Law*' and '*Miscellaneous*' (Darlington, 2013, p.3-4). The section on '*Parties and Securities*' refers to establishing the base roles of the tenant, how much rent to pay along with other financial obligations (Darlington, 2013, p. 3). '*Premises*' refers to the kind of premises the lease will afford occupancy of, as well the nature of other associated land and facilities, including furnishings. The '*Rent*' aspect of the leasing contract refers to the basic rent payable, as well as turnover rent and rent review and increases. The '*Service Charge*' section also concerns itself with the aspect of payment, however, concerns the costs of services in the building as well as caps and exclusions. '*Insurance*' covers the insurance obligations of the tenant, the expectations of the tenant, rent suspension and termination as well as risks that are considered uninsured. '*Use and Rights*' refer not only to the rights of the tenant, but also those of the landlord as well as regulations on the use and open lease clauses. The section on '*Parting with the lease*' concerns the rights of both parties to terminate the lease, regulations on subletting, charges associated with this as well as the right of pre-emption. '*Alterations and Signage*' is concerned with the right of both parties with regard to alterations of the property, the ability to change signage and other related aspects. '*Term*' refers to the term length of the lease, security of the property and the rights of landlords to enter and breach the property. '*Repair and Compliance with Law*' refers to repair and regulations responsibilities. '*Miscellaneous'* is naturally diverse with clauses ranging from noise regulations, licensing, shop front zones, escalators and lifts, along with costs and encroachment (Darlington, 2013, p.3-4).

As mentioned previously, a Green Lease is a standard form lease with clauses that positively impact the sustainability of the building (Bugden et al, 2013, p.2). However, certain clauses do deviate from more standard leases in order to qualify as a '*Green Lease*'. The BBP in Sydney in 2016 released a document titled '*BBP Leasing Standard Template Clauses*' that attempt to set out clause types and qualities in order to turn a standard lease into a Green Lease. The clause section categories are '*Cooperation and Works*', '*Management and Consumption*', '*Reporting and Standards*' and '*Compliance and Costs*' (BBP, 2016, p.4). In the '*Cooperation and Works*' clauses, the BBP notes involving environmental initiatives, sustainable upgrade works, sustainable management collaboration, sustainability optimised design, waste management from alterations as well as social initiatives. For clauses related to '*Management and Consumption*', these clauses are the most relevant for FM. These clauses refer to energy, water and waste management, indoor environment management, along with sustainable cleaning, procurement, transport and utilities. In '*Reporting and Standards*' are found clauses that require the attention of both FM's and tenants. These contain clauses in information sharing, performance ratings, design/ development ratings, performance standards, metering, monitoring and comfort. The final sections on '*Compliance and Costs*' concerns itself with the resolution of disputes, assignments and the review of rent (BBP, 2016, p. 4). The BBP, however, are keen to state that these are not exhaustive but should provide material by which to update or develop new clauses, as well as educate relevant stakeholders (BBP, 2016, p. 4). The document does not mention FM's directly in their clauses.

In terms of how both standard form and Green Leases compare to one another, *Figure 5* presents comparable clauses side by side based upon BBP (2016) and Darlington (2013). This offers the possibility to better surmise the information in the previous paragraphs. In order to better understand some of the nuances of a Green Lease when compared to standard lease, a side by side comparison is beneficial to the point, although this clause list is not exhaustive.

Green Lease Clause Category	**Standard form Lease Category**
Cooperation and Works	Repair, Decoration and Complying with Law, alterations and signage
Management and Consumption	Use and rights, Insurance
Reporting and Standards	Use and rights, Premises, Insurance
Compliance and Costs	Service charges, Term

Figure 5 – Green Lease and Standard Lease Clause Type Comparison

As *Figure 5* demonstrates, Green Clauses impact the wording and responsibilities of several clauses found in more traditional lease recommendations, however with a more sustainable perspective in mind. In order to demonstrate, an example from each Green Lease category will be compared with one of the standard types in Darlington (2013). In '*Cooperation and Works*' alterations are conducted with sustainable considerations in mind, with consideration made with regards to waste from these alterations (BBP, 2016, P.4). In a standard form lease, the only mention of waste from works is that ensuring that accumulated wasted does not lessen the value of the property, with no mention of alterations and repair work in relation to its impact on sustainability, instead only mentioning the degree to which tenants can make unilateral alterations to their property (Darlington, 2013, p.75-76). In the Green Lease clause category of '*Management and Consumption*', the clauses lay out the responsibilities of landlord and tenants in terms of energy management (which may include energy caps), as well as sustainable procurement obligations (BBP, 2016, p.4). Energy management is mentioned in a standard form lease from the perspective of Darlington (2013), however, does not mention energy caps or other user based initiatives. Disclosure of Energy Performance Certificates is mentioned, with a further note that "*it has been mooted that in the future business rates may be linked to energy efficiency so those poor performing units will be pay higher rates*" (Darlington, 2013, p.98). The document does not mention any relevant uses of '*procurement*' of any kind. In terms of Green Lease Clauses and '*Reporting and Standards*', one set of clauses relating to metering and the sharing of information with the landlord information such as energy consumption (BBP, 2016, P.4). There is no mention in Darlington (2013) about any utility information sharing of any kind, instead, the only concrete mentions referring to the confidentiality of any kind of information sharing between both parties (Darlington, 2013, p. 19-20). In the final Green Lease clause category '*Compliance and Costs*', one element of the clauses concerns itself with the personal sustainability commitments of tenants, and how these responsibilities are transferred if there is a change of tenant (BBP, 2016, p. 60). Interestingly, Darlington (2013) does not mention a transfer of rights (even outside of sustainability consideration) but instead focuses more heavily on the rights of tenants to terminate a lease and the repercussions for doing so (Darlington, 2013, pp. 4, 63).

Whilst the investigation in this section is not intended to be exhaustive, it does give an indication of how Green Leases and standard form leases differ, and which areas of a

standard form lease are altered to develop them into a Green Lease arrangement. Whilst the two core documents here do not mention FM and FM's outright, these Green Lease clause place responsibility on FM's in aspects not visible in a standard form lease, such as energy monitoring and sustainable repairs and alterations.

2.3. Facilities Management and Sustainable Facilities Management

Whilst not solely a thesis on FM, facilities management provides a broad frame by which to consider many of the elements that make up the approach and the implication of the findings in this thesis.

2.3.1. Facilities Management

Practice

A task of considerable challenge for FM scholars and practitioners is to pin down the meaning of the ever-moving target that is facilities management. This is mainly due to the increasing elements that have become considered as a part of the FM milieu. In terms of definitions from FM associations, the International Facilities Management Association (IFMA) defines FM as a "*profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology*" that includes the core competencies of: Communication, Risk Management, Sustainability, Finance and Business, Occupancy and Human Factors, Leadership and Strategy, Operations and Maintenance, Project Management, Performance and Quality, Real Estate and Facility Information Management and Technology Management (IFMA, 2018).

Standards and Models in Practice

In terms of terminological standardisation on an international level, FM representatives in 2006 came together to develop the European Committee for Standardisation (CEN) definition of FM (EN15221-1: 2006), which was defined as the "*integration of processes within an organization to maintain and develop the agreed services which support and improve the effectiveness of its primary activities*" ((CEN), 2006). This definition has been widely adopted by European FM associations which include Europe's largest, The European Facilities Management Network (EuroFM). The standard also developed a model which aligned their definition with the strategic, tactical and operational levels of organisational management.

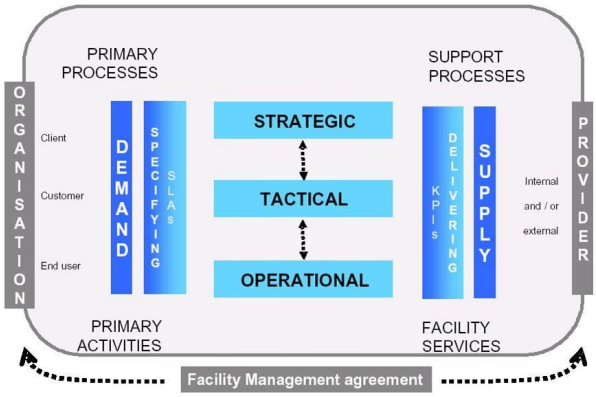

Figure 6 – A Definition of Facilities Management ((CEN), 2006)

This model shows how FM goes beyond the CEN (2006) definition alone and shows how FM supports activities of an organisation from multiple perspectives, as well as needing to be a concept conscious of the supply and demand economics associated with FM services.

A recent revision of the ISO standards (now superseding previous standards as '*ISO 41011:2017*') has established yet another set of benchmarks by which to define facilities management. According to the new standard, the terms '*facilities management*' and '*facility management*' are interchangeable (ISO, 2017a), and defines FM as an "*organizational function which integrates people, place and process within the built environment with the purpose of improving the quality of life of people and the productivity of the core business"(ISO, 2017b).* The standard also established what elements constitute FM practices, which consist of:

— improve quality, productivity and financial performance;

— enhance sustainability and reduce negative environmental impact;

— develop functional and motivating work environments;

— maintain regulatory compliance and provide safe workplaces;

— optimize life cycle performance and costs;

— improve resilience and relevance;

— project an organization's identity and image more successfully. (ISO, 2017a)

As this new standard illustrates, as well as more commonly found qualities in FM definitions such as supporting building operations, ISO 41011:2017 also places a focus on well-being within workplaces, and crucially – sustainability considerations. This is a demonstration of the fact that more widely respected and accepted standardisation institutions such as ISO are viewing sustainable development as being not just an issue but is seen as increasingly a part of the core roles, responsibility and identity of FM.

Aside from efforts by the CEN and ISO, there have been other endeavours in practice to develop further forms of FM standardisation, with varying degrees of depth and scope. An example of such a standard is the 'Facilities Management Professional Standards' model by the British Institute of facilities management (BIFM) (2017).

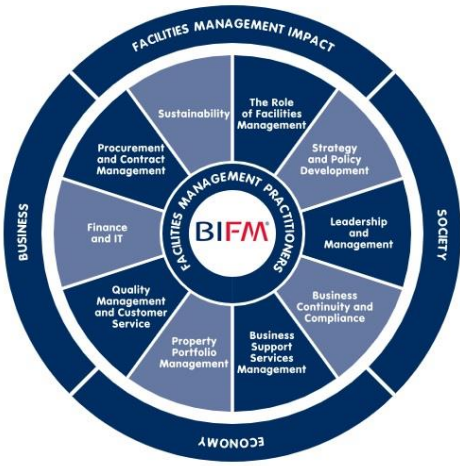

Figure 7 – The Facilities Management Professional Standards (BIFM, 2014)

This attempt at a standard focuses less on organising FM operations into an organisational management perspective but instead organises elements of FM by themes related to the three legs of '*Economic*', '*Environmental*' and '*Social*' aspects associated with the Triple Bottom Line of sustainability. A fourth thematic focus is '*Facilities Management Impact*'. Further moving away from organisational management and instead focusing on the roles of FM's themselves, this standard attempts to clearly define "*the competencies that are necessary to be a competent facilities management practitioner at all career levels; forming a global*

competence model for the profession" (BIFM 2014). Whilst the CEN model attempts to map and illustrate the systemic and management elements within the responsibilities and roles of FM, BIFM is placing an emphasis on how FM's fit within this framework, and how they can implement some of the more widely acknowledged efforts at standardisation.

Scott Wilson, managing director of Drake & Scull FM, however, has developed a model which attempts to make a more holistic framework, combining both the role of the FM and their integration into service management and organisational management.

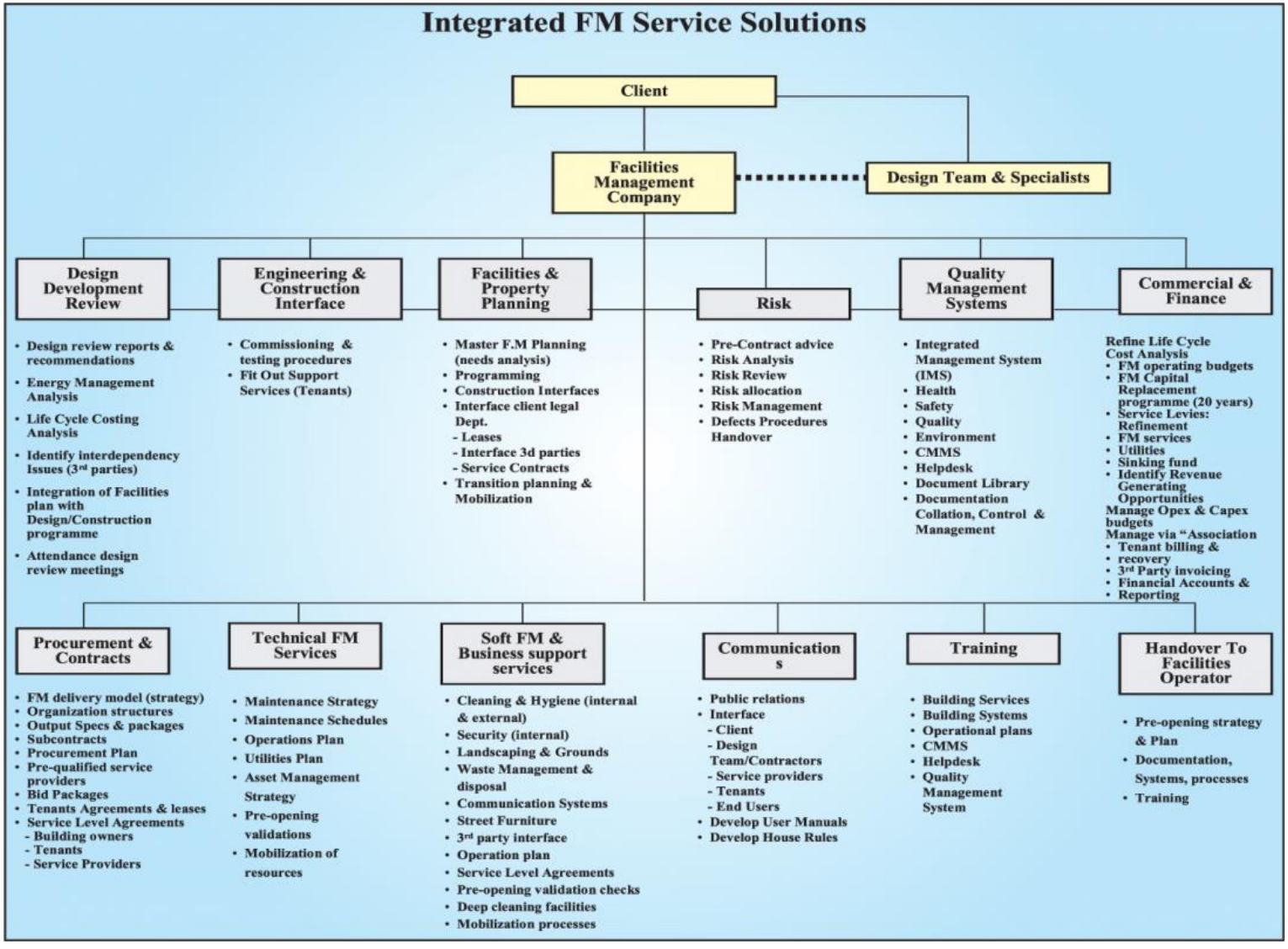

Figure 8 – Integrated FM Service Solutions (Wilson, 2005)

Wilson divides each role by activity, with each subsection representing a combination of both FM and service related tasks as well as more organisational management elements such as '*asset management*' and '*documentation systems*'. There are even elements within this model that could be considered to have a lifecycle focus, such as '*handover to facilities operator*' and '*design development review*' (Wilson 2005). The lifecycle focus is a key framing component of this model, with Wilson himself saying that "*bringing building operators and developers together at the design phase of a project has hugely beneficial long-term implications*" (Wilson 2005). In describing his model he states that (in 2005) building management systems (BMS) are a still inadequate in analysing and fulfilling the needs of clients, which can impact on the success of FM services and endeavours more broadly (Wilson 2005). The weakness in this model, however, is its lack of systematic compartmentalisation, with FM services, FM's tasking, products and lifecycle considerations seemingly weaving in and out of each other within the same sections.

A key component missing in these models (at least implicitly) is that of how value can fit into a model and standard. This aspect, however, was covered in a simple FM model offered by FMS Associate Asia. Known as the 'I-S-C Facilities Management Value' model, which standards for '*Identify Value*', '*Sustain Value*' and '*Contribute Value*', this model is considered by FMS to be a blueprint for value-based FM ("I-S-C Facilities Management Model," 2014).

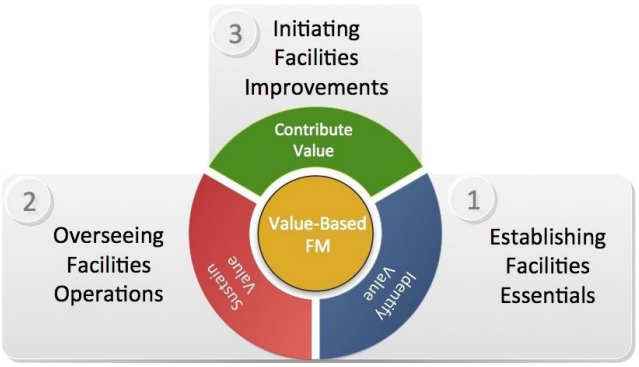

Figure 9 - I-S-C Facilities Management Value Model ("I-S-C Facilities Management Model," 2014)

Whilst this model is not an exercise in depth, it is a means by which to divide overarching elements loosely related to organisational management (such as '*initiating facilities improvements'*) and linking them to the kind of value such a task can accumulate. According to FMS, the I-S-C components consist of :

"1. Identify Value – Establishing Facilities Essentials
FM identifies value through appreciating an organization's need for facilities services and their impact on the organization's business operations. Learn to take stock of the facilities services conditions.

2. Sustain Value – Overseeing Facilities Operations
FM sustains value through ensuring facilities services are operating at their peak performance through best practices and compliance with legal requirements and the organization's policies and procedures.

3. Contribute Value – Initiating Facilities Improvements
FM Contributes value through intentional continual improvement in supporting the organization's business operations." ("I-S-C Facilities Management Model," 2014)

These three elements seem to feature small elements of all previous models, however, they are also simplified in a format that primarily focuses on creating FM services, ensuring these services operate optimally and to the highest quality, as well providing added value to clients and providers. The model also stressed the importance of FM and services in supporting core business and ensuring that the value of organisations outside of their FM is supported by these services, an aspect that was given less attention in the previous models.

In terms of Nordic standards and models relevant to FM, the international cross-border cooperative organisation 'Nordic Innovation' developed a model for sustainable refurbishment.

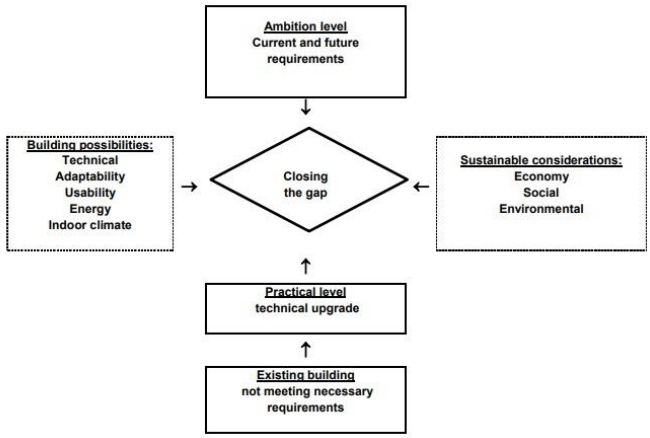

Figure 10 - The aim of sustainable refurbishment is to close the gap between the old buildings condition and new building requirements with a sustainable approach (Innovation, 2015, p.8)

This model is not specifically about FM, but it does present many aspects that are FM relevant. Regarding '*building possibilities*' and even '*sustainable considerations*', the terms '*ambition level*' and '*practical level*' can be viewed as proxies for the FM terms of '*tactical level*' and '*operational level*' The auxiliary purpose behind this model is to combine them in closing the gap between all of these elements, whilst in turn also ensuring that the needs of new and existing buildings are noted as being different (Innovation, 2015, p.8). The relevance for FM is in the form of the technical ambitions present in the model, along with other more human operational elements such as usability, all of which require competent FM to achieve.

Whilst all these models serve a purpose and need in of themselves, the degree to which they are holistic requires further investigation. To a greater or lesser degree, these models address the three stages of organisational management (strategic, tactical and operational), lifecycle considerations, sustainability, the role of FM's and FM services. *Figure 11* illustrates the degree to which these models reflect these qualities. They are divided on the upper row by OM levels as well the degree to which these models cover sustainable considerations, lifecycle stages and FM roles and services. These aspects were chosen to reflect a holistic approach which encompasses areas as diverse as organisational management, building lifecycles as well as FM's elements in the context of sustainable development.

Model	Strategic Level	Tactical Level	Operational Level	Lifecycle Stages	Sustainability Considerations	Role of FM's	FM Services
A Definition of Facilities Management ((CEN), 2006)	Yes	Yes	Yes			Yes	Yes
ISO 41011:2017	Yes	Yes	Yes	Yes	Yes	Yes	Yes
The Facilities Management Professional Standards (BIFM, 2014)					Yes	Yes	Yes
Integrated FM Service Solutions (Wilson, 2005)	Yes	Yes	Yes	Yes		Yes	Yes
I-S-C Facilities Management Value Model ("I-S-C Facilities Management Model," 2014)						Yes	Yes
The aim of sustainable refurbishment is to close the gap between an old buildings condition and new building requirements with a sustainable approach (Innovation, 2015, p.8)		Yes	Yes	Yes	Yes		Yes

Figure 11 – A comparison of FM models and standards

Figure 11 demonstrates a diversity of breadth of coverage. One of the most holistic of the models in this matrix is the integration model by Wilson (2005), which covers most of the areas except for a clear management of sustainability. The least holistic of the models is the I-S-C model, however, it does have a more significant and specific focus on value than the others. Overall organisational management is ignored as a specific consideration in many of the models, however, these are instead considered to a degree in the form of the types of

facilities and stakeholders that they include. The Nordic Innovation model is also one of the more holistic models, containing within it is a clearer attempt to establish it in the context of the triple bottom line of sustainability. The most holistic model is the ISO 41011:2017. This is in part due to its wording which attempts to cover as many OM levels and lifecycle stages as possible, whilst also focusing on ensuring that FM's and FM services form a part of the picture. Secondly, this is due to its acceptance as a standard, which results in wider circulation amongst FM professionals in academia and practice. Of note in these models is the lack of sustainability featured in them, despite the importance of sustainable considerations in the marketplace. The researcher was unable to find any relevant FM models beyond what is here that featured sustainability at their heart (or as a major element) of their structure.

The CEN and ISO models however only represent two of the many and constantly changing sets of FM standards on multiple levels of regional, national and international regulations, many of which can be found here in *Figure 12*. This figure isn't a standard in itself but is representative of the diversity of standardisation attempts, ranging the local (in this case Britain) moving up to Europe, and then internationally. All three levels share a commonality in that they all have a standard of FM terms and definitions. However, the diversity in standards in other areas of *Figure 12* shows that any attempt to establish one set of standards covering all areas from the international to the local eludes the industry.

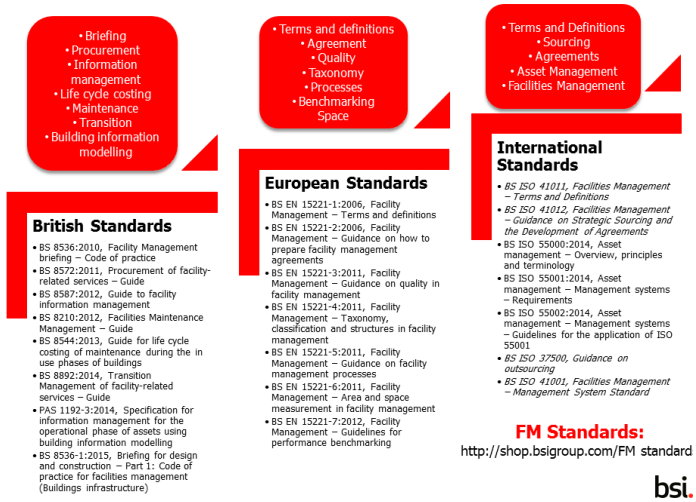

Figure 12 - Roadmap for FM Standards Published ("Roadmap for FM Standards Published," 2014)

Models and Standards in Academia

As with practice, academics have endeavoured to create tools by which to not only define what FM is but also to better untangle its roles, responsibilities and functions. With regards to academia, definitions of FM are numerous in scope and vision, however one of the more widely accepted come from Atkin and Brooks (2015), who define FM as the "*operational environment needed to support and enhance an organisations core business processes and activities*" (Atkin et al., 2015, p.4). They go further, however, and acknowledge that as FM is a relatively new concept in real estate as a coordinated discipline, a fully comprehensive definition is hard to state with any certainty (Atkin et al., 2015, p.5). Another widely cited definition from academia is from Barrett and Baldry (2003), who define FM as an '*integrated approach to operating, maintaining, improving and adapting buildings and infrastructure of an organisation in order to create an environment that strongly supports the primary objectives of an organisation*" (Barrett et al., 2003, cited in Atkin et al., 2016, p.5).

Haugen et al (2017) developed a 'Knowledge Triangle' that placed a focus not just on the role of FM, but also its development.

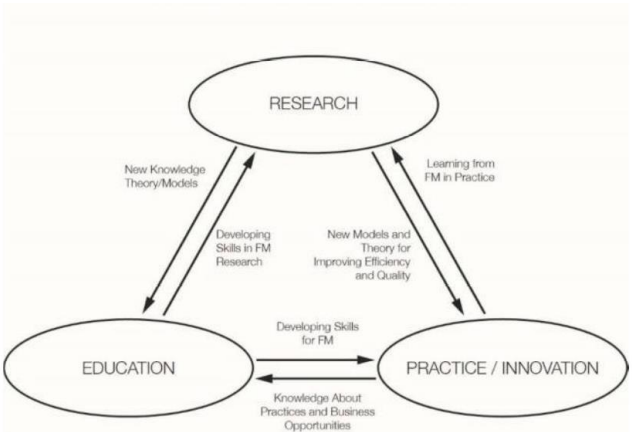

Figure 13 – The Knowledge Triangle for FM (Haugen et al., 2017, p. 6)

As with other models from academia and practice in this thesis, this model attempts to bridge a gap, which in this case is that of linking education to research and practice/ innovation. This

model doesn't contain a central binding element but instead weights each of its three main elements equally to demonstrate their equal value. Bilateral feedback arrows illustrate that each element is dependent on a two-way relationship, showing that knowledge and development in FM is a multi-faceted effort. This model, however, doesn't deal with the role of FM's and their strategic, tactical and operational implementation, instead, it provides a more theoretical developmental framework.

Some academic discussions also focus on FM in the context of lifecycle thinking, as well as the role of FM in a larger building context. Such an example can be found in Asmone et al (2016) in their model on FM involvement in the sustainable built environment, as shown in *Figure 14*.

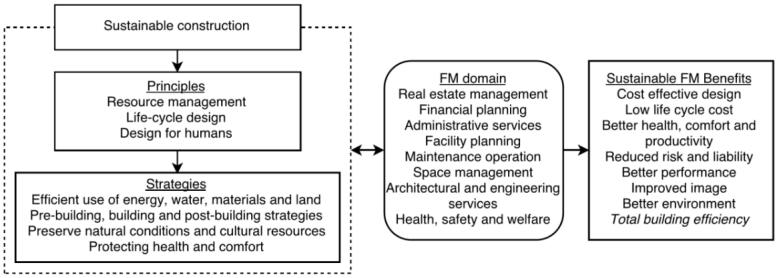

Figure 14 – Built Environment Sustainability Benefits and FM Involvement (Asmone et al., 2016, p.4)

This model is representative of an assimilation of FM into a strategic building context, as well as one of SFM. Here the author links the broad supporting roles of FM's and with arrows shows the bilateral relationship between the principles and functions of the built environment, with a pan lifecycle set of considerations that range from preserving natural conditions to efficient resources use. Interestingly, the SFM outcomes are given separate attention, and the author does not make it clear as to whether all FM here is considered SFM if used within this context, or whether SFM is an entirely separate strand of FM as a possible option within such a building. Although this model does state that it involves lifecycle thinking in its design, its considerations overall are primarily at the 'operational level' with

only minimal attention (which is mostly at the 'tactical level') given to the other two levels of organisational management.

When considering a model with an equally as broad view (but larger than a building context), Nielsen et al (2010) created a model that encompasses sustainable FM into a more 'worldview' context.

Figure 15 – The SFM World View (Nielsen et al., 2010, p. 3)

Whilst this model completely omits any considerable positioning in the context of organisation management levels and lifecycle consideration, it does focus on FM and SFM's roles within a core and supporting functional context. On one hand, this model is demonstrative of a typical FM definition, that of supporting the core, supportive and at times fringe functions and business of an organisation. However, the model also goes beyond this by placing these organisational functions in a wider societal context, both '*local*' and the '*global climate and eco-system*'. Although discussed in more detail in the next section, this model recognises that SFM is different from FM in one key aspect, in particular, that of the wider ecological and societal implications of building operations and their associated services, and not just thinking in a singular context of the impact of one buildings and the positive impacts of the client at the expense of the environment. What this model lacks,

however, is a deeper integration of these issues in a wider building context, either in terms of organisational management, or building lifecycles. Whilst this model makes a profound point in terms of the impact considerations of SFM, it does not place them in a '*triple bottom line*' of sustainability context.

Aside from development and sustainability, some FM scholars are also looking at understanding FM from an innovation perspective. One such example of this was published by Rasmussen et al (2012).

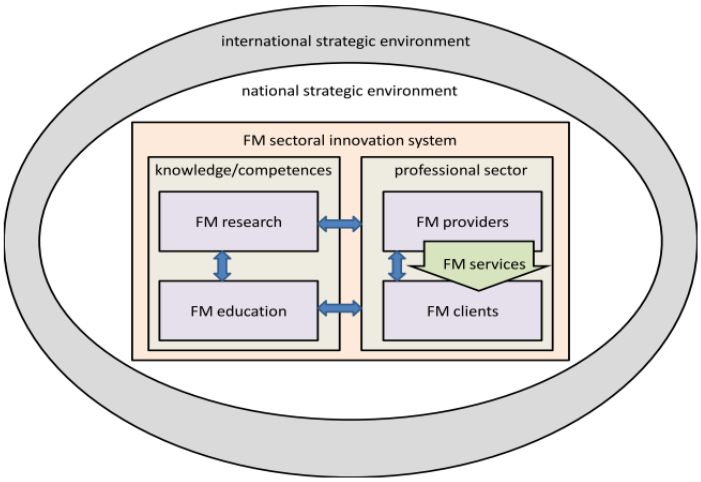

Figure 16 – Framework for FM Sectoral Innovation System (Rasmussen et al., 2012, p. 9)

In some respects, this model offers some similarities with *Figure 13*, in the sense that it is a gallant attempt at bridging the gap between education and practice in order to foster FM development. However, a notable difference in this model is not only its position in a sectoral innovation system but also its placement in the '*International Strategic Environment*'. This places it in a position of being more transferable that *Figure 13*, whilst offering similar flows and feedback for innovation and development. The model accounts more for the impact of globalisation and network thinking, whilst simultaneously claiming that some of the more basic elements of innovation and development remain unchanged regardless of its contextual positioning. Once again, however, this model does not organise itself through organisational management, lifecycle thinking, and does not account for sustainability.

Whilst all of these models offer different positions, outcomes and suggestions for FM and FM roles and services, the degree to which they are holistic is equally as variable.

The models in academia whilst broader in scope in many respects are much less holistic overall. In the case of the innovation and development models, they were the most superficial in their coverage by keeping their subject matter within the boundaries of the roles of FM's and FM services. The most holistic however was by Asmone et al (2016), which combined various elements (with some omissions) of organisational management and building lifecycles, whilst also considering how this can be considered in the contexts of both FM's themselves, their competencies, and the services they provide. This model can be considered the most useful, holistic and comprehensive when examining Green Leasing.

As can be seen from these definitions in academia and practice, FM is broad in terms of what encapsulates it, but also appears to represent some synergy in understanding in terms of how vital it is in supporting the core processes and functions of an organisation. FM has relevancy in this thesis not just because FM supports the core processes of Green Lease and Green Leased buildings, but also a vital competency partner in ensuring that Green Lease and Green Leasing initiatives and principles appropriately monitored and managed within the scope of their role.

2.3.2. Sustainable Facilities Management

In recent years, a greater focus has been placed on sustainability in FM, which in itself has resulted in new developments in academia and practice. In the context of a Green Lease, this is expressed through the very nature of the lease itself, especially from the perspective of a more holistic approach to tenancies. Many greener tenancies also adopt an SFM approach. In terms of what differentiates SFM from regular facilities management from academia, this can be considered to "*include consideration not only of core business and support functions but also relations with the local and global society as well as the climate and the ecosystem*" (Nielsen et al., 2010, p.3). In essence, SFM contains much in the way of similarities of standard definitions of FM, however, decisions concerning procurement, implementation and strategy are conducted with the environmental impact in mind. This was expressed in a theoretical model by Junghans (2011), which features in *Figure 17.*

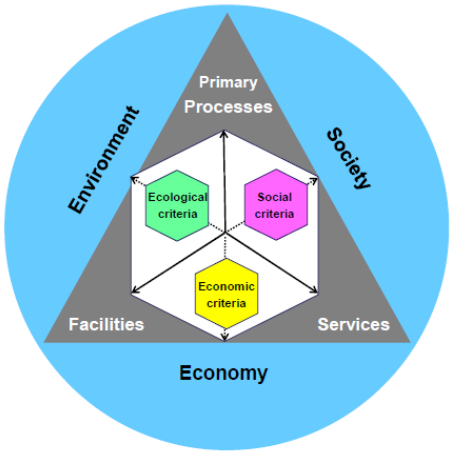

Figure 17 – Sustainable Facilities Management Model (Junghans, 2011, p.6)

This model reinforces the previous claims of sustainable considerations, were the primary processes, facilities and services are within the consideration of the Triple Bottom Line as a sustainable 'guide' through an SFM way of thinking. However, according to Nielsen *et al* (2016) SFM research is still 'niche' within the study of FM, which mandates researchers to move forward with deeper research (as is being attempted in this thesis) with a particular emphasis placed in practice on having a holistic mindset (Nielsen *et al*., 2016, p. 10).

In practice, there is less of a move in terms of SFM as a coordinated service but instead is mostly represented in the form of individual services that are sustainable themselves. American conglomerate 'Honeywell' for example, incorporate sustainability into some of their services, mainly with a focus on energy efficiency and management (Honeywell, 2016). In terms of specific services, international FM organisation 'Integrated Service Solutions' (ISS) sells a service specifically marketed at '*Green Cleaning*', with its promotional material, in particular on using such a service to promote the sustainable ambitions of the company in which it is employed (ISS, 2014). Not all FM organisations with sustainable services believe in a '*service by service*' perspective. British FM company Almeda, for example, advertise services specifically as '*Sustainable Facilities Management*' with a varied service portfolio ranging from soft FM services to managing energy performance certificates (Almeda, 2015).

In terms of this thesis specifically, Green Leasing and Green Leases require sustainably orientated support to facilitate their infrastructure, with SFM being an important component. The degree to which and what services are employed is a partial focus of one of the key empirical studies of this thesis.

2.4. Sustainable Certification Methodologies

In the field of the built environment in the current climate, numerous toolkits (from both the private and public sector) have been developed as a means by which to not just find robust methodologies by which to develop and compare sustainable RE, but also as a mechanism in of themselves by which to advertise and promote the sustainable credibility of a building to prospective buyers and tenants, as well as customers and other receptive stakeholders. The two leading certifications in the world are Europe's BREEAM certifications and the mostly North American centric LEED certification scheme.

Both BREEAM and LEED are private sector initiatives (although BREEAM began its existence as a state-funded scheme before being privatised) who franchise some or part of their certifications to regional and international operators. They cover both residential and non-residential buildings and many stages of a building's lifecycle – however not in the form of one holistic overarching certification.

2.4.1. BREEAM

BREEAM was initially founded in 1990 and is the longest running methodology of its kind in the world. It began life as a British government supported scheme before becoming a fully private venture for the certification of sustainable building stock. In the nearly thirty years since its launch, it has become Europes leading certification scheme, enjoying 80% of the market share (BREEAM, 2015). BREEAM's most implemented certifications consist of '*New Construction*' and '*In-Use*', with the first primarily dealing with developing new and high performing buildings, and the latter an operational phase certification. Several iterations of the BREEAM New Construction manual featured Green Lease provisions up until 2011, before being quietly dropped due to its perceived cumbersome nature and lack of popularity (Global, 2011). BREEAM also features several other certifications, '*Communities', 'Infrastructure'* and *'Refurbishment and Fit-out'*, however, these are less relevant for issues concerning Green Leasing (BREEAM, 2018).

BREEAM identifies several overall criteria when establishing the degree of certification awarded. These categories consist of *'Energy', 'Health and Wellbeing', 'Innovation', 'Land Use', 'Materials', 'Management', 'Pollution', 'Transport', Waste' and 'Water'*, all of which have their own indicators (BREEAM, 2018b). Certifications are organised via a balanced scoresheet, where awards are given out from highest to lowest consisting of '*Pass', 'Good', 'Very good', 'Excellent'* and the highest possible award – *'Outstanding'* (BREEAM, 2015).

As mentioned earlier in this thesis, Norway acts as a BREEAM NSO, which has afforded the possibility to develop a bespoke variation of the BREEAM certification to better meet their needs and reflect the Norwegian climate and building codes. This form of the certification became known as 'BREEAM-NOR' with the Norwegian Green Building Council (NGBC) acting as the administrative body.

2.4.2. LEED

LEED is a certification methodology founded in 1993 and is North Americas dominating certification scheme with a presence in all 50 states, as well as 90 countries (Starrs, 2010, pp.6-7). LEED certifications consist of several separate types of certification, which consist of *'Building Design and Construction', 'Interior Design and Construction', 'Building Operation and Maintenance', 'Neighbourhood Development', 'Homes',* and *'Cities and Communities'*(LEED, 2014). LEED has categories for certification that are similar to BREEAM in many respects and are known as 'Impact Categories', however they place more of a focus on the regional placement of buildings. These categories consist of *'Integrative Thinking', 'Energy', 'Water', 'Waste', 'Materials', 'Location and Transportation', 'Sustainable Sites', 'Health and Human Experience', 'Regional Impacts', 'Innovation'* and *'Global, Regional and Local'* (LEED, 2018b).

LEED currently has more than 92,000 projects in its register, with its final certification awards consisting of *'Pass', 'Silver', 'Gold'* and *'Platinum'*(LEED, 2018a). Norway currently has 9 LEED certified buildings, 3 of which are offices, and with the others consisting of retail units, the US Embassy in Oslo and a student housing building in Trondheim. One of these buildings (Bloomberg, Oslo) received LEED's highest possible award, 'Platinum' (GBIG, 2018). As is also the case with BREEAM, LEED does not offer (and never has offered) specific provisions to support Green Leases, however, the nature of

the schemes themselves ensure that Green Leasing is a thing that may be necessary for many of the buildings that employ a BREEAM or LEED certification.

2.5. Sustainable Non-Residential Buildings in Norway

Like much of the rest of Europe, Norway has taken measures by which to further improve the sustainable credibility of its building stock, both commercial and residential and in older and newer buildings. This is a scene that is not coloured by one element of the field alone but is a combination by efforts in practice, as well as developments in research that have been the main catalyst for such marked change.

2.5.1 Practice

Like many countries, Norway has state-mandated building regulation (known as 'Tek') which dictate everything from the quality of the building, their safety, usage of materials, and other forms of control. In recent years, however, the increased emphasis within the building code has been placed on improving the sustainability of Norwegian non-residential buildings. In Norway, new buildings only represent 1-2% of building stock each year ("Technical Regulations on Buildings," 2018), which demonstrates the need to cover both new and existing buildings in regulations. Norwegian building regulation is often made in tandem with European Union (EU) regulation and occasionally surpasses it. In the 2010 regulations (named 'Tek 10'), numerous changes were made that improve the energy efficiency of buildings. For example, exterior walls have to have a U value <0.22 W/m2K and ceilings <0.18 W/m2K. Changes to air circulation and thermal insulation also are strictly regulated, with non-residential buildings being required to have 1.5 air changes per hour as standard ("Building regulations TEK10," 2010). This concept is an extension in many respects of current mandated regulation on energy performance certificates (EPC), which have been compulsory since July 2010 for any building that is sold, constructed or rented out, including having such certificates on display for non-residential buildings over 1000 m2 ("Technical Regulations on Buildings," 2018). The rating system is from 'G' to 'A', with buildings that meet Tek 10 standards normally achieving a 'C' rating, whilst high performing buildings and passive houses will achieve an 'A' or a 'B' ("Technical Regulations on Buildings," 2018). The most recent variant of Norway buildings regulations is 'Tek 17', adds increasingly strict regulation on building emissions, such as banning the installation of fossil fuel heating installations, along with 115 kWh/m2 heated gross internal area per year energy budget for

office buildings that cannot be exceeded (Authority, 2017). However, none of the existing regulations focuses on Green Leasing (or Green Leases) and is broadly weak in assisting in the development of sustainable rental offices.

In order to support Norwegian building regulations, the state has developed support mechanisms to assist developers in meeting the challenges associated with Tek 10, Tek 17, and other regulations. One such supporting institution is that of Enova. Enova is an organisation owned by the Ministry of Climate and Environment and supports the building industry in order to reduce its emissions and develop climate technology to support it (Enova, 2018). Enova accepts that making environmentally friendly changes to buildings and other industries brings with it significant financial risk, with such risks also existing for the development and implementation of technologies that can be used to support this. Enova provides consulting and financial services to reduce these risks, which amount to more than 2 billion Norwegian Krone of public resources (Enova, 2018). An example of an Enova supported project the development of Ruseløkkveien 26 AS in Oslo. Due to open in 2021, this new office building received 19 million Norwegian Krone (roughly 2,013,000 Euros) in support, with a 5 GWh/ year energy result. This support resulted in the building implementing smart regulation and monitoring of energy solutions through cloud technologies, a structure that exceeds passive house requirements, and even heat recovery from transformers, its retention basin and cooling production (Enova, 2017, pp.30-31). Despite Enova interest in this area, it is yet to publish research and provide substantial support for Green Leases, however, Green Leasing receives a degree of proxy support through its support for sustainable office building development.

Another institution supporting practice in this area is newly formed 'NGBC - Grønn Byggallianse' (The Green Building Alliance), formally known as the simply as the 'NGBC' and 'Grønn Byggallianse' as separate institutions, which was formally founded in 1st July 2018. One of their main roles is as the franchisor of BREEAM-NOR and LEED certifications. In their BREEAM centric literature, they state that they have 1,533,300 square metres of certified space in 301 registered buildings (NGBC, 2018).

2.5.2. Academia

Outside of more direct practical implementation, academia and other research projects and institutions have contributed in their own way to sustainable development in the context of the built environment. One example of such a project is Multiconsults (in cooperation with its

partners) 'Oscar' project. Whilst not a project that focuses solely on sustainability (instead has a primary focus on '*value*'), this project is organised under the understanding that there is a clear connection between how we design and operate our buildings (both residential and non-residential) (Oscar, 2018). A 2016 survey by the Oscar project focusing in the Triple Bottom Line of sustainability in the context of the '*Environmental*', '*Social*' and '*Economic*' with a wide range of stakeholders concluded that collaborative approaches to the development of buildings can result in a more sustainable approach and a higher degree of user satisfaction (Støre-Valen et al., 2016, pp. 2,5). Although not discussing Green Leasing specifically, the discussions on the value in this project along with cross-stakeholder engagement offer insight into some of the challenges, particularly in the context of drivers for owners and tenants and of some of the research associated with **RQ2**.

Another important project in the development of sustainable buildings from the perspective of research is that of the Norwegian Centre for Zero Emission Buildings (ZEB). The ZEB vision has been to eliminate the emissions from buildings through research, innovation and implementation. The centre was based at NTNU's Gløshaugen campus and included research partners as diverse as SINTEF, and even industry partners such as the building developers Skanska and Entra (ZEB, 2018). Their projects featured a multidisciplinary team ranging from computer scientists to social scientists to engineers and architects. The project ran from 2009 to 2017 and was supported by the Norwegian Research Council, as well as its long list of partners. During its lifespan, the project focused on 5 work packages – *'Advanced Materials and Solutions', 'Climate-adapted Low-energy Envelope Technologies', 'Energy Supply Systems and Services', 'Energy Efficient Use and Operation', and 'Concepts and Strategies for Zero Emission Buildings'* (ZEB, 2017, p.11). For this thesis, the 4th work package on '*Energy Efficient Use and Operation*' offers the most relevance, mainly due to its focus on non-technical evaluations, but still focusing on high environmental ambitions. An example of 'project within a project' that is within the scope of this work package, is the research project 'Methodologies for Improvement of Non-Residential Buildings' Daily Energy Efficiency Reliability' (MINDER). This was a project intended to reduce the reliability gap of non-residential buildings, the gap that which exists between the potential performance of a building as it is advertised to its users, and how it performs in practice (Berker et al., 2014, p.1). Through interviews with FM's and other operational personnel, the project intended to identify gaps and possible solutions by which to fill them. Not only was ZEB a research project, but it also resulted in tangible 'in-project' results in the form of pilot

buildings, one of the more notable being 'Powerhouse Kjørbo'. Powerhouse Kjørbo was a building built in 1979 and is located in Sandvika, near Oslo. After an extensive refurbishment, the building didn't just improve its energy efficiency, but went as far as to receive a BREEAM-NOR 'Outstanding' certification, the highest possible certification a building can achieve (ZEB, 2017, p.44). The building was stripped back to its core during refurbishment, with a high level of detail in terms of not just its construction materials, but also waste management (Throndsen et al., 2015). After its completion in 2014, this old 1979 non-energy optimised office building had become an attractive modern office building that had reduced its energy consumption by 90%, and even had solar panels on the roof that could produce more than 200,000 kWh per year, which is twice as much as the buildings needed to operate ("Powerhouse Kjørbo, Sandvika," 2015). Despite the ZEB projects substantial contribution to the development of sustainable development, the barriers and drivers for owners and tenants have not been given the same level of attention as FM's and other operational stage stakeholders. The scope of this project in many respects provides information and motivation for all of the research questions, which incidentally means that future projects of a similar type could find useful contributions from the work conducted in this thesis.

Aside from ZEB and Oscar, other smaller but equally as important research projects are being conducted by other academic and research institutions. Kjetil Gulbrandsen at the University College of Østfold conducted research on value drivers for building development, with a focus on BREEAM-NOR certified commercial buildings. This placed a focus on some of the aspects of value considered by the Oscar project, but with a sustainable twist. Out of the value factors of *'increased sales value', 'increased rental income', 'easier renting', 'reduced operating costs', 'reduced risks – (withstanding stricter future regulatory requirements and user requirements)', 'reduced risk – (high technical quality)* and *'improved reputation'*, the survey indicated that the most valued factor was reputation (Gulbrandsen, 2017). NTNU's ongoing project called 'Smart Sustainable Cities' is looking closely at a cross-disciplinary approach to moving towards a smart and low carbon future, one of their projects is the successor project to ZEB, the 'Research Centre for Zero Emission Neighbourhoods in Smart Cities' (FMW WEN)' (NTNU, 2018). Much of the work conducted here is relevant to the results of **RQ2,** and to some extent **RQ3**.

2.6. The Relationship Between Owners/ Developers, Tenants and Facilities Management

An attempt at implementing a Green Lease or Green Leasing in an office building requires a keen focus on the key stakeholders that are involved in such a project. Although not about Green Leases and Green Leasing specifically, Haugen (2008) created a stakeholder diagram (*Figure 18*) that attempts to integrate the stakeholders of '*Owner*', '*FM*' and '*User*' into the corporate real estate (CRE) context:

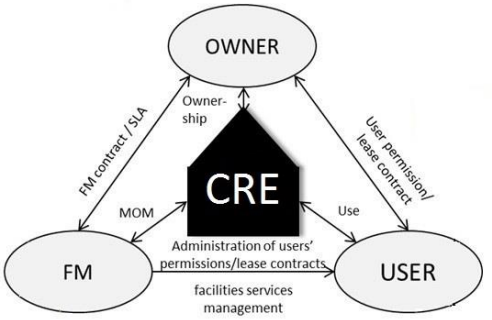

Figure: Owner-FM-User interrelation in Facilities management / buildings management, (Haugen, 2008)

Figure 18 – Owner-FM-User interrelation in Facilities management/buildings management, (Haugen, 2008)

According to Haugen in *Figure 18*, these roles can be defined by their essential roles in the building to which they are related. The primary function the owner is creating value for the company throughout its lifecycle, whilst the user takes the perspective of operating the building to support their needs for it. The success of this endeavour can be measured by how it meets their own requirements per cost unit. FM's, on the other hand, has a role that ensures that this building operates optimally for both the users and owners (Haugen 2008, pp.15-16). Although this is of interest and importance for a non-residential building, it is also important to look at how these roles operate the degree to which they are valued in the context of Green Leasing and Green Leases.

Regarding owners in a Green Leased building, they have a key responsibility at the strategic level in developing the leasing option, instigating the Green Leasing process, as well as

procuring an appropriate tenant. This is particularly crucial when considering that in a sustainable building the most common real estate transaction under their stewardship is that of the lease (Kaplow, 2008, p.375). Sustainable buildings can be more expensive to build and develop than one without sustainable considerations (around 2% more), which mostly consists of the costs of a green certification, planning changes and enhanced commissioning. However, owners and developers are in one of the best positions to reap the rewards of these buildings through the '*sustainability dividend*' due to cost savings in operations and higher rents (Kaplow, 2008, p.379). Their role, however, needs to be re-evaluated in a Green Leased building, as in the past their relationship with the tenant has been mostly void of environmental discussions. This changes considerably in a Green Leased building but maybe as disruptive and challenging as it is rapid (Hinnells et al., 2008, pp.541, 544). Outside the organisations themselves, however, it has proved challenging in the current marketplace to secure incentives for owners/ developers to consider Green Leasing options. Challenges in the context of BREEAM are an example of such difficulties. In 2011, BREEAM included Green Lease considerations in the form of certification credits when owners chose to negotiate a Green Lease with a prospective tenant. However, due to such a lease being unpopular with tenants at the time due to the extra obligations such a lease included, Green Lease credits were dropped from BREEAM in their 2014 revised handbook (Janda et al., 2016, p. 664). The issue of split incentives is another such example. In a triple net lease, for example, a landlord invests the money in the building's improvements to improve a buildings energy efficiency, whilst the utility bill paying tenant is rewarded through lower operating costs (Kaplow, 2008, p. 395), lessening the incentives of owners to make these sorts of changes.

A tenant in a Green Leased building is also a stakeholder that sees a reorientation in focus. In a sustainable building as in a regular building, the tenant's primary relationship with their landlord is the paying of rent for access to space and associated services. However, Green Leasing and a Green Lease that may exist in conjunction with it require a reconsideration of the dialogue with their landlord. This poses a challenge due to two primary issues in such a building, new operational obligations and responsibilities on the part of the tenant, as a well as a lack of incentives. In a building in a Gross Lease for example (where utilities are included), a tenant has little to no incentive to control their energy use through operational savings alone (Kaplow, 2008, p. 395). In terms of changes in responsibilities, many Green Leasing and Lease arrangements involve building users participating in the environmental

management of their building, varying from recycling to attempting to lower their energy and water consumption. This is contrary to historical leases, where joint maintenance and improvements have often been specifically halted through lease contracts (Janda et al., 2016, p. 661). The relatively short time that tenants occupy their property may also hinder the incentive for tenants to make sustainable investments with their landlord (Hinnells et al., 2008, p.544). This re-evaluation of the landlord-tenant relationship in such a leasing agreement is currently complex, however, one aim of this thesis is to uncover in more detail the types of incentives that may exist through a better understanding of the drivers for tenants to occupy such buildings.

For facilities management, whilst their primary role is in supporting the functions of their building for the needs of their occupants, the nature of this support is in some cases different in a Green Leased building. Whilst FM's are generally not the instigators of Green Leasing or a Green Lease, dialogue with them can form of a part of the agreements that take place in preparing them (Hinnells et al., 2008, p. 545). Due to the nature of greater tenant engagement in the sustainability of their building, FM's may also act as consultants and 'go-betweens' between the tenant their building. An FM may be responsible for teaching tenants how to use a joint recycling facility (Pivo, 2010, p.193), or teach tenants how best to reduce their energy consumption in order to meet the demands of their Green Lease. Outside of their engagement with tenants, FM in a sustainable building can act as an incentive in its own right. FM has a secondary job of providing added value to such buildings (Adewunmi et al., 2012, p.350) , enhance an owners competitive edge through appealing to sustainable desires of tenants, as well as positively impacting corporate social responsibility (CSR) programs (Nielsen et al., 2016, p. 260). Of the three stakeholders featured in this section, FM's are the most under-researched and least utilised, which is something the researcher hopes to improve upon in this thesis.

In this thesis the owner/ developer, tenants and FM are the key stakeholders for investigation. Whilst all are individually important and are deserving of attention from academia and practice, it is only in tandem that Green Leases and Green Leasing can improve their success factors. To quote Hinnells (2008), "*the behaviour of the landlord, tenant and facilities manager are all a part of the story of energy consumption*" (Hinnells et al, 2008, p. 543).

2.7. Green Leasing in a Theoretical Context

This section features theoretical discussions and frameworks that place the discussions on Green Leasing within a theoretical context. Whilst not strictly fitting into any field in isolation, they mainly come from studies of the built environment, FM, architecture and social sciences research with a degree of business studies, law and other associated fields.

The featured theoretical concepts will be as follows:

- Firstly, a look at issues relating to the asymmetry of relationships between the owner, tenant and associated service providers in the form of the '*Principle-Agent Problem*' and '*Split Incentives*'
- Secondly, a look at the role of users in sustainable buildings
- Thirdly, a look into corporate social responsibility (CSR) and circular economy.

2.7.1. Landlord-Tenant Relationship and Service Providers in Office Buildings

When looking into theoretical concepts relevant to the study of Green Leasing, it is important to consider theoretical ideas that impact the flow of services, costs and information in buildings, all components that are relevant to the success of Green Leasing. This is not a newly recognised challenge, with organisation management being well off poorly aligned incentives amongst stakeholders, which may or may not be directly responsible for the oft-perceived 'short-sightedness' associated with energy saving technologies in the form investment in quick returns (DeCanio, 1993, p.908). One such concept that is relevant (and particularly important in rented properties) is that of the so-called '*Principal-Agent Problem*'. The core concept of the '*Principal-Agent Problem*', is that of asymmetrical information and skills within a network of stakeholders. This is a principal from the discipline of microeconomics, with a fundamental academic grounding in Agency Theory. This aspect of Agency Theory is particularly linked to examining the relationship between company, shareholders and other relevant actors (IEA, 2007, p.28).

The '*Principal*' in this concept is an individual stakeholder or party (e.g. a landlord) who commissions an external party or '*Agent*' (E.g. an external FM provider) to act on their behalf to provide a service or fulfil a role (such as cleaning). The reasons for the Principal employing the Agent can be numerous and varied. It could be due to the Principal not having the skills, resources or contacts to fulfil the task themselves, or because the Agent can perform the task to a higher standard or a lower cost.

In terms of the '*problem*' element, it is the idea that the '*Agent*' may not always be acting in the best interests of the commissioning '*Principal*', who may not know or have the skill and power to resolve it due to these resources remaining in the hands of the Agent ("Definition of principal/agent problem," 2017).

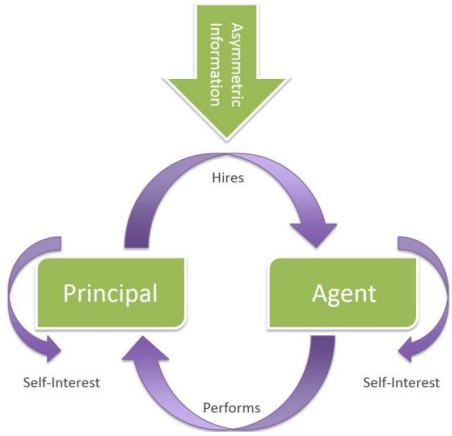

Figure 19 – The Principal-Agent Problem ("Principal-Agent Problem," 2017)

The Agent may act in their own best interests at the expense of the Principal, either due to systemic errors with the agency principal relationship, self-interest, preservation of their service or skill, or even financial gain. In the context of sustainable non-residential buildings available for rent, the Principal-Agent Problem is often reflected in the context of the advantage of the Agent due to the asymmetry of information available to the Principal. More specifically, it often relates to matters of the building owner and external service providers. An example given by the International Energy Agency (IEA) is that of the purchase of a refrigerator. A building owner may want to purchase an energy efficient refrigerator for their property in support of their sustainability objectives, however, the sales company may provide incorrect information about the appliances sustainability to meet their own objectives (financial or otherwise) (IEA, 2007, p.32).

As with any relationship of this nature, the Principal aims to untangle this relationship to get more value (both financial and less tangible) from their Agency actors. To some extent the '*Principal-Agent Problem*' can also be reflected in the Owner and Tenant relationship in a sustainable building, where the Principal is the tenant who may be inexperienced in the needs and challenges associated with a sustainable building, and relies on the Owner (who is, in this

case, the Agent) to fulfil a service in the absence of the knowledge of the Principal. As with the case of the refrigerator, the Tenant is at the mercy of how the Owner chooses to exploit and use the knowledge and skills lacked by the tenant.

A theory related to the '*Principal-Agent Problem*' but more relevant to the relationship between the owner and tenant, is that of '*Split Incentives*'. In a Split Incentive, the incentives between two parties diverge, meaning that an overall policy cannot be enacted due to the differing interests of both of the parties involved ("Overcoming Split Incentives," 2013, p.1). This is particularly an issue in the office rental sector, where the one who benefits the most from a transaction (in this case the tenant who benefits from cost saving due to energy efficiency) is not the one who pays towards the improvements to make this possible (the 'landlord') (Catellazzi et al., 2017, p.3). This becomes complicated when the '*Agent*' is not keen on making these necessary investments if the '*Principal*' is not fully informed (Melvin, 2018, p.344). Furthermore, if the 'Agent' is a building owner or landlord, they may expect sustainably positive interventions to be effective, inexpensive and easy to implement in order to be feasible (Carrico et al., 2011, p. 9). Green Leases, however, are products impacting these challenges in a positive way as it can "*bridge these differences*" by ensuring that the costs and benefits are split between both parties during an energy efficiency upgrade of a building (Catellazzi et al., 2017, p.8). The challenges posed by '*Split Incentives*' are not entirely ignored by practice. For example, in some countries governments are demanding that owners of commercial buildings disclose their energy bills with the aim of motivating them to more visibly implement energy-saving initiatives. According to Stern *et al.,* (2016), this sort of initiative has led towards qualities in Green Leasing such as energy data sharing and the sharing of upgrade costs (Stern et al., 2016, p.9).

The '*Principle-Agent Problem*' and '*Split Incentives*' are also important to consider when reflecting on FM services in buildings. A client in a building (whether it be the owner or the tenant) may seek to an FM service provider, but be given an unneeded or excessive service due to the lack of competences in this area on the part of the client. For example, a building owner may attempt to procure an air conditioning unit, only to be sold one of greater monetary value but with functions excessive to their needs. In the context of Green Leasing and Green Leases, this type of challenge is of a similar type. Due to the lack of understanding and knowledge of such buildings on the part of the tenant, this could result in the tenant signing the lease of and/ or occupying a building that requires a monetary contribution that is unnecessarily excessive when compared to their needs.

There is, however, the potential for some of these incentives to align with the appropriate research being conducted in both industry and scholarly endeavour. One attempt has been made by the World Green Building Council (WGBC), who has conducted its own research on stakeholder perceptions that affect the value of Green Buildings in *Figure 20*:

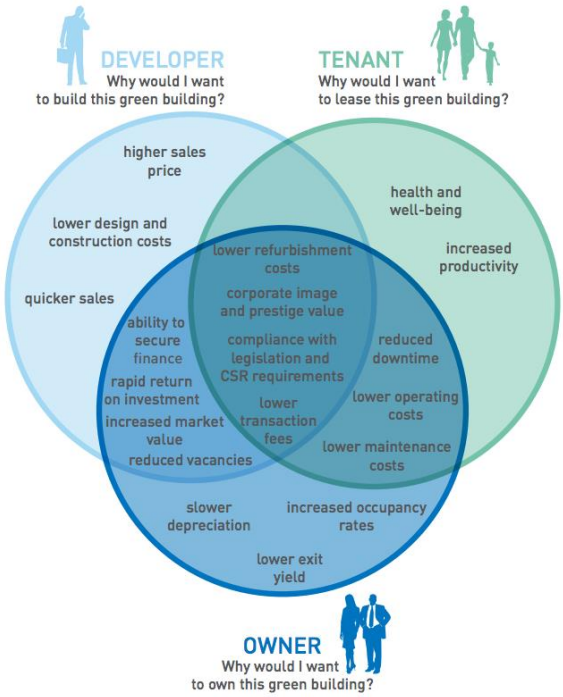

Figure 20 – Stakeholder perceptions that affect the value of Green Buildings (WGBC 2013, p.35)

As *Figure 20* shows, despite some differences in motivation, common ground can be found in CSR initiatives, lower rehab costs and transaction fees. Whilst this thesis attempts to move deeper and further into the differences between these stakeholders, work in the commonalities to prevent incentive disjuncture is not an unrecognised research prospect in academia and practice. Returning once again to FM services, a more expensive appliance (such as the previously mentioned air conditioning unit) could result in lower costs in the longer term if their energy use is reduced and maintenance costs are also lowered. There is

then a possibility that this saving could be passed on to the paying client. Similarly, a client may be tempted by a more expensive FM appliance if in the longer term the energy cost reduction outweighs the initial costs and/ or rental of the device or service. In the context of Green Leasing, and improvement in dialogue and an improved understanding of the leasing product may remove many of the challenges posed by '*Split Incentives*' and the '*Principle-Agent Problem*'. In the case of Green Leasing, whilst a rented office space might be more expensive per square metre, a reduction in operational costs and aspects of added value such as CSR benefits might outweigh expensive rental premiums.

Whilst Green Leasing alone does not provide a panacea to remove entirely the complications in the Landlord-Tenant relationship that can be caused by the '*Principal-Agent Problem*' and '*Split Incentives*', they do have the potential to approach it more positively.

2.7.2. Rental Office Stakeholder Interaction Model

When looking at how best to understand how relationships in rental offices work, seeing them in relation to the sum of their parts is in an important aspect to consider. As a part of the theoretical development of this thesis, the '*Rental Office Stakeholder Interaction Model*' in *Figure 21* was developed in order to better define and illustrate these relationships.

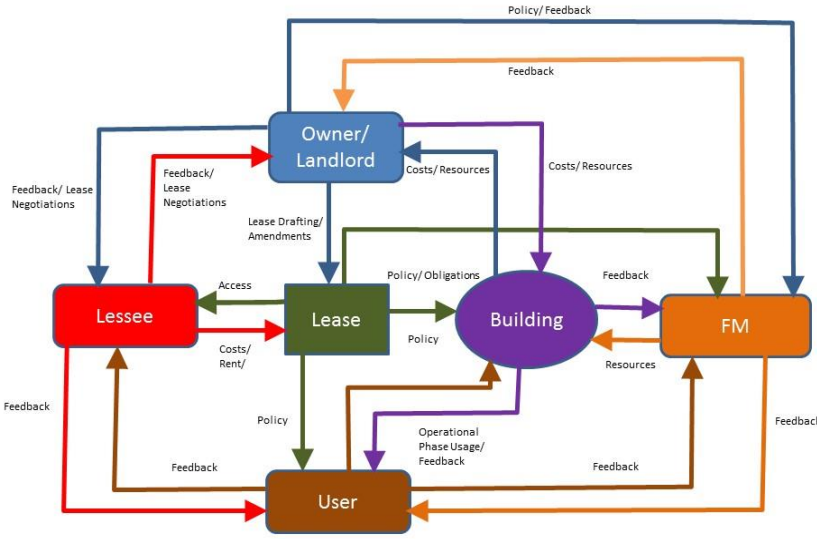

Figure 21 – Rental Office Interaction Model (Collins, 2018)

The originally published in **Paper V**, this model represents the key relationships that exist between the key stakeholders of '*owner/ landlord*', '*lessee*', '*user*' and '*FM*' which are considered agency actors in the context of the model overall. These actors have agency and are placed in the context of other elements in the network that do not, which are the '*building*' and the '*lease*' itself. One of the ways in which this model is unique is that it divides the '*lessee*' and '*user*' as separate entities. This is because, in offices, the person who signs the lease may not be the one who uses the building (Collins, 2016, p.4). For example, a bank head office in Oslo might sign a lease for a bank branch in Trondheim, but the person signing the lease will not use the building themselves. This means that both stakeholders can potentially two different experiences with this property. This division is essential as the success or failure of a Green Lease or Green Leasing project may not just be down to the building itself and FM, but also the experience of the user tenant. Issues associated with this can range from the sustainable behaviour of these occupants (such as failing to turn off electronics) or challenges in the users being able to interact with the building, due to technological usability (such as complex BMS system interfaces), to poor build design, to

users being poorly trained in how to use building properly in line with its sustainability objectives. There is even current research that suggests that fostering a sense of community with common sustainability values may positively impact the experience of users in a building (Dixon et al., 2015, p. 126), which in turn places further importance on users in the context of their story in the Green Leasing experience.

The '*lease*' and '*building*' elements form the core of the model and serve as the two binding components of the entire network. This logic feeds into previous discussions on the '*Principal-Agent Problem*', but in this case reflect that the '*owner/ landlord*' want to accrue the best value from their rentable asset through rent and occupancy, with the '*Lessee*' and '*User*' endeavouring the extract the best value from their rental fees, which in both cases are bound together through the '*lease*' and '*building*'. The FM is important, but is placed in a separate position, and is the key binding stakeholder that has agency. The FM primarily communicates with the '*user*' and '*owner/ landlord*', however, this relationship is in no way binary. The placement of the FM in this model is reminiscent of what Goulden *et al.,* (2015) describe as FM's being "*caught in the middle*", meaning that FM's are often not a part of larger decision making processes within a building, yet is still a key conduit between higher levels of management and the building's users (Goulden et al., 2015, p. 281).

The '*Feedback*' elements in the interaction arm represent the possible forms of communication between stakeholders, through complaints, negotiations, requests and other forms of verbal and non-verbal feedback.

This model contains numerous facets for enquiry and thus becomes very complex by definition. For the purpose of this thesis, it requires simplification, which can be found through *Figure 22*, which is a truncated variant of *Figure 21.*

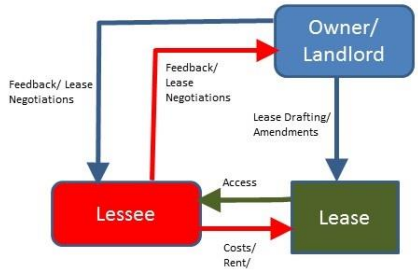

Figure 22 – Rental Office Interaction Model (Truncated)

Figure 22 presents a version of the model that is more representative of the stakeholder reactions that feature in the empirical data collection for this thesis, however, this is not entirely binary as the '*FM*' and '*user*' experiences were uncovered in the data, however they were not the stakeholders that were contacted as a part of the data collection process. In this variant of the model, we see that the primary purpose of the '*owner/ landlord*' is to negotiate with the '*lessee*' to develop a lease, and then to draft the lease to reflect this, as well as provide amendments were necessary. For the '*lessee*', they also partake in these negotiations, whilst providing rental income in exchange for building access. The '*lease*' is a malleable construct for the '*owner/ landlord*', whilst serves the purpose of providing access to the '*lessee*'.

Whilst *Figure 21* and *Figure 22* do not provide an exhaustive framework for the interaction of stakeholders in rented offices, they do provide a useful theoretical overview.

2.7.3. Theories on Building Users in Sustainable Buildings

A core consideration of a Green Lease or Green Leasing arrangement is the discussions surrounding how building users may or not be involved in these initiatives. Whilst a Green Lease may not necessary specifically mandate user intervention outside of the boundaries of a traditional lease, the likes of hitting energy reduction targets and other similarly proactive clauses may require this by default.

Whilst buildings are generally designed with specific considerations about how users will interact with them, the human factor cannot always be completely predicted or accounted for at a buildings design stage. Some are aware of this challenge, with Dutel et al., (2011) for example stating that involving users in the concept stage of buildings is essential to meeting the building intentions for its energy consumption. This approach also has a potential for knock-on effects related a better use of construction materials, the buildings durability throughout its lifecycle and air conditioning systems that are better suited for the needs of their users (Dutil et al., 2011, p.455). This way of thinking can also be coupled with discussions surrounding the user's impact on innovation. Von Hippel (1998) for example states that users do not only 'spark' innovation, but directly result in innovation itself at times, believing that users impact on innovation is all too often under recognised (Von Hippel 1998, cited in Bogers et al, 2010, p. 858).

In terms of allowing users to be motivated to positively impact sustainability boundaries (through a Green Leased building or another initiative), this presents its own opportunities and challenges. Much of the existing research in this area has primarily focused on energy consumption, with an extensive study by Delzendeh et al., (2017) developing this set of motivators in *Figure 23.*

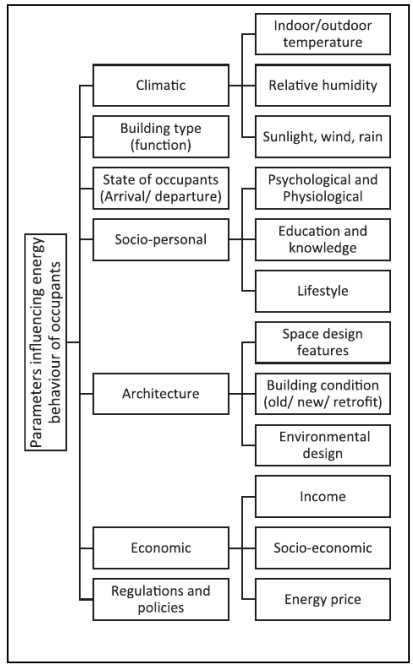

Figure 23 – Factors and subfactors influencing energy behaviour of occupants (Delzendeh et al., 2017, p.1067)

As the above diagram illustrates, the factors that impact the users and their subsequent energy use are as varied as they are complex. Not only is this influenced by factors in the building itself, such as its temperature, design and usability, but also less tangible factors. The education of the user, their socio-economic situation as well as their income (Delzendeh et al., 2017, p.1067) are all crucial in dictating the ability of users to conform to sustainability goals. Considerations like this are at the heart of a Green Leased approach, although what factors, which stakeholders and the ability to understand how to positively impact user criteria, all generate risk factors to Green Leasing.

The user experience in Sustainable Buildings is also a relevant topic to consider. It is already recognised that end users can be more tolerant of Sustainable Buildings if they feel sufficiently incentivised and engaged with it. Leaman et al (2007) state that when it comes to Sustainable Buildings overall, users are generally more tolerant of the change in practices and technical challenges they pose. This is less clear-cut however when buildings are broken up into component parts (Leaman et al., 2007, p, 672). Goal conflict and the degree to which

tolerances expire are an important consideration both in the short term (such as 'snags' in new buildings) or the longer term (technical and usability challenges). Wågo et al., (2014) states for example (in the context of residential properties) that whilst an increase in having to read documentation such as instruction manuals will be unlikely to directly result in improved user behaviour, an interplay between the architecture, technology and these occupants might (Wågo et al., 2014, p.195). However, rather than relying on these factors alone, there are possibilities to promote sustainably positive behaviour from occupants using the organisation's structure itself as the catalyst. Christina et al., (2013) states that in retail properties for example, that the usage of organisational structures and their associated practices may be able to help achieve multi-level goals that could even be in conflict. This approach can only work however if it is supported by an understanding of the preferences of end users, the approach to the use of equipment, as well as alternative demands that may come from the user (Christina et al., 2013, p. 177).

Discussions surrounding users and sustainable buildings are incredibly complex and could warrant a thesis on their own. However, this section has tried to outline that the motivations for sustainably positive user behaviour are also incredibly complex, and it is through a combination of understanding these factors combined with the organisational support that can aim for longer-term positive results. Although varied in success at present, Green Leases and Green Leasing are two such possibilities to take into account research such as this and go forward with possibilities for more sustainable occupant behaviour in rental office buildings.

2.7.4. Corporate Social Responsibility

When it comes to motivations for sustainable thinking amongst companies as well as other philanthropic endeavours, CSR is never far away in such discussions. As with so many definitions and concepts in this thesis, CSR also does not possess a universally accepted definition. Definitions in this case, however, are much less fractured and controversial. The Financial Times Lexicon (2017) for example, defines CSR as "*a business approach that contributes to sustainable development by delivering economic, social and environmental benefits for all stakeholders*" that is slightly different in its approach depending on the country that is applying it due the broadness of the definition of the concept ("Definition of corporate social responsibility (CSR)," 2017). Ultimately, however, CSR serves the purpose of driving change towards sustainability ("Definition of corporate social responsibility (CSR)," 2017). Some CSR definitions, however, have tried to reduce the broadness of the

definition to a degree. Elmualim (2017) for example states that CSR is a deliberate attempt to include the public interest into corporate decision making and with it the Triple Bottom Line of sustainability and what this entails (Elmualim, 2017, p.3). It is also important to recognise that CSR programs are not just exercises in the improvement of an organisations image. Organisational values can be important factors in influencing sustainability positive behaviour and can override personal values less aligned with those of their employer (Andrews et al., 2016, p. 198). A productive CSR from the perspective of sustainability is however only possible if the value of sustainable propositions is tackled strategically in the form of highlighting the positive impacts of such decisions on elements such as a firm's competitiveness (Cooremans, 2012, p.514).

Outside of varied definitions and understanding of CSR, in 2010 ISO released its own CSR standards, known as '*ISO 26000 – Social Responsibility*', which also saw some revisions in 2011 and 2014. According to ISO, this standard was introduced in order to "*respond to a growing world need for clear and harmonized best practice on how to ensure social equity, healthy ecosystems and good organizational governance, with the ultimate objective of contributing to sustainable development*" (Frost, 2011). In this standard, ISO provides guidelines on how businesses can operate in a more socially responsible manner and consider the environmental impacts of the way they operate the company. With it, this combines with the growing understanding that there is a need to ensure healthier eco-system, more social equality and good organisational governance (Frost, 2011). From a more technical perspective, ISO 26000 brings together existing best practice models and infrastructure already being used, relevant declarations from organisations like the United Nations, MOU's with labour standards and combines them into tangible guidelines, such those in the categories represented in *Figure 24* (Frost, 2011).

Figure 24 - ISO 26000 – Social Responsibility – 7 Core Subjects (Frost 2011)

The above model from ISO 26000 represents the core area covered by the standard, from considerations more literally entangled with business such as '*consumer issues*' and '*fair operating practices'*, to more globally embedded considerations such as '*human rights*' and '*the environment*' (Frost, 2011). Whilst not literally divided in this manner, its components are categorised in a manner reminiscent of those found in the Triple Bottom Line of sustainability's categories of '*Economic*', '*Environmental*' and '*Social*' sustainability.

Owners of the sustainable real estate are also concerned with issues around CSR, something that is the focus of some of the empirical data collection of this thesis. One of the more substantial examples of CSR in non-residential buildings is certifications methodologies such as BREEAM, that have an expressed aim of improving the environmental impact of real estate. BREEAM themselves claim that 40% of developers have that CSR is one of the main reasons for them pursuing a BREEAM certification (Soulti et al., 2016, p.8). Green Leasing initiatives are also an important part of this move towards CSR, with corporate image and more responsible building practices being an increasingly important part of company operations. FM service providers are not only a core part of ensuring the sustainability of Green Lease and Green Leasing practices themselves, but also are increasingly embedding CSR initiatives and considerations into how they do business. FM is now increasingly focusing on its role in CO2 reduction, resource saving, commodity reductions and lower energy consumption, meaning that SFM itself is increasingly becoming a part of the CSR

policies of their clients, as well as themselves (Redlein et al., 2015, p.8). This is further emphasised in areas where FM can have a positive impact within the limits of FM services on industries that are already high in carbon emissions, such as airports in a world with increasing amounts of air travel (Elmualim, 2017, p.4).

2.7.5. Circular Economy and Sustainable Business Models

Whilst difficult to quantify financially, environmental aspects could be considered the driving the momentum behind the adoption of Green Leasing. Some in the industry recognise this as a factor, under the view that "*recent critical awareness of global warming and local environmental degradation, and the emergence of regional and global targets for reductions in the production of greenhouse gases and the consumption of other resources, means that we must get commercial leases modified now*" (Brooks et al 2008, p.2). A means by which this can be best understood in commercial leases is by adhering to the principles of a circular economy. In traditional economic models (sometimes known as '*linear consumption*'), the focus on a system characterised by a "*take-make-dispose*" logic of economic thinking (MacArthur, 2013, p.13). What this means more literally, is an economic model that focuses on the extraction of raw materials, the application of labour to create a product, its sale and then later its disposal by the consumer when it is no longer needed (MacArthur 2013, p.14). This, in essence, is a one-way economic system. Although a traditionally (but not exclusively) follows an economic rationale, it is not without its challenges. A one-way system of creation and disposal of goods is not resource efficient and risks resulting in a deterioration of the environment, the global economy, and even public health (Murray et al., 2017, p.372). With this in mind, the impact of linear economic thinking on sustainable development is essentially negative, due to the absence of an unlimited amount of natural resources needed to fulfil its needs (Murray et al., 2017, p. 373). Outside of purely environmental considerations in a linear economy, companies themselves have recognised the problems with this approach, both directly and indirectly related the concerns in the environment. A linear approach risks exposing businesses to the challenges posed by high resource prices in unpredictable markets, which realises a need to try and uncouple sales revenues from material inputs (MacArthur, 2013, p. 14). Other issues exist within this model and include waste from the processing of raw materials, end of life waste from the products created from these materials, as well emissions resulting from landfill (MacArthur 2013, pp. 15-16). In the case of sustainable buildings and FM services in relation to a linear economy,

inflexible buildings and buildings with high maintenance costs are suitable examples. Poor energy efficiency in buildings is higher in emissions as well as expensive, a fact that can be corrected or improved in refurbishment and/ or with a well-developed SFM infrastructure.

A circular economy can be considered to be a business model that approaches product design and services from the perspective of 'cradle to cradle' as opposed to the traditional '*cradle to grave*' approach. When a building is considered in the context of a circular economy, its entire lifecycle is focused not on eventual decommissioning, but eventual reuse. It also comes in tandem with the understanding that the built environment is a form of environmental construction made by humans, and minimising the negative impact of this is a crucial part of circular economy thinking (ARUP, 2016, p.11).

Figure 25 – What is the circular economy? ("What Is The Circular Economy?," 2015)

A business model that operates in this pattern reabsorbs its key components with the endeavour to become self-supporting in the hope that "*new resource-efficient business models can mean good business is growing daily*" ("What Is The Circular Economy?", 2015). This can also be considered in the context of an SFM based model. When a customer buys into a contract with an SFM company who also own the equipment, this model will intend to positively benefit the environment by default. If an FM company installs an air conditioning system, for example, the quality of that device will be of paramount concern. The FM team will want to keep that system in a good state of repair for as long as possible, to avoid the more substantial base cost of a full or partial system replacement. A reduction in terms of the number of times such a system would need full replacement would see a positive impact on

emissions and resource use. In addition to this, an SFM team will also likely install a comparatively energy efficient device, in keeping with the spirit of a Green Lease (Collins et al, 2015 p.130). In terms of a more overarching business model, a more profound leasing culture in terms of consumer goods and other items could "*give manufacturers an economic incentive to design sustainable products*" (Merkies et al., 2012) , as quality would be in the better interest of the owners, as opposed to the rate of replacement to align with consumer demand.

A factor of equal significance in a Green Lease is that of energy reduction and improved energy efficiency. This can already be found in existing discussions on sustainable business model archetypes, even in the context of wider company strategic policy. Bocken et al (2014) put this more bluntly, stating that "*maximising material and energy efficiency should run through the entire business and subsequently enhance the value proposition*", ultimately resulting in reducing the depletion of resources associated with the generation of energy (Bocken et al 2014, p.49). This is of itself can an endemic consideration in a sustainable business model.

A mentioned in previous sections, Green Leasing and Green Leases are in their relatively early stages of adoption and development. Whilst it is evident from some existing practices that both are trying to become entwined with circular thinking and sustainable business models, the degree to which this is successful is undetermined.

2.7.6. The Triple Bottom Line

When it comes to theories on sustainable development, few are more recognised and understood than the '*Triple Bottom Line*' (TBL). The TBL was developed in 1994 by John Elkington, an English CSR expert and Entrepreneur. The TBL consists of three bottom lines that when analysed can be used to evaluate the success of an enterprise or endeavour in the context of sustainable development as opposed to accruing monetary profit alone. These bottom lines consist of '*Economic Sustainability*', '*Environmental Sustainability*' and '*Social Sustainability*', all of which are different from traditional forms of measuring profit in corporations and other profit focused industries. The bottom lines are sometimes referred to as '*People*', '*Profit*' and '*Planet*'.

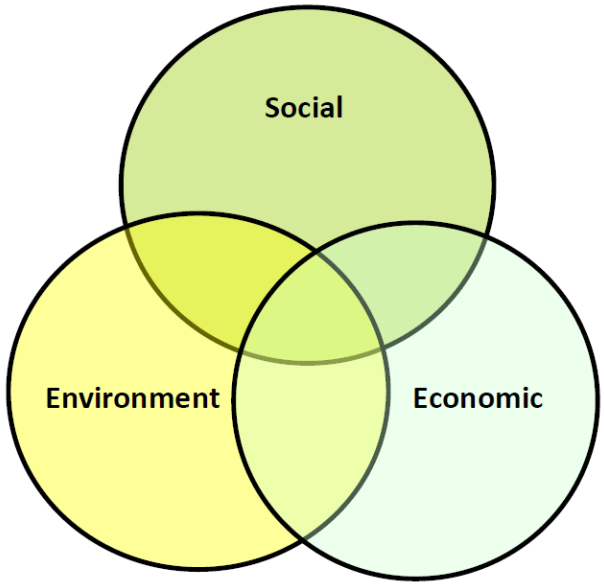

Figure 26 – The Triple Bottom Line (Intlcorn, 2014)

In a traditional business transaction, the 'bottom line' is often that of simply monetary profit. Elkington suggested that climate change can be considered a threat to this single bottom line, which means that the '*triple*' bottoms lines with a focus on sustainability can be used to combat some of the challenges that climate change can pose ("The Triple Bottom Line," 2018). Not only is the TBL a means by which to think of profit accumulation, but also impacts on the development of CSR programs within organisations. Many companies consider their corporate social considerations in the context how they fit in with the TBL, such the impact of oil spills and sometimes result in a re-evaluation as to what constitutes 'business as usual' in work where sustainability is increasingly impacting the way companies do business ("The Triple Bottom Line," 2018). Factoring in and considering the impact of sustainable development and climate change and business also has the possibility to open up

possibilities to create new products and services, which in turn can result in the TBL being a means by which to create new revenue streams, and not just calibrate old ones.

According to Slaper *et al* (2011), these three bottom lines can be considered difficult to measure in the context of sustainable development, however measurable elements do exist (Slaper et al., 2011, p.5). In the case of economic measures, personal income, establishment churn, job growth and revenue by sector can be considered good indicators. For the environmental leg, the measures are much more quantitative and consist of the likes of sulphur dioxide concentration, electricity consumption and change in land use. For the third social leg, unemployment rates, relative poverty and even average commute time can all be considered as measures of meeting these sustainability goals (Slaper et al., 2011, p.5).

Although each of the bottom lines in the TBL has separate indicators for the most part, they are not entirely separate entities in of themselves. Although their degree of co-dependence is debated, many of the more widely accepted discussions on this topic lead towards a nested relationship, the most common of which is displayed in *Figure 27.*

Figure 27 – Nested Triple Bottom Line ("Nested Triple Bottom Line," 2013)

Much current research leads to considering the TBL as a primarily nested relationship. The '*environmental*' leg can be considering the shell of the TBL, as it is an embedded circle that encompasses not only the all of life within it but also is the element with a broader imbalance that is a key instigator of the TBL's creation. Within the Environmental leg is the '*social*' element, which exists to frame our environment with our own experiences and its resulting impact. However, our experience is restricted within the constraints of our environment, and how this changes based on our impact on the environment. The final inner '*economic*' leg is a by-product of the social and has value created by the '*social*'. This is due to humans creating value to meet their own needs, and the needs of other humans (Brown, 2010). Whilst this variant of the TBL is not considered definitive and is still heavily debated (much like the TBL itself), it is still representative of the necessity of academia and practice to consider sustainable development in its wider concept as a sum of its parts, and not individual isolated elements.

2.8. Concluding Thoughts

In summing up this section on theoretical frameworks as seen in *Figure 28*, it seems that Green Leases, Green Leasing, SFM and FM services are not just entangled with varying levels of distanciation, but are also becoming increasingly embedded. With sustainable development as the overarching linking element, combined with demands from government, industry and clients, sustainable thinking is becoming an increasingly important and essential area of focus in the sustainable office sector. This is also becoming a form of opportunity as well as a formal consideration. The sustainability industry is finding ways of monetising these issues through sustainable business models, as well as creating new products and services (of which Green Leases could be considered a prime example) to fill many of the needs sustainable thinking will create. In terms of how the information in this thesis can be integrated into the wider context of this thesis, this is shown in *Figure 28.*

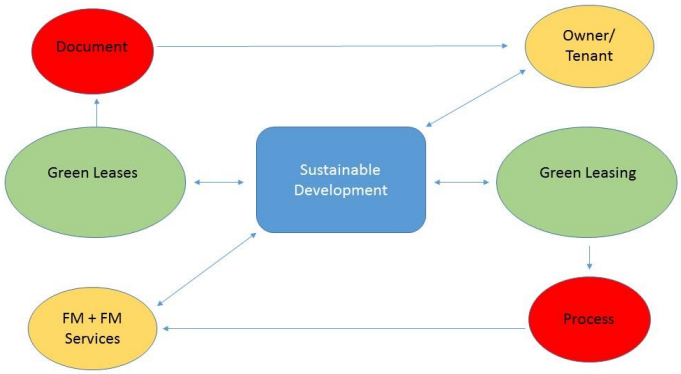

Figure 28 – Summing up the impact of the theory

In this figure, we see that although numerous building processes are not just integrated as individual '*Green Lease*' and '*Green Leasing*' relevant elements, but are also related to one another. The key binding element (or in many respects 'objective') is that of '*Sustainable Development*', which concluded the major arms of the model. *Figure 28* also shows that FM services providers are also increasingly becoming a part of the story of Green Leasing, and other developments within the sustainable built environment, A green building (with or without a Green Lease) will need FM infrastructure to support its needs. New products also need to be created in order for this vision to be managed, ranging from EPC's to stated green cleaning initiatives. Different approaches to lifecycle thinking (particularly in a circular context) are putting FM's in an increasingly important position in early and later areas of a building lifecycle, as building developers come to realise how vital their expertise is on the operational stage, and how a building can be optimised in other lifecycle phases to ensure that this expertise can be better exploited and managed. This aspect is particularly important in Green Leasing thinking.

In conclusion, rethinking buildings and the services that support them in the context of sustainable thinking have directly lead to the development of Green Leases, Green Leasing and associated SFM services and infrastructure. What is not known from these frameworks, however, is the barriers and drivers for their development and how this is being addressed by

FM orientated actors more broadly. This thesis in the coming sections attempts to address these missing elements.

3. Research Methodology

3.1. Research Context and Ethical Considerations

Whilst this is not the first thesis on FM written in the context of a social science approach as an element of its research, it may well be the first done when combining these factors with Green Leases and Green Leasing.

This principle may result in more human centred solutions to the challenges presented in this thesis, however, they do not neglect the possibilities in supporting this that is offered by technological, bureaucratic and institutional possibilities.

A core component of any piece of research is the ethical considerations that need to come with it. According to Yin (2014), ethical standards are essential for a variety of reasons. Aside from ensuring that interview subjects are taken care of adequately, good ethical standards also ensure accuracy, better credibility, a better understanding of the studies limitations and stronger professional competencies (Yin, 2014, pp. 76-77). Whilst aspects such as transcript consent were very important in the empirical work in this thesis, anonymity was also crucial component due to the potentially commercially sensitive data included in this thesis. This ethical bend also influenced the cross-sectional research design approach, as this approach to data collection helps to ensure that respondents and interviewees are not tracked so rigidly, which also improved the anonymity of their answers to surveys and interviews (de Vaus, 2002, pp. 192-193).

In the case of all of the interviewees for both of the interview based studies, all of the respondents were made aware of the nature of their involvement before the study took place. This included informing them that the interviews were being conducted for a PhD research project, be recorded, transcribed and published in a peer-reviewed conference paper or peer-reviewed journal article. Interviewees were also informed that all transcripts (both typed and recorded) would be destroyed once the publication process was completed. Three subjects over both sets of interviews withdrew prior to the interviews taking place based upon not feeling comfortable with this arrangement. After the interviews were completed, the typed transcripts were sent to the interviewee and the recordings destroyed, and a copy of the completed pre-publication article forwarded to them at a later date. For each item, an email was sent stating that if they did not respond by a specific date (which was a month after the

email was sent) I would assume that the interviewee was happy to remain involved. None withdrew at this stage.

For both interview-based studies, a rule was followed that stated that if at least one interviewee wanted to be anonymous, then the entire study would be anonymised. This was the case for both studies, so all subjects were not named. In the first study, companies were named, however, this was done in agreement with all of the interviewees. As mentioned earlier, none of the participants pulled out of the study when presented with how their answers would be published.

In the case of the survey, the anonymity was addressed from the beginning in the opening preamble to the survey on the internet. As with the interviews, potential survey respondents were informed in the same preamble that this was a PhD research project, the nature of the study and that the results would be published in a peer-reviewed conference paper or peer-reviewed journal article. Many of the questions concerning personal information (gender, company name, etc.) were optional in order to make sure that each respondent felt comfortable and did not feel that they were risking any kind of confidentiality difficulties. Optional company names were requested, but this was only to assist in ensuring that companies were not answering the survey more than once, and there was no intention to publish any company names. Whilst the survey data was not destroyed after the publication of the results (in order to use it for a later project), the survey was removed from the internet, the data from Google Forms deleted and the remaining data copy stored on a University network drive by the researcher.

3.2. Research Approach: Mixed Methods

As with any project, the research and approach to answering research questions are coloured by the philosophical perspective of the researcher, which in this case is primarily constructionist. The educational history of the researcher prior to their Doctoral study has also had an impact on the development and outlook of this project. More specifically, a Bachelor in Modern History and Politics from Cardiff University, and a Masters in Globalisation, Global Politics and Culture from NTNU.

The qualitative phase of the study in the form of interviews was aimed at providing narrative and explorative data that could provide content and focus for later and more detailed survey development. This provided possibilities to probe deeper from the information gained in

literature reviews which provide momentum and scope for a deeper investigation through quantitative research.

The second phase is dominated by quantitative research, which served two key purposes. Firstly, it allowed for refined and optimised questioning that provided for more exact questioning that is less open to individual interpretation in both its questions and answers. Secondly, this form of questioning is better suited for comparing results, which was particularly important for statistical analysis and for comparative the challenges and opportunities between stakeholders.

When narrowing down the research to a less broad epistemological approach, the research can be considered to be constructionist in outlook and process. According to Creswell (2013), an epistemological perspective is needed to also understand not just what the researcher thinks they will learn from their project, but also how they will learn (Creswell, 2013, p.6). In the context of this project, constructionism can be defined as the idea that social constructions and phenomena are in a constant state not just of change, but also of meaning. This requires the constant description of a social reality, rather than excepting one as definitive (Bryman, 2012, p.33). The reason for taking this approach is due to the perception and need of involving users in the sustainability of their building are both defused and in flux. The degree to which different actors feel they should be involved (as is discussed in **Paper I**) is controversial and devoid of an accepted approach. This requires a constructionist approach in order to describe several possible realities (e.g. one where users should be involved, and another not) due to the complication of the overriding issues (social, legal, financial and technical) surrounding this field.

In order to meet the goal of this thesis and create new knowledge, a mixed method approach was chosen when tackling the empirical data collection and research design. more specifically, the data sets comprise of both interviews and a survey, as well as a qualitative and quantitative data collection in both. The rationale behind this approach is that the quantitative elements are to be used for the purposes of direct scientific comparison, and the semi-structured interview elements allowing for questions to be "*carefully worded so that you appear genuinely naïve about the topic and allow the interviewee to provide to provide a fresh a commentary about it*" (Yin, 2014, p.111). The quantitative forms of the study help to establish the '*what*' elements of data collection, with interviews supporting this by adding the '*how*'. The same approach

(although leaning much closer to the 'quantitative') was also used in the development of the survey.

Combination of these approaches are a "*well-trodden*" path in research as Yin (2014) describes it, and provides an opportunity to collect "*complimentary data*" to contrast each method and even conduct "*counterpart analysis*" and can allow the means by which to "*collect a richer and stronger array of evidence that can be accomplished by any single method alone* " (Yin, 2014, pp.65-66). Yin (2014) also acknowledges that this approach can be more difficult to execute than a purely quantitative or quantitative approach (Yin, 2014, p.67), however, this project has accounted for the difficulties on account of the researcher's previous experience using mixed method approaches to empirical data collection. Yin (2014) also more specifically mentioned this projects survey and interview approach, acknowledging that a so-called '*survey interview*' could be an embedded part of case studies and other forms of research (Yin, 2014, p.112).

3.3. Research Design: Sequential and Concurrent Models

A mixed method research design offers many possibilities for an in-depth research project that provides scope for both comparative and narrative forms of data accumulation. In order for these to be harmonised to some degree, however, a structure is needed in order to reach useful and analysable concluding results. Whilst looking into developing their own sequential model for this researcher, the researcher first looked at models that were relevant for the research design of this thesis. Creswell and Clark (2011) developed two models that provide structure to the mixed method research project, whilst Creswell (2013) provided a more text-based understanding as to the needs and value of a mixed method methodological framework. Whilst both provide slightly different perspectives on what is meant by the needs and value of this approach, their emphasis on the importance of mixed method research remains the same.

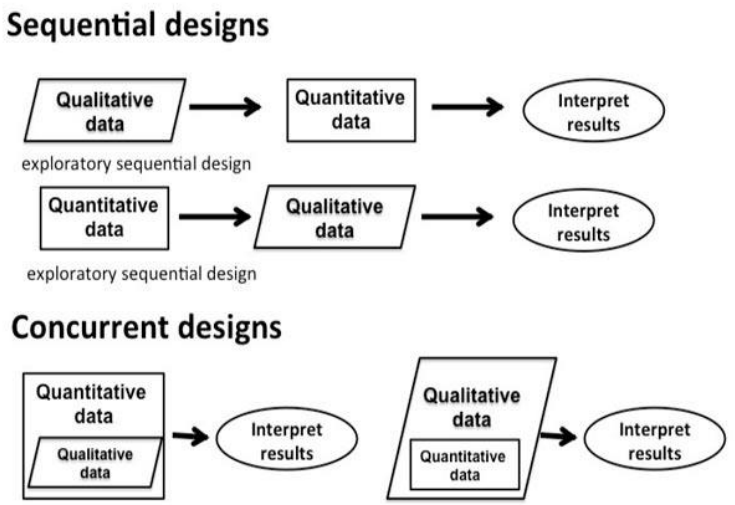

Figure 29 – A Sequential and Concurrent model for Mixed Method Research (John Hopkins Bloomberg School of Public Health (based on Creswell and Clark, 2017)

This model represents the two possibilities in which a researcher can approach mixed method research, whilst ensuring that there is a common momentum to reach interpretable results.

Sequential Designs

In a sequential design (the exploratory variant), the researcher first conducts quantitative research, and then later adds to the results through qualitative research. This is often considered exploratory in its nature, primarily because one piece of research adds to another (Creswell 2013, p. 44). This is reversed from an explanatory perspective. In this approach, the qualitative data is used to inform the quantitative further research. This is also used to inform a second quantitative phase that is based on the outcomes of the two previous rounds of quantitative and qualitative study. A sequential mindset also needs to be prevalent when approaching the supporting literature for these studies. In a sequentially mixed method perspective, literature must be presented in a way that is consistent with the method. Creswell (2013) states as an example, that a quantitative study would require a substantial literature study to inform the research design and likely questions and justify the rationale. For a qualitative study, however, literature research is less substantial as this stage. In this sort of

study, literature research is needed nearer the end of the study as a more inductive approach to the research (Creswell 2013, p.62).

Concurrent Designs

In a concurrent mixed method approach, both quantitative and qualitative data are collected at the same time in tandem with another. This is considered by Creswell (2013) to save time, as each dataset is not collected as a separate attempt as field research (Creswell 2013, p.281). The audience for the study, however, must be carefully considered in order to ensure that a concurrent data collection approach with both qualitative and quantitative elements is suitable for the person/ people being studied (Creswell 2013, p.62). If a researcher places equal weight on both the qualitative and quantitative elements of the study, the literature research associated with the study also must be of a similar weighing in terms of focus (Creswell 2013, p, 62).

For this PhD study, the researcher considered the strengths of both mixed method approaches before deciding on the most appropriate way by which to conduct their own research project.

Challenges associated with this design

Whilst a mixed method approach presents many opportunities over other methodological approaches, it is not without challenges that may hinder some of the possibilities for reliable and useful data collection.

The data collection process for this thesis was a combination of sequential and concurrent mixed method research. This means that the data collection (although planned) may come across as less systematic than if the research had been conducted by sequential and concurrent methods alone. For example, the first exploratory study was wholly qualitative, which lead to further interviews that were weighted more heavily as qualitative than as quantitative. This then resulted in informing a final survey that was weighed considerably more quantitatively than qualitatively. This overall asymmetry could risk an equally as challenging asymmetry over the development of each study and the possibilities for a more optimised research design at each stage. This was overcome by ensuring that the overarching narrative for each study did not differ, so the research design and questions to respondents were not just informed by each preceding study, but also overall goal and object of the project a whole.

From an academic perspective, Creswell states that with a mixed method approach, there can be challenges associated with the validity of the data. This could be due to the researcher not following up on all of their options before moving on to the next step of the study. The complexity of this approach may also result in the researcher overlooking aspects that they would not have missed should they have not used a mixed method approach. The sample size may also be inadequate to reflect a significant enough amount of respondents for either the qualitative or quantitative aspects of the research (Creswell 2013, p. 275). Insufficient rigour in the design and/ or analysis for either the qualitative or quantitative may represent a significant challenge in the overall ability to justify the validity of both methods. These challenges were overcome by considering the outcomes as the individual studies developed. A second opinion on the research design (mainly from the researcher's supervisors and other colleagues) allowed for other eyes to look at any research shortfalls and asymmetries, which were then fixed prior to the conduction of the data collection.

Thirdly, the familiarity of the researcher with the methods could be considered a challenge. As a young researcher in this field, the author does not have 'trial and error' experience based advantage of a more experienced Professor or other research focussed knowledge worker. This was partially overcome through the scrutiny mentioned in the previous paragraph. Institutional instruments at NTNU also assisted as a checking mechanism, primarily in the form of first and third year PhD hearings, as well as the submission to the PhD board of a project proposal. Mandatory methodological training was also essential in providing the required skills needed to enact this research. The thorough reading of essential books on methodology such as Bryman (2012), Creswell (2013) and Yin (2014) provide good methodological literally spine to the development of the project. The author also has some practice-based research experience as an intern in Scandinavia's largest research institution SINTEF, which provided a useful experience-based understanding as to the challenges and possibilities associated with mixed method research.

Systematic Model for Data Collection

Based upon the researchers own intentions for their research design, a model for systematic data collection was developed.

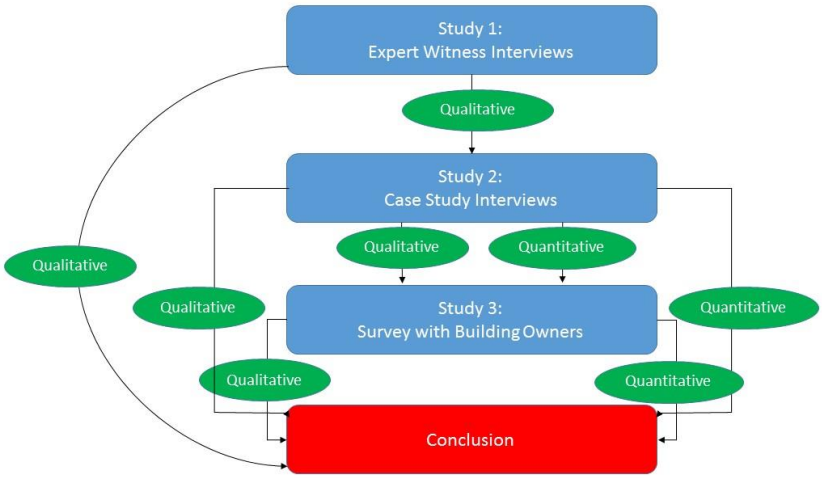

Figure 30 – Model for Systematic Data Collection

Figure 30 is a model that represents the systematic processes that the data collection followed in order to reach its concluding findings and analysis. This model was developed for not just to guide the overall project to better that each study informed the next, but also to better communicate how the research studies were constructed, the types of research that they included, and how each set of research informed the next stage.

The rationale behind a bespoke model for this thesis is due to the differences between the author's approach and those described by Creswell and Piano (2011). Primarily, this is due to the research being to some extent a hybrid of both '*sequential*' and '*concurrent*' mixed method approaches. As mentioned earlier in this section, the overall study shared an overarching focus, however, the research studies were conducted as separate entities with each methodological choice made based upon the most appropriate one required. This made existing models a poor fit for the purpose of this study, requiring a new one that better explains how the data was collected.

In this study, each empirical study was not only mixed method for the most part, but also informed the approach, scope and perspective of each subsequent study. The data from each study is then brought together in its conclusion. In *Figure 30*, we see each of the empirical studies as blue boxes, with the green boxes showing the methodological approaches associated with each study. The arrows in both sets of boxes represent how each element informs the other. For example, the qualitative approach to study 1 produced results that informed the mixed method study that occurred in study 2. The model also demonstrates how the data collection informed the conclusion. Each study did not just systemically inform the next step of research, but each study has important results in of itself. It was also important to state separately that 'quantitative' and 'qualitative' elements for each study. This is due to each form of research offering different qualities. In studies where both were used, the quantitative provided the bulk of the comparative data whilst the qualitative provided context and depth of narrative, which each influencing a different aspect of the next study differently. In the case of 'Study 1' and 'Study 2', the first study provided explorative groundwork, whilst the second study needed more comparative data. This is an example of why both the qualitative and quantitative elements of the study needed to be separated for clarity. This can be seen in the arrows that come from each of the blue boxes, leading to the red box representing the conclusion. This is because each study is not just a step in the development of this project as a whole, but is also a contributing component to the '*study by study*' approach to the overall results.

3.4. First Phase – Qualitative Exploratory Interviews

The first study of this thesis was in the form of quantitative interviews, which serve the purpose of answering the first research question - "*to what extent is research and the implementation of Green Leases and Green Leasing given attention by academia and practice in the context Sustainable Corporate Real Estate and Facilities Management*".

The primary purpose of this study was to try and articulate the need and attention that user based considerations are given in sustainable office buildings. The second purpose was to establish what issues there are within this topic and to analyse these issues to inform the next phases of empirical work in the later studies of this thesis.

As opposed to population-based surveys and interviews, the purpose behind the interviews here was not to generalise the views of a large sample, but to instead focus on extracting data from targeted individuals, which in this case were experts in the sustainability of non-residential real estate. This allowed for a more in-depth focus due to the smaller targeting sample, which also offered more possibilities to uncover not just areas that are important to this topic, but also research and practice gaps that exist that can be met by academia and industry, and possibly in this thesis to an extent.

The results of this study were published in **Paper 1**.

3.4.1. The Role of the Researcher

Whilst in more structured interview situations the researcher's role may place a more substantial focus on ensuring the questions are answered, in mixed method interviews such as this their role is expanded. Not only does the researcher keep the focus of the interviews 'on the topic', but they must also be aware of how the qualitative questioning is developing to ensure that they can be expanded on and gain rich data to the highest possible degree. An understanding as to the flow and the narrative was also important in order to ensure that data was not confused or diluted due to poor management of the interview.

There also has been a consideration of the bias. Whilst the researcher did not attempt the interviews with a pre-defined agenda on the data, bias associated with the researcher's knowledge and academic background has to be accounted for. There is also the risk that the researcher could pursue topics in the interview that they find interesting, which may result in unintentionally neglecting other issues. Unintentional 'leading of questions' based upon the

bias of the author also cannot be ignored. This potential for bias was overcome by ensuring that although the interviews were 'semi-structured', there was sufficient structure by which to ensure that questions were 'lead', but not the answers. By 'lead' the researcher refers to how the questions were guided to ensure that core subject areas were covered, but with no attempt to produce pre-defined outcomes that could negatively impact the credibility of the results.

3.4.2. Sampling

The target interview subjects for this study needed to fill the following criteria:

- Experts in the field of energy efficiency and sustainability in non-residential buildings (ideally offices)
- From both industry and research (not necessarily academia)
- From more than one country in order to offer an international perspective

Whilst the potential possible sample size overall is impossible to obtain, a targeted approach allowed for a sample of a higher quality. Eight possible interviewees were contacted, with six giving the researcher permission to interview them.

In terms of which interviewees were contacted with the respondent criteria, several aspects were considered in this process. Firstly, priority was given to contacts who worked for renown institutions in this field from the industry (such as BREEAM), along with respected research institutions such as ZEB. These criteria were also considered according to the researcher's own judgement. For example, although international in nature, the survey sample was kept within the boundaries of Europe in order to keep the issues more comparable. This meant that although a representative from LEED would have been a good fit on one level, considering the small sample size this has diluted the data unnecessarily. The sample was procured by the researcher alone, without the need to exploit networks and contacts from other individuals.

3.4.3. The Instrument

The study took the form of semi-structured interviews on an individual level (and no group interviews). When developing the interview guide a focus was placed on the perceived lack of time available on the part of the respondents. With this mind, each interview was designed to last for under thirty minutes. When conducted, however, the majority of interviews took closer to an hour. The interviews were conducted in person in the case of Norway based

interviewees, and by telephone or Skype for interviews not based in Norway. Each of the interviewees was provided with an interview guide at least 24 hours before the interview, in order for them to prepare appropriately.

The interview guide was also developed in consideration of the literature review that was conducted along with it. State of the art research had an impact on the division of sections as well as the questions, particularly with regards to discussions surrounding '*scripting*', and '*building automation vs user control*'.

The interviews were a part of the data collection for the researcher's Master thesis project, so did not go through pilot or focus group tests. However, the interview guide was not implemented without checks and feedback. Feedback was sought from the researchers Master thesis supervisor at NTNU, as well as expert senior researchers in this field at SINTEF. The primary result of this feedback was the merging of some of the questions to reduce the length of the interview guide without reducing the scope, as well as optimising some of the questions to make them more understandable to respondents. The guide was also tested on a colleague in order to gauge the estimated length of the interview.

The interview guide was organised into several section topics

General Usage - Respondents were asked as to how the issues of usage were currently being dealt with regarding sustainable buildings. The purpose behind this was to generate an understanding as to what kind of issues that exist in this field, without being influenced by the topics of later questions. This also laid the groundwork for unscripted questions later, based upon the experience of the respondent.

Scripting and Anti-Scripting – This section posed questions relating to how users in buildings interfaced with the technology in their buildings, and the degree which this may or may not have gone against the intention of their design. This was also aimed at accumulating information about the usage of a building from a technological interface perspective, and how it impacts the sustainable performance of a building.

The Users Perspective – In this part of the interview, respondents were asked more directly about what they felt were the roles of users in sustainable office buildings. This also led to discussions surrounding the degree to which technology should take on some of the sustainability responsibility, and vice versa. Respondents were also asked more about technology, their experience of users engaging with it, and the outcomes. The level of

competency amongst users in engaging in the sustainability needs of their buildings was also of importance.

Knowledge Generation – In this section of the interview respondents were asked to discuss their views on the advances in knowledge in this area along with future developments and challenges as they perceived them. A key element of this investigation was a look at the changes in competencies in these fields, and how different academic and research fields can contribute to the sustainable development of buildings going forward.

Institutions – In the final section of the interview guide, respondents were asked about their institution. They were asked about what their institution has contributed to discussions on users in sustainable buildings, and how they perceive their role changing and contributing to it in the future. They were also asked directly as to how and which institutions (such as governmental bodies) could advance this field as it develops in the future.

3.4.4. Data Collection

All of the respondents agreed to an appointment with the researcher prior to the interview being conducted. As stated in the previous section, interviews were conducted in person, by telephone and on Skype as appropriate.

The interviews were conducted individually, with the first interview commencing on 26th March 2014, and the final interview conducted on the 23rd April 2014.

Each of the interviews was initially recorded on an Apple iPod Touch and transcribed in full within two weeks. The transcripts were emailed to each of the interviewees with a deadline set for tacit acceptance should they not respond to the email. After this date, the recording was destroyed.

3.4.5. Analysis of the Findings

After the completion of the interviews, the data analysis process began. After the transcriptions were complete, each of the sectional blocks of the interviews from the guides was placed together with a combining of the interviews. This allowed the researcher to see what each of the respondents said and could see if there were any substantial differences between interviewees, academia and practice, as well as between institutions.

Due to restrictions of the academic paper format, not all of the information could be included in the final publication. In order to make the best use of the space available, similar opinions were grouped together for analysis (combined with contextual information where appropriate). Differing viewpoints which were considered important in the judgement of the author were also given attention. The data was written in both a narrative and systematic form in order to do justice to the topics of the interview, and answer the research questions in the published article.

Due to the qualitative nature of the data, many quotes were used in the publication and were paraphrased where appropriate. Where there was agreement amongst respondents were found, detailed summaries were given to ensure that such commonalities were understood by the reader.

For the sake of simplicity, the interviewees were made anonymous in the final publication

3.4.6. The Limitations of the Instrument

An approach such as this is not without its limitations. The advantages and disadvantages of using this instrument will be addressed in this section.

Sampling: Although a targeted sample offers important possibilities for richer and higher quality data, the small sample size does negatively impact the validity of the data. A larger sample size of similar types of respondents would have made the results more generalisable. This is ultimately representative of the time pressures associated with a Master thesis project. From the perspective of the scope of a Doctoral project, there were possibilities to increase this sample size. However, whilst the international sample size did increase in the next study, it was decided that this would be for a different stage of the data collection and not an expansion of this stage.

Country Focus: The interview sample in this study consisted of international interviewees as well as those based in Norway. The reason for this was to see if there were any differences in the countries approaches, which could later provide feedback on the development of further stages of this Doctoral project. The respondents were from Norway, England and Wales, however, the validity of this international perspective could have been improved with the inclusion of more countries. The researcher was aware of this at the beginning of the project, which is why BREEAM, an organisation with an international presence was asked to contribute. This resulted in data concerning for example Spain, however, without a primary

expert witness in these countries, the broader validity of this data is compromised. This once again was a limitation that reflected the nature of the study as a Master project.

Question Form: The type of questions used can also be seen as a limitation. Whilst a semi-structured narrative approach was used to provide a data set that could be investigated in a freer form way, the lack of quantitative elements was a disadvantage. A degree of quantitative questioning would have offered possibilities for comparative data sets, whilst still ensuring that the intended topics were covered. This aspect was first acknowledged by the researcher after the completion of this study, which heavily influenced the approach of the next empirical study. Another limitation was the type of questions used. Whilst attempts were made through drafting and feedback to ensure that questions were worded in a way that was easily understandable, some difficulties did occur. Some of these were due challenges associated with some respondents speaking English as a second language, however, some were also terminologically based. This was particularly the case with respondents outside academia, where terms such as '*anti-scripting*' were unfamiliar to them, and required explanation. Due to non-academic contacts being unfamiliar with journal publications and much of the current academic research in this field, certain other sub-concepts mentioned by the researcher during the freeform parts of the interviews also occasionally required further explanation by the researcher.

3.5. Second Phase - Interviews with Qualitative and Quantitative Elements

After the completion of the first empirical study, the analysed and published data were used in part to form the approach (methodologically and thematically) for the second empirical study. The primary purpose of this second study is to answer Research Question 2 – "*What are the drivers and barriers for the development and lease up of sustainable and Green Leased office buildings from the perspective of owners and tenants?*".

With knowledge gaps established through data from the previous study along with literature reviews, a 'real world' investigation through case study research was chosen. This was approach was acknowledged by Yin (2014), who stated that the case study approach can study a "*contemporary phenomenon in-depth and in its real-world context*" (Yin 2014, p. 237). This allowed for a data set that was less anecdotal and more representative of what is really going on in the field.

In order to answer Research Question 2, mixed method semi-structured interviews (featuring qualitative and quantitative elements) were conducted with owners and tenants of sustainable office buildings. The choice of interviews was an initiative to gain insight into the decision-making process surrounding why these buildings were developed in the way that they were, and why tenants chose to occupy them. Conversations with both owners and tenants were considered important in seeing the differences in the barriers and drivers between both, as well as reflecting on how this would fit into discussions surrounding split incentives.

The results of this study can be found in **Paper III**

3.5.1. The Role of the Researcher

Whilst in more structured interview situations the researcher's role may place a more substantial focus on ensuring the questions are answered, in mixed method interviews such as this, their role is expanded. Not only does the researcher keep the focus of the interviews 'on topic', but they must also be aware of how the qualitative questioning is developing to ensure that they can be expanded on and gain rich data to the best possible degree. An understanding as to the flow and the narrative was also important in order to ensure that data was not confused or diluted due to poor management of the interview.

There also has been a consideration of the bias. Whilst the researcher did not attempt the interviews with a pre-defined agenda on the data, bias associated with the researcher's

knowledge and academic background has to be accounted for. There is also the risk that the researcher could pursue topics in the interview that they find interesting, which may unintentionally neglect other issues. Unintentional 'leading of questions' based upon the bias of the author also cannot be ignored.

3.5.2. Case Selection

Selection Criteria: In keeping with the broader international aspects of this thesis, a key criteria for the selection for contacts was for them to not just feature Norwegian respondents. Whilst Norwegian and British contacts were used again in this study, this time there was also a decision to use contacts in the United States of America. Due to this being a larger study, it was felt there was the scope on this occasion to be able to look at if there were differences beyond the boundaries of Europe.

In terms of selection for the criteria of buildings, once again office buildings were used. More specifically, these needed to be office buildings (both single and multi-tenant) that were available for rental and had active tenants. The research question mandated that these buildings had to be sustainable, so criteria as to what constituted 'sustainable' also had to be factored in. The sustainable certification scheme of BREEAM was used for the European cases. This was due to two key factors. Firstly, whilst not a perfect standard, BREEAM is a widely acknowledged and respected certification used to class a building as 'sustainable' which is accepted as such by many in the industry. The second reason was due to its international presence. It is Europe's largest sustainable certification for buildings, so is valuable for the purposes of using it in an international context. Although BREEAM certifications do vary slightly from country to country, a BREEAM 'Excellent' building in Norway and another in Britain can be more easily compared than most other available methodologies. BREEAM has a relatively limited presence in the United States of America, so LEED-certified buildings were the selection criteria in this case. Whilst BREEAM and LEED are not easy to compare as methodologies, their acceptability and acknowledgement in the real estate industry are comparable in their respective regions.

In terms of individuals to interview within the scope of the above criteria, this was very much based on the roles they represent within their organisations. In the case of building owners, the contact had to be someone who was involved in the decision-making process to purchase and/ or refurbish the buildings and had responsibility for its letting out. For tenants, the contact had to be an individual who was responsible for the decision-making processes

surrounding the procurement of their tenancy. This contact did not necessarily have to be the user of the building, although in all of the cases they also occupied the building themselves.

Acquiring the Cases: The cases in this study were acquired through a variety of methods. For Norwegian buildings, the network of the researcher's supervisors was initially exploited. This yielded two cases for study. In the case of the rest of the Norwegian cases and all of the British cases, these were obtained from BREEAM's own data. BREEAM has an online database called 'Greenbook Live' listing all of the BREEAM certified buildings in each country and sorted by certification and building type. The researcher looked through this list to find all of the buildings from both countries that were multi-tenanted office buildings available for rental. As many of the buildings were contacted as possible from both countries, with the initial emails being sent to either the building managers or a general enquiries contact. For buildings that agreed to be interviewed, emails back and forth were able to procure the most appropriate contact. For the most part, tenant interviews were acquired through these building owners, with some contacted directly by the researcher. For the LEED cases, they were acquired through the United States Green Building Council's Chicago Chapter. The Councils project manager made contact with several receptive building managers, who the researcher contacted directly to make an appointment for the interview. Tenant interviews were acquired through the same process as the BREEAM building in Norway and the UK. During this process overall, 56 potential interviewees were contacted to participate in this study.

Number of Cases: After the acquirement process took place, 13 different buildings became a part of the study. A total of 20 interviewees were spoken to across these buildings, 10 of which were interviews with individuals with the other 10 being in the form of group interviews in groups of 2 interviewees. There were a total of 9 tenant interviews and 11 interviews with owners. Whilst the researcher tried to match the owners and tenants to the same buildings, this was not possible for many of the cases. In terms of country distribution, 12 interviews were with Norwegian contacts (7 owners, 5 tenants), 3 were from the UK (2 owners, 1 tenant) and 5 were from the United States of America (2 owners, 3 tenants) making the cases still Norwegian centric, despite the international element. In terms of the roles of the interviewees, all of the tenant interviews took place with people who were responsible for the decision making and management of their tenancy. In the case of Owners, all of the contacts were responsible for the letting and development/ refurbishment of their buildings to

a greater or lesser degree. The Owner occupational roles consisted of 5 project managers, 3 operations managers, 2 building managers and 1 asset manager.

3.5.3. The Instrument

In this study, the instrument consisted of semi-structured interviews with quantitative and qualitative elements. The reason for this mixed method approach was not only to allow for rich narrative data (as was the case with the previous study) but also to produce quantitative data that could be used to compare amongst and between individual stakeholders and types of stakeholders.

Whilst being produced with the intention of answering Research Question 2, this study addressed certain other themes as a part of this investigation. The interviews endeavoured to discover more about the buildings themselves, discover more about the decision-making processes of each stakeholder, their experience with the building and to find out more about their Green Lease/ Green Leasing arrangements should they have them. The barriers and drivers associated with the development and rental of their property along with how they defined a sustainable building were also addressed.

The interview guide was arranged by the following themes and sections:

Priorities: In this section, each interviewee (or interviewee group) was asked rank in order of importance (1 being the most important, and 6 being the least important) how the factors in *Figure 31* were to them in the decision to occupy or develop their buildings. This section yielded comparable quantitative data.

Factor	Description
Costs	Operational costs, construction costs, development and rehab costs
Green Certification	BREEAM, LEED and other sustainable building certifications
Legislative Compliance	Compliance with international, national and local governmental or legal regulations
CSR	Corporate social responsibility and other company orientated social responsible and philanthropic initiatives
Company Policy/ Culture	Policy within the company that is a part of their brand and influences
Industry/ Customer Demand	Demand from consumers, clients and other stakeholders that use the services of the interviewee

Figure 31 – Driving Factors

Due to the semi-structured interview format, many of the interviewees expanded on some of these points. Some of the information that this expansion yielded was either published in its associated article and/ or used to inform the drivers for the next stage of research in the form of a survey.

Defining a Sustainable Building: In this quantitative section interviewees were given statements and asked if they agreed or disagreed with them. The questions aimed to establish what, in their eyes, constituted a sustainable building. Questions such as '*a building can only be sustainable if it has a green certification*' and '*a sustainable building have to have support personnel that focus on the sustainable infrastructure of the building*' were some of these questions. The intention here was to establish if there was a common understanding as to what constituted a sustainable building amongst the interviewees.

The Interviewees Building: In this qualitative section, interviewees were asked about their building specifically, such as information about its development or refurbishment, and information about its history. Interviewees were also asked about any challenges they faced,

if they overcame them and how they would have done things differently. There were also limited quantitative questions addressing what part of the building lifecycle sustainability was factored in (for the owners only).

Users, Green Leasing and Green Leases: In this qualitative section, owners were asked about whether they marketed their building as a sustainable building to their tenants, and if they felt users should be involved in the sustainability of their building. If they answered yes, they were asked in what way this was done. Both sets of stakeholders were asked if they had a Green Lease, what form it took if they did, and if their building has SFM. They were also asked about the advantages and disadvantages of owning and using their sustainable building, as opposed to one that was not considered sustainable.

In developing the interview guide, it received considerable and significant feedback from the researcher's supervisorial team. Staff members at the researcher's faculty also provided feedback, particularly on the placement of questions in the final structure. The interview guide was tested twice with PhD colleagues to estimate the length of time it would take to complete an interview, which took around 35 minutes.

3.5.4. Data Collection

The data collection for this study was conducted between September 2015 and October 2016. The study concluded with a trip to Chicago in October 2016 to complete the final interviews. The interviews were conducted in a variety of ways. One of the Norwegian single interviews and two sets of group interviews were conducted face to face. One Norwegian interview was conducted via Skype, and the rest by telephone. All of the interviews with British contacts were conducted by telephone. All of the interviewees in the United States of America were conducted face to face. Interviews took from 30 minutes to 1 hour and 45 minutes.

Most of the interviews were recorded on an Apple iPod Touch and then transcribed in full. The transcripts were emailed to interviewees and the recordings destroyed should they not raise an objection within a defined timeframe. Two of the interviewees in Chicago did not consent to be recorded, however, they did allow notes to be taken during the interviews. The typed notes were emailed to these interviewees, who raised no objections as to their content.

3.5.5. Analysis of the Findings

Prior to publishing the results of the study, the data was analysed. In the case of qualitative data, the approach broadly mirrored that of the previous study. Groups of answers were arranged together, but this time divided by stakeholder. This allowed for easy comparison and the possibility of grouping themes together and understand in what ways they differed. In the final publication, quotes were occasionally used to show the barriers, drivers and other elements, although paraphrasing was also used, particularly in sections where there was a common understanding between stakeholders.

For quantitative results, these were placed in a matrix in Microsoft Excel. This allowed for the easy sorting of responses in a spreadsheet, which could also be easily sorted by stakeholder, country and building. When publishing the results, the quantitative results were placed in a table in the case of the **Priorities**. Based upon their average positioning by stakeholder, they were organised under the barrier thresholds of *'high', 'high low, 'low', and 'low high'*. This categorisation in the publication was done in order to make the results more accessible to the reader, without compromising on the quality of the results and the significance of the averages. The same approach was done for the same question again, but this time for a division by countries instead of stakeholders.

Due to the later context of the publication and the page count, much of the data related the **Defining a Sustainable** Building was not used.

Due to the concerns of two of the respondents, the identities of the interviewees were made anonymous in the final publication.

3.5.6. The Limitations of the Instrument

As with the previous study, this set of interviews was not without its challenges, which the researcher endeavoured to overcome where possible.

Sampling: Whilst the sample in this study is larger than the previous interviews, it is none the less still small. In the context of all of the countries included within this study, the small sample size cannot be considered generalisable. The researcher attempted to overcome this challenge by offering in the conclusion the possibility of expanding it further at a later date. The results were also considered to be still exploratory to an extent, with the results being seen as informing the next stage of data collection for this PhD project.

Country Focus: Although this dataset expands on the number of countries when compared to the previous study, this still represents some challenges. As with the previous study, the number of countries for inclusion overall is still highly restricted, which limits the global generalisability of the data. This was also overcome to an extent, by being clear with the reader in the publication that the results were 'indicative' and not 'definitive'. The differenced in sustainable certification methodologies (i.e. BREEAM vs LEED) were not comparable as methods. This was overcome by being clear on the difference between the two in the publication's methodology, and ensuring that this was a study of comparing barriers and drivers and not methodologies.

Question Form: The types of questions used in these interviews and presented in the interview guide posed difficulties of their own. As with the previous study, the bias and contextual challenges of open-ended and qualitative questions can result in issues of understanding, along with the issues with missing valuable data if the questioning went down a less an ideal route. The time restrictions of the interview format also have the potential to restrict some of the more narrative discussions surrounding decision making processes in these buildings. Precise and in-depth interview questions were used to attempt to overcome a sizable amount of these challenges, however due to the nature of the method they cannot be overcome entirely.

In the case of quantitative questions, the small number of such questions proved to be the biggest challenge. More comparable data could have been accumulated if some of the qualitative questions had been quantitative, however, this was not considered to be too substantial a barrier by the researcher. The level of understanding in the quantitative questioning was also a limiting factor. Similar language challenges existed as in the previous study, however, some terminological challenges also existed. Regardless of the first language of the interviewees, terms such as CSR and Green Leasing had to be explained on many occasions, which may limit the richness of the data yielded from these answers.

3.6. Third Phase: Quantitative Survey with Limited Qualitative Elements

The third empirical study in this paper consists of a survey that is primarily quantitative in its focus, but also contained a few qualitative questions where relevant. The primary purpose of this study was to answer Research Question 3 – "*What are the challenges and opportunities for Facilities Management in the context of the development of sustainable office buildings*".

The creation of this survey was considered the third step of the two previous studies, with this being evident due to two core reasons. Firstly and crucially, this is because this PhD project is one project consisting of three contributing parts, as seen in *Figure 30*. Secondly, this is due to how the previous studies informed the methodological and research question approach. Whilst the two previous studies were exploratory to a greater or lesser degree, this project was focused on being more representative with a narrower country focus. This is why (and in some respects addressing the weaknesses of previous studies) it focuses on only one country (Norway) in order to offer possibilities for more in-depth research and is mostly quantitative in order to provide more comparative results for the purposes of later analysis.

The primary purpose of this research was to look at owners and tenants of sustainable Norwegian office buildings to find the barriers and drivers for the development/ refurbishment or occupancy of these buildings. The survey also endeavoured to find out about their SFM infrastructure, their Green Lease arrangements as well as find out if they received support (financial or otherwise) from external organisations in supporting these initiatives.

The results of this study are published in **Paper VII**.

3.6.1. The Role of the Researcher

As opposed to the interview format of the previous studies, the role of the researcher, in this case, was less based on contact and more focused on correct research design. Due to not meeting the respondents in person in this case, there was no possibility to elaborate on the terms and concepts as was necessary for the two previous interview-based studies. This required the researcher to be more apt in ensuring concepts were clear, and that acronyms were used minimally (and explained where necessary). The role of the researcher was to be in the 'crow's nest' and observe the data collection process rather than be more proactive as each piece of data is being collected.

This type of indirect engagement also could generate a very specific kind of bias. Should the questions be written in a way that could lead a respondent to a specific type of answer, then the research has no possibility in the data collection process to intervene and orientate the respondent away from it. In other respects, the prospects for bias are similar to those of the other studies. The intrinsic biases of the researcher could affect how the questions are formulated, as well as be indicative in the intentions of the research questions. Similarly, quantitative questioning restricts the depth of scope of individual questions, meaning that important information may be missed under this approach.

3.6.2. Case Selection

Selection Criteria: For this study, the focus was in some respects more precise but in other respects broader when compared to the same selection for the previous two studies. This study took place only in Norway as opposed to the international focus on the other studies. The respondents, however, had to either be owners involved in decision-making processes for the development/ refurbishment of their building or be tenants involved in the decision-making process behind the signing of the lease for their office. The choice of buildings, however, was broader in this study and was not just focusing on BREEAM or LEED buildings, but rather has a focus on buildings the respondents considered to be sustainable.

In essence, the respondents had to meet these criteria:

- They must represent an owner of Norwegian building stock or a tenant from a Norwegian rented office building
- Owners must have had a part in the decision-making process to develop or refurbish their building in a sustainable way.
- Tenants must be a part of the decision-making process to take up a tenancy in their sustainable building
- Both types of stakeholder must consider the building for the study ‘sustainable’ in their judgement.

Acquiring the Cases: In order to procure an acceptable sample size for this survey, contacting individuals as in the previous studies was not considered sufficient in this case. It was decided early on that using a network (or possibly several networks) was the most appropriate approach to take. Due to the Norwegian nature of the study, Norwegian FM and real estate organisations were contacted. After discussions with the researcher’s supervisors,

the networks of Norsk Eiendom (NE) ('The Norwegian Property Association'), the Norwegian Green Building Council (NGBC), Norges bygg og eiendomsforening (NBEF) (Norway's Building and Real Estate Association) and a list of past students on NTNU's experienced-based Masters program in Real Estate Development and Facilities Management were considered.

After an initial meeting and emails in October 2017 and a meeting in Oslo in January 2018, NE decided to decline involvement due to a policy of being very selective in the way they contact their members. The NGBC were receptive to distributing the survey, however, due to wanting this to be conducted in conjunction with an article in an industrial publication, this was not feasible in the timeframe available for the study. The list of past students was eventually discounted as due to the age of the contact data, and the labour involved in updating it would outweigh the benefit. A meeting with a representative from NBEF in January 2018 proved fruitful and productive. After looking at a draft copy of the survey they agreed to send it to their members as a part of their email newsletter.

Number of Cases: On the 20th February 2018 the survey was sent to recipients by email, which consisted of all of the NBEF members who were on their email newsletter list. This consisted of 1700 email addresses, and 236 of the respondents clicked on a link on the email, one link of which being the survey. Of this number, 55 respondents completed the survey in total when the survey was closed on 8th May 2018.

3.6.3. The Instrument

The data collection instrument for this survey took the form of an online survey hosted by Google Forms. In order to provide comparable data between groups and individual stakeholders, the decision was made to make the questions quantitative in nature. This allowed for more precise analysis for the later publication. There was considerable emphasis placed on ensuring that concepts and terms were understandable, and that due to the schedules of potential respondents, that the survey could be answered in a few minutes.

Development of the text and format took several months and was heavily influenced by the feedback and input from the researcher's supervisors, and other colleagues and external contacts.

In order to ensure that the research questions could be answered, the questions were quantitatively designed to be as detailed as they were simple. The data from the previous

interviews heavily informed the questions format for this study, particularly with regard to the barriers and drivers. The barriers from the previous study were included here, but each driver was addressed individually in order of importance on a Lickert scale, as opposed to an overall ranking as per the interviews. The drivers were also an example of how the previous studies informed the questions. The qualitative information from the interviews in Phase 2 was now placed in this study in a quantitative form and placed on a Lickert scale of 'relevance' in a similar fashioned to the drivers.

Although the organisations could give their company name in the survey, the publication published the results with the respondents being made anonymous.

The survey contained the following sections:

Respondent and Company Information: The purpose behind this section was to gauge the kinds of respondents that were responding to the survey. They could also optionally provide the name of their company. Respondents were asked the size of their portfolio, whether they were from the private or public sectors, their job title and level of education. This along with asking to which stakeholder category they belonged, served the purpose of ensuring that they were appropriate for the survey, and the gauge kind of company they represented. They were also asked specifically about the sustainable building they were considering in the study, such as how old it was, which set of Norwegian building regulations they adhered to, and other factors. They were also asked if they requested external support in their sustainable endeavours, and in what form it took. The BREEAM status of these buildings was also asked. All of these questions were quantitative, with the exception of asking for information such as their company name. This line of questioning was split into two parts, with one part at the beginning and one part at the end.

Barriers and Drivers: In this section, respondents were asked to consider one sustainable building in their portfolio. For the drivers, they were once again asked to consider the factors in *Figure 31*.

However, rather than rank them as a whole, they were asked on a Lickert scale of 1-5 to state their importance individually, with the scale being:

1 = Very important 2 = Important 3 = Moderate 4 = of little importance 5 = Not Important

Next, respondents were asked to consider the barriers for the same building, although due to the nature of the questioning this was only aimed at owners. Whilst other barriers such as

'*lack of knowledge'*, and '*legal barriers*' could have been added, these were not used in this study. This was for two primary reasons. Firstly, these were not barriers expressed profoundly in the previous case study interviews. Secondly, the researcher was keen to ensure that the survey was of a length which not to put off potential respondents, so a selective approach to the barriers (as well as the drivers) was done to ensure this. The barriers they were asked to consider are found in *Figure 32*:

Factor	**Description**
Technical Barriers in the development, Planning, Engineering and concept phases	Barriers of a technical nature during the earliest phases of the building's lifecycle
Technical Barriers in the detailed design and Construction Stage	Barriers of a technical nature during the early stages of the building's lifecycle after the planning stages have been completed.
Technical Barriers after Construction i.e. BMS or Usability issues	Barriers of a technical nature during the operational phase of the building's lifecycle
Bureaucratic Barriers i.e. BREEAM certifications and local regulations	Barriers related to bureaucratic complications and challenges associated with voluntary or mandatory regulatory compliance.
Market Barriers i.e. problems with demand	Barriers related to marketability and vacancy rate of the building

Figure 32 – Barrier Factors

They were asked to place this on a Lickert scale based on the relevance to their building, with the scale being:

1 = Very significant 2 = Significant 3 = Moderate 4 = of little importance 5 = Negligible 6 = Non-Essential

Green Leases: For this line of questioning owners were asked to consider their whole portfolio and not one building, whilst tenants only had to consider the building they occupied. In this section, respondents were asked if they had heard of Green Leases and if they employed them in their building. They were also asked what kind of clauses they contained from literature informed model clauses. There was also some limited qualitative questioning

where respondents were asked to mention clauses in their leases that were not contained in the quantitative options.

Sustainable Facilities Management: This section contained questions looking at both the individual building and portfolio level. They were asked to consider if they used SFM, what form it took if they did, and the degree to which users were involved. There was some limited qualitative questioning concerning in what ways they engaged their users in the sustainable infrastructure of their building.

Although not formally pilot tested, the survey content was given to the researcher's supervisors and other staff at NTNU to provide feedback. Shortly before it was distributed the survey was tested for length with PhD candidate colleagues, NTNU staff and an external practice contact. The surveys completion took from 5 to 7 minutes.

3.6.4. Data Collection

The data for this survey was collected using Google Forms. This format was chosen for several reasons. Firstly, the researcher had previous experience with this format. Secondly, it provided an easily distributable link, it was easy to edit and provided a good standard of analytics. Although there were some technical problems initially with question duplication, this was later rectified. Initially, an English and Norwegian language version of the survey existed, however, due to the likelihood of Norwegian being the native language of the respondents, only the Norwegian language version was used.

The survey was distributed in its initial email newsletter form on 20th February 2018. Between this date and 2nd March 2018, there were 54 respondents who answered. On March 14th NBEF sent a reminder via the business social network LinkedIn, which yielded one more response on the same day bringing it to 55. Two weeks after this with no further responses, the survey was considered closed.

3.6.5. Analysis of the Findings

For this piece of research, a different analytics approach was required when compared to the previous studies, owing to its quantitative nature. In order to provide for better statistical analysis, the analytical software SPSS was used. This was chosen due to the respectability of SPSS as a piece of analytical software within the field, as well as its ability to read Microsoft

Excel readable formats such as XLS files, which are easy to convert from the primary export format of Google Forms, which is CSV files.

The data was converted into tables for data that required tests for statistical significance such as the barriers and drivers, as well as histograms and graphs for data such as building age. Whilst not all of the tables and histograms could be included in the final publication, the inclusions from SPSS provided relatively easy to understand analytics for the reader.

Only limited elements from the qualitative questions were used in the publication and were mostly restricted to the way in which users were involved in the sustainability of their building. For this question, similar answers were extracted and grouped together, which commonalities of significance included in the final publication.

3.6.6. The Limitations of the Instrument

A survey as with any instrument of this kind contains limitations and challenges to its validity. Bryman (2012) states in his own explanation of online survey several disadvantages of note (Bryman, 2012, p.677). This section will endeavour to address each of Brymans states disadvantages in turn, and how the researcher has tried to overcome them.

Respondent Motivation: Bryman states that a lack of motivation amongst respondents can result in challenges when trying to procure a sample. Whilst no incentive was offered by the researcher to respondents, it was hoped that the respected name of the NBEF would assist in this. Combined with the understanding that everyone benefits from this type of research, it is hoped that this acted as a form of encouragement. However, the number of respondents (55) compared to those who received the survey (1700 in the original email) does mean that this is a realistic limitation of the method.

Confidentiality and Anonymity: Although respondents could choose to remain anonymous, the act of filling in an online survey always brings with it concerns about data safety. Although no guarantees can be made about data online (even when the survey data is deleted), printed copies are kept locked in a cabinet and the published results are wholly anonymous. Printed copies of the data were destroyed upon publication. Whilst this does not amount to a guarantee for respondents, it does demonstrate due diligence.

Respondent Validity: In a medium such as online survey, ensuring the quality of respondents is a challenge. The truthfulness of both answers and respondent validity are

impossible to maintain, as well as the possibility of respondents answering more than once. The former is almost impossible to address without asking for email log in's to the survey, which was not carried out to assist with confidentiality. Although duplicate answers are also difficult to spot, keeping the survey in the relatively closed network of the NBEF can help to assist in the quality of respondents, as well as ensure that respondents are less likely to fill in the survey more than once. The number of total respondents also negatively impact the validity of the results. For this reason, it is stated in the publication that the results are 'indicative' and not 'definitive'.

Survey Access: Bryman viewed the necessity of internet access a limiting factor for a survey of this type. In the modern world where internet access is an essential component of company business, as well as Google Forms being smartphone optimised, this factor was not considered a limiting factor of significance.

Questioning Form: Aside from Brymans disadvantages, the quantitative questions in the survey could be a limitation. Quantitative questions provide answers to respondents in advance, which can limit the possibilities of rich narrative data were there more detail to provide, or if the respondent's answer is not listed in the questions possible responses. The researcher made attempts to overcome this by including some limited qualitative questions, however as with the interviews in the previous studies, this is a stated limitation in the publications with this disadvantage considered to be a natural 'trade-off' of the chosen method.

4. Presentation of Findings, and the Synthesis and Coherence of Research Papers

The purpose of this chapter is to account for and outline the scientific work in the context of the seven scientific papers that are included in this thesis. This will be done through an integrative approach that not only provides details of the narrative elements of the overall project but also ensures that there is a relationship between this narrative and the research questions.

The papers are presented in chronological order of when they were written (although not necessarily when they were published) and addresses and discuss the following topics:

Paper I served the primary purpose of justifying the need for a user considered research project on the sustainability of non-residential buildings, with an emphasis on offices. This paper consists of interviews with expert witnesses in the field of building sustainability (particularly, although not exclusively focusing on energy). These interviews and subsequent results are the findings of the '*First Phase – Qualitative Interviews*'. It not only outlined the justification for this PhD project but also represented areas that are under-researched in this field. The results of this paper informed the literature and scholarly approach to the further two empirical studies.

Paper II is a literature review of existing research on Green Leasing and Green Leases, particularly within the context of FM. The approach of this review was broad and did not focus just on offices, in order to present the state of the art of Green Leasing and Green Leases in as broad a scope as was possible. This paper informed further literature research and some methodological development to foster an understanding of existing implementation and areas that were in need of further research.

Paper III presents the results of the '*Second Phase - Interviews with Qualitative and Quantitative Elements*'. Through literature research and interviews with the owners and tenants of BREEAM or LEED certified offices in Norway, the UK and USA, this paper attempts to uncover the barriers and drivers for the development and rental of such buildings. The data from this paper not only served the purpose of answering the second research question but also informed the scope and methodological approach of the third empirical study.

Paper IV is a terminological discussion based on existing literature. Through a focus on FM literature, this paper aimed at examining how the terms '*Green*' and '*Sustainable*' are used in academia and practice, and the degree to which there is consistency in the usage of these terms. This paper serves the purpose of untangling the conundrum of definition in these terms, which can inform endeavours at further terminological standardisation.

Paper V is a theoretical paper combined with a literature review. The purpose of this paper was primarily two-fold. Firstly, it endeavoured to go further than **Paper II** by conducting state of the art research that focuses only on rental offices. Secondly, it presents a theoretical model developed by the researcher that illustrate all of the possible relationships that can exist in a rental office building that may or may not have a Green Lease.

Paper VI is another terminological discussion. In order to move the terminological debate forward, this paper explores whether there is a difference between the terms '*Green Leasing*' and '*Green Leases*', and if there is consistency in the usage of these terms in academia and practice. This paper attempts to standardise the use of terminology in the field (as well as this thesis) and to encourage more substantial attempts at standardisation of such terms in both academia and practice.

Paper VII presents the findings of the '*Third Phase: Quantitative Survey with Limited Qualitative Elements*'. This paper follows on from the results in **Paper III** by looking at the barriers and drivers, but this time in a purely Norwegian context. The data also provides information on the Green Lease and Green Leasing initiatives in these buildings, as well as their SFM and external support mechanisms. These papers serve the purpose of answering the final research question as well as methodologically a synthesis of the two previous studies.

Paper VIII is a combined empirical study and literature review focusing on bridging the gap in sustainable design and FM. The purpose of this paper is to provide an empirical, theoretical and thematic link between the study of FM and sustainable buildings, and push forward the state of the art work conducted in this thesis.

4.1. Paper I - The Users Impact on Buildings Sustainability – A Qualitative Approach

This paper is an empirical exploratory study with a focus on how users impact the sustainability of the buildings that they use - from the perspective of expert witnesses in the field of building sustainability.

In terms of their contribution this overall PhD project, this paper made the following two primarily contributions:

- Establishing the needs to focus on users and human stakeholders in the sustainability of offices
- Offers possibilities as to how the challenges associated with users of buildings and its sustainability can be met through lifecycle and stakeholder considerations.

Establishing the need to focus on users

The interviewees in this study were asked in what ways the users of buildings impact its sustainability (both positively and negatively), and the degree to which this was important in the broader context of sustainability in the built environment. Users are an important stakeholder to consider due to their impact on the building, from being the core customer in a rented office to being an actor that impacts the kinds of changes and refurbishments to be made to the property, as we as sustainable considerations.

In the case of this paper, the users are those that use the buildings (primarily in this case 'tenants'), but not necessarily those that have signed the lease. Numerous factors involving users were mentioned. The '*sustainability mindedness*' of users was crucial in buildings where users enjoyed considerable control over their environment. A user who understands the sustainability needs of their building and cooperates with them can result in positive outcomes. The opposite is the case with users who do not consider the sustainability needs of their buildings. This also can be considered in conjunction with the attitudes of users, who are more likely to leave electronics on in their office in ways they would not do at home, as they do not pay the bills for energy use in their workplace. In buildings that use automated processes such as Building Management Systems (BMS) that take the control (and thus risk) of sustainability management away from users, usability is important. Even with automation, a technology that is difficult to use performs poorly or is used in ways the designers did not

intend, can still have a negative impact on the sustainability of a building. User happiness is also a consideration, as although the risks to sustainability are less so in a building that is more automated, user satisfaction can be reduced due to lack of an ability to control their environment (such as sealed windows in passive houses). There was no consensus however on whether user control or increased automation was the best approach to solve this problem.

Interviewees considered the impact of users significant, and that this was an opportunity for innovation in processes, products and services to further ensure that the impact of the user on a building's sustainability is both minimal and achievable.

Meeting the Challenges

The interviewees also offered solutions (both theoretical and practical) on how these challenges can be met.

Some of the interviewees suggested increasing legislation and regulation to ensure buildings were operated better, but with an emphasis on 'carrots' as opposed to 'sticks' where at all possible. Voluntary regulation such as BREEAM certifications was considered as a possible solution, mainly due to a positive brand image, reduced operational costs, and other incentives such a certification can potentially provide. Green Leases are another possibility for regulation, although their implementation is challenging and the concept in of itself is still maturing.

Training users on how to use their building was a solution suggested with the aim of resolving some of the challenges associated with the unpredictability of human behaviour. Interviewees noted a couple of examples of how good or poor user training has impacted on specific cases, and how a change in the culture in the modern built environment may pay sustainability dividends.

Some of the interviewees emphasised the importance of technological solutions, either in the form of increased automation or systems more easily understood and operated by users. This approach, however, could not stand alone and needs to be implemented in conjunction with well-resourced and trained FM infrastructure and support.

Aside from a purely technological approach, FM's in some cases may be a key element in solving user related sustainability challenges. One of the interviewees noted that the FM in a building they had studied as a part of a doctoral project they had supervised had been the building 'champion', and they understood how best to reduce energy in that building, and had

the personal competencies to engage users in these endeavours to a degree. According to the interviewee, the level of expertise in FM is an important reason why they should be core members of design teams, which in turn may result in better performing sustainable buildings.

Overall, the interviewees offered three key approaches to tackle user-oriented sustainability challenges – '*training*', '*technology*', '*regulation*' and '*FM*' – all of which are components that could be found in Green Leases and Green Leasing.

4.2. Paper II – Sustainable Facilities Management and Green Leasing: The Company Strategic Approach

The second paper of this thesis is the first phase of a multi-phase literature review spread over several papers with the expressed aim of looking at Green Leases and Green Leasing more broadly, moving towards more study of literature involving commercial rental offices in the final publications.

The purpose of this paper specifically is to 'set the scene' for the more overarching review steps, by looking a Green Leases and Green Leasing overall without focusing solely on commercial rented offices. However, one narrowing element came in the form of trying to orientate the literature search towards Green Leasing and Green Lease from and FM perspective where possible. The outcomes of this paper also informed the development of the survey for the '*Second Phase – Interviews with Qualitative and Quantitative Elements*' – particularly in the development of the quantitative drivers.

The primary aim and objectives of this paper were to investigate and uncover the following things:

- To look at the degree to which economic, environmental and social criteria (the Triple Bottom Line) are considered in Green Leases and Green Leasing initiatives.
- Look at the similarities and differences between companies in the RE and FM sector compared to other industries in the corporate strategic approach to these issues.

Economic, Environmental and Social Criteria

This literature study indicated several factors that impacted all three criteria in the context of Green Leases themselves, along with the Green Leasing of buildings and other kinds of property, and is broadly covered in both lease and leasing initiatives.

From an economic perspective, this can be done through value management. This is something that can be achieved through clearly tangible means such as operational costs reductions, as well as voluntary regulation such as BREEAM certifications, which can improve the asset value of a property. Furthermore, compliance with legislation such as the 'Carbon Reduction Commitment' (CRC) also means that sustainable operations and leasing can result in cost management, although from the perspective of non-voluntary forms of regulation. In terms of the social criteria, CSR was an important consideration of focus in the

literature. Many organisations saw Green Leases and Green Leasing as a way to support their company brand and image, whilst also resulting in a positive impact from a societal perspective. For office workers, this can also feed into the utilisation of good quality, well-lit and well-ventilated working areas in a high performing sustainable building. The environmental criteria ultimately were considered in the context of the 'economic' and the 'social', primarily due to the fact that a positive environmental impact was the goal for this criteria. Whilst the overall motivations for considering Green Leasing and Green Leases were variable, their goal was generally a positive environmental outcome, either through reduced emissions, operational costs or other means.

When considering the impact of the three criteria together, the literature appeared to suggest that in the case of organisations that are consciously considering the 'Triple Bottom Line', the ease of conceptual understanding seems to be the motivator, as opposed to its broader utility. In this sense, the Triple Bottom Line is not an ideal approach for the development of Green Leases and Green Leasing arrangements, mainly due to it focusing on the outcome of the criteria as opposed to methods and strategies for implementation.

Similarities and Differences

Due to the size and possibilities of scope in this paper, the researcher accepted that a definitive answer to this question was not possible, although indicative data was collected. The literature suggests a forward momentum in terms of sustainable development in both the residential and non-residential sectors, although the speed of this momentum in each sector is not easy to determine. It was also demonstrated that Green Leases still seem to be a leasing product that currently experiences the most implementation in the non-residential sector, with little evidence of formal Green Lease arrangements in residential buildings. Whilst the reasons for this are complex, it could be due to the more easily defined operational processes and operational hours of buildings such as offices, which are less easily predicted in the likes of houses and apartments.

A similarity suggested by the literature focused on the pan-sector possibilities for landlord/ tenant friction. The development of leases has often resulted in challenging negotiations and other strains on the relationship between both stakeholders. A Green Lease (or even Green Leasing) requires different obligations and operational activities from both landlord and tenants outside of traditional practices, which may result in tension. The financial impact

could also be a factor, as some Green Leases require economic investments by the tenants in both the financial amount and form that are outside traditional leasing relationships.

4.3. Paper III – Green Leasing in Theory and Practice: A Study Focusing on the Barriers and Drivers for Owners and Tenants of Commercial Offices

This paper represents the publication of the findings of the "*Second Phase: Interviews with Qualitative and Quantitative Elements*", as well as attempts to address and answer Research Question 2. This was a piece of international research which involved data collection from Norway, the UK and the USA through semi-structured interviews with the owners and tenants of BREEAM or LEED-certified office buildings that were available for rental.

The purpose of this apart from answering *Research Question 2*, was to establish the motivating factors for the development and rental of these buildings, as well as narrative data aimed at better understanding the challenges that these buildings faced.

This paper endeavoured to fulfil two aims:

- What drivers and barriers exist for owners in the development and refurbishment of BREEAM and LEED-certified office buildings available for rental?
- What drivers and barriers exist for tenants taking on the tenancy of a BREEAM or LEED-certified office building?

Barriers and Drivers for Owners

In this study, owners were mainly motivated by less tangible drivers. What this means more specifically is that although costs always matter in business, as an initial motivator they were considered less important. Owners developed these buildings primarily due to the company policy and culture within their organisation, which was a part of their company brand. This motivation sometimes came from the investment arm of the RE organisations studied, and was a message to potential customers that they wanted to be seen as leaders within their industry. Green certifications (such as BREEAM) were also important motivators, due to a combination of customer recognition and its status as a 'toolkit' for improving the sustainability of their building. Demand from their customers to be seen as 'sustainable' also influenced their approach. Although costs were the least important consideration of owners, legislative compliance and CSR were also less of a priority.

With regards to barriers, these were primarily bureaucratic, technical and structural in nature. Bureaucracy proved to be an issue for BREEAM certifications outside the UK. BREEAM documentation had to go via the UK headquarters and not regional NSO's, which meant that final certifications were both long to finalise, and complex to complete. LEED-certified

building owners did not report such problems. In terms of technical challenges, these were often found in some of the Computer Aided Facilities Management (CAFM), more specifically the BMS systems. Owners reported that they not only had usability difficulties with these systems but also found that the technologies it was meant to control were not always working correctly. Numerous strategies were attempted by owners, one of which hired their own commissioner to minimise the 'day one' challenges of integrating building technologies with the BMS systems designed to control them. Structural issues also place stresses on the process. Local building regulations sometimes reduced the sustainability potential of desired building refurbishments and were often not accounted for adequately in the BREEAM and LEED certification processes.

Barriers and Drivers for Tenants

For tenants, their building certification was the highest priority for their choice of building. The reasons for this were numerous in nature, although taking up a tenancy with a well-recognised mark of sustainability such as BREEAM or LEED was an important factor. Unlike owners, costs were the second highest motivator for tenants. Managing their operational costs versus their rent was a key focus of them taking up a tenancy. The less tangible motivators of CSR and company policy followed on from this, with customer demand being seen as a much less vital consideration. For tenants, compliance with legislation at any level was a factor they least considered overall.

In terms of barriers, these were naturally very different than those of the owners. Whilst literature implied that the landlord-tenant relationship and associated frictions may be a barrier, none of the tenant interviewees mentioned any tensions of significance. They even implied that their productive relationship with their landlord was a key factor in them renting their office. Communication barriers, however, were a barrier noted by some, particularly concerning misunderstandings during design meetings which resulted in differences in the buildings that they had not accounted for previously, such as unwelcomed floor plan revisions. Similarly to building owners, some of the tenants noted challenges with technological usability and poorly working environmental systems, much of which was being addressed with landlords at the times the interviews took place.

4.4. Paper IV – Green and Sustainable: How are these Terms Reflected in the Context of Facilities Management?

This paper takes the form of a terminological discussion aimed at providing clarity on the differences between the terms '*Green*' and '*Sustainable*' in the context of FM and SFM, that also briefly covers Green Leasing and Green Leases. This was done through a thorough investigation in the form of desk research, covering the usage of both terms from the perspective of both academia and practice. The data in this paper also contributes to *Research Question 1*.

As opposed to some of the CRE orientated publications in this thesis, this paper has more of an FM focus in terms of how the research was conducted.

The paper endeavours to fulfil two aims:

- Is there a difference in how academia and practice use the terms '*Green*' and '*Sustainable*``?
- How are these terms reflected in the context of facilities management?

Green and Sustainable

The study in this paper concluded that there is little overall consistency in terms of how both terms are being used. Despite this, there is marginally greater consistency in academia than there is in practice. For the most part, these terms are being used interchangeably by various actors and stakeholders, however, the desk research did yield some differences between how academia and practice are using them. Operational level considerations are the most commonly found uses of term '*Green*' in academia, whilst in the case of '*Sustainable*', this more often used in the context of the Strategic Level of organisational management. Practice is less consistent, with '*sustainable*' having a usage that is fairly evenly spread of over all of the OM levels. In the case of Practices usage of the term '*Green*' however, they are marginally more consistent, which is dominated by Tactical Level contexts of usage. When looking at the academia and practice combined, this is much more interchangeable. However, the most common references to '*Green*' and '*Sustainable*' were found on the Tactical OM level.

Green and Sustainable in the Context of Facilities Management

In terms of the usage of these terms in tandem with their impact on FM and FM services, there little to no standardisation to make using these terms reliable if different meanings of both are considered. This lack of consistency risks having a negative development on the development of FM products and services. Taking Green Leases as an example, using a term like '*Sustainable Leases*' or '*Energy Aligned Leases*' may stifle research and development if people do not know that this is the same product, but with a different name. This is also the case when considering more FM specific terminology, such as '*Sustainable Facilities Management*' and '*Green Property Services*'.

The lack of terminological consistency not only poses challenges to the FM industry but also to researchers looking into these topics, despite their marginal increase in consistency in the case of academic discussion. A lack of proactive and systematic terminological standardisation is marginalising and isolating research if scholars and researchers are not using the same terms for the same topic, whilst risks stifling progress, cooperation as well efforts at standardisation.

4.5. Paper V – Green Leasing in Theory and Practice: A State of the Art Review

The fifth paper in this thesis is another piece of desk research focusing on Green Leasing and Green Leases in the context of the sustainable built environment. The aim of this paper is to not just go further than the state of the art research conducted in **Paper II**, but also decrease the broadness of its scope and focus on only offices that employ Green Leases and Green Leasing.

The purpose of this paper is to gain an understanding as to the state of Green Lease and Green Leasing research as it is today, whilst also addressing the stakeholder impact. This paper used literature from academia and practice in order to provide the data required for the discussion. This was done from the perspective of focusing on key stakeholders in a Green Lease and Green Leasing relationship, whilst also providing a theoretical model to help in explaining, systematising and to some extent codifying these relationships. The data from the paper provides a contribution to *Research Question 1*.

The primary objective of this paper is to investigate the following issue:

- Do the roles of '*owner/ landlord*', '*lessee*' and '*facilities management*' in a building with a Green Lease and a Green Leased office differ from those without

Its secondary role is also to contribute to theoretical discussions surrounding these issues through a theoretical model – The '*Rental Office Stakeholder Interaction Model'*.

The Roles of Owner/ Landlord, Lessee and Facilities Manager in a Green Leased Building.

In the case of the owner, their primary role is to create value for the building, an aspect that remains fundamentally unchanged in a Green Leased building. In terms of their input into the development of a Green Lease, this places new demands that require a consideration of the operations of the prospective tenant, which need to be considered when drafting such a document. This can be seen in the '*paternalistic*' approach versus the '*cooperative*' approach to the development of a Green Lease, and this requires an important level of management consideration in context with the needs of tenants. A new role for owners and landlords in a Green Leased building ensures that appropriate levels of investment (technological or otherwise) are made to the building. This is sometimes outside the scope of normal building refurbishment and maintenance, such as the introduction of submetering for active energy monitoring. All of these changes also need to be done with a sympathetic eye towards the marketability of the building and to ensure its attractiveness to prospective tenants.

The role of tenants also sees a change in a Green Leased office building. The motivations of the tenant are different from standard tenants, as occupying a Green Leased office might be motivated not just by potential operational savings, but also by CSR and brand orientated motivations. The most profound change for the tenant is that of their new role in contributing to the sustainability of their building. In a Green Leased building, the tenant is a part of the sustainability story, whether that building has a Green Lease or not. Should the tenant have signed a Green Lease, their responsibility may be to restrict their energy use or be mandated to buy only lower energy certified electronics. Even without a Green Lease, the tenant may be mandated to make contributions to recycling and energy-saving efforts, all of which are out the scope of the traditional relationship they would have with a building that is not Green Leased. The usage of BMS systems in such buildings also adds a technological dimension to these changes of roles.

For facilities managers, a Green Leased building results in a mixed degree of re-evaluation with regards to their role. In a Green Leased building, FM's are responsible to a greater or lesser degree to ensure that their tenants are meeting the requirements for the buildings sustainability infrastructure. This can require a more 'face to face' role for FM's as they address issues arising from energy submetering, or teaching tenants how to use more advanced supporting technology such as BMS systems. For FM service providers the development of Green Leasing and Green Leases results in not just a change in work practices, but also an opportunity to develop new products and services to support these initiatives, such as '*energy performance contracting*' and green cleaning services. The roles of FMs in the development of building policies is also important. Whilst FM teams do not formally become involved in the development and negotiation of a Green Lease, they are responsible for developing the building's policy, and to an extent procurement and infrastructure, as well as providing feedback for adjustments in the Green Lease and/ or Green Leasing being employed.

Rental Office Stakeholder Interaction Model

In this paper, the researcher also created a theoretical framework to support not just the papers findings, but also future research in this area. The result was the *Rental Office Stakeholder Interaction Model* (*Figures 21 and 22*) which is discussed in detail in section 2.7.2.

4.6. Paper VI- Green Leasing and Green Leases: A Terminological Discussion of Academia and Practice

The sixth paper of this thesis attempts to tackle the conundrum of definition that is evident in this field with regard to the terms '*Green Leases*' and '*Green Leasing*'. This is another stage of the literature review process that endeavours to form a better understanding as to the state of the art in this field, however the data collected in his paper has a relevance over all of the research questions as it works towards creating a definition benchmark that can be both used here and in the industry more widely. The literature for this paper was gathered from academia and practice from the fields of FM, law, architecture and the built environment. Whilst a discussion of these terms was conducted earlier in this thesis, the nature of this review warrants a repeat of this discussion.

The primary objective of this paper was to address the following questions:

- How is the term '*Green Lease*' used in academia and practice, and is there a common understanding of the term?
- How is the term '*Green Leasing*' used in academia and practice, and is there a common understanding of the term?

Green Leases

Using the benchmark dictionary definition of a Green Lease as a lease document, considerable synergy was found in the literature used for this study. In academia, uses of this term were commonly linked to discussions surrounding tenancy agreements, with the majority of other definitions still focusing on a contextual usage that is relevant to a document based lease arrangement. This reaffirms that the dictionary definition holds true broadly speaking in an academic context. This definition, however, was not universally accepted. There were some sparse references to so-called '*Green Lease Schedules*' which are process plan for the development of a Green Leasing arrangement, and not a specifically just a document.

In practice literature, the terms were used almost exclusively in the context of a lease document, and rarely if ever as leasing process. Terms such as '*Green Lease provisions*' were found which imply the development of Green Lease clauses. Many property owners and landlords also used the term in the context of signing such an agreement with a tenant, which further cements this consistency.

When considering the data gathered in this paper, there is a broad (but not exclusive) understanding that a Green Lease refers to a lease document that a tenant signs to provide access to a building and its associated services.

Green Leasing

As a benchmark dictionary definition by which to move forward, Green Leasing can be considered to be the process by which a Green Building is let out and occupied, and done with sustainable considerations in mind. A building operating Green Leasing may or may not also have a Green Lease in conjunction with this arrangement. This is in many respects a developing term, and there were limited mentions of it in both academic and practice-based literature. In academia, there are numerous mentions of in the context of '*leasing practices*', which imply a process orientated use. Other academic uses state terms like '*environmental process*' in the context of leasing, and some literature even separates leases and lease processes in the same sentence. This study found no instances of Green Leasing being used to describe a lease document in academic literature.

In practice literature, leasing processes were also the dominant contextual use. Whilst usages were also scarce here, many used Green Leasing in the context of a more operational outlook in their buildings lifecycle, and in one case even stating that the slow development and adoption of Green Leases is directly related to the slow uptake of Green Leasing initiatives. An isolated mention of Green Leasing used in the context of a Green Lease document, however, was used by the Institute for Market Transformation, who states that "*high-performance leasing*" is the signing of a Green Lease (Feierman, 2015, p.6).

Although this is a term yet to be widely adopted, in the context of data presented in this paper, there is broad (but not exclusive) acceptance that Green Leasing is the process of letting out and operating a building in a sustainably considerate manner.

4.7. Paper VII – It's not Easy Being Green: A Study of the Barriers and Drivers for Green Leased Rental Offices in Norway

The seventh paper in this thesis consists of data accumulated from an online survey developed solely for the purpose of this research. The data from this paper contributes to **Research Question 3** and is the presentation of the '*Third Phase: Quantitative Survey with Limited Qualitative Elements'* of data collection for this thesis.

The survey in this paper consists of quantitative and qualitative elements, with the target respondents being building owners and tenants of sustainable office buildings in Norway. This piece of research was envisaged as a project influenced by the two prior stages of data collection. Whilst the line of questioning was heavily influenced by the data and 'unanswered questions' from the previous studies, it is not internationally focused (only focusing on Norway) in order to ensure that the data collected for this paper was not watered down due to a too broader country focus.

The primary objective of this paper was to address the following questions:

- What are the barriers and drivers for owners and tenants with regard to the development, rental and refurbishment of sustainable rental office buildings in Norway, and is there a difference between the private and public sectors?
- To what extent are Green Leases considered and deployed by building owners in sustainable office buildings in Norway, and is there a difference between the private and public sectors?
- What sustainable FM is employed in these buildings in order to support the sustainable credibility of the building?

The Drivers and Barriers for Owners and Tenants

In this study, costs were considered to be the primary driving factor for all stakeholders, regardless of the sector. This is in contradiction to the findings of **Paper III**, where intangible factors were of a higher value to owners (such as CSR), although tenants still considered the cost to be a significant factor. Whilst the study did not look directly at why these contradictions occurred, it can possibly be implied this is due to cultural and economic differences between both samples, as well as the survey study having a considerably larger sample than that of the interviews. The least significant drivers, however, were not the same

across all stakeholders and sectors, but instead were more sector (but not stakeholder) specific. In the private sector, both owners and tenants considered CSR to be the least significant of the drivers in the development and occupancy of their building. In the case of the public sector, both owners and tenants also had consensus on the driver that was of least significance in the context of their buildings development or rental. In this case, a green certification (such as BREEAM or LEED) was the least significant driver.

In terms of barriers (a question only addressed to building developers), these differed depending on whether they were from the private or public sectors. In the private sector, the most significant barrier to the development of their building was in both the construction and planning stages. This differed in the public sector, where the two most significant barriers were at the construction stage, but also those relating to bureaucratic processes. In terms of the least significant barriers, these were bureaucratic barriers in the case of the private sector. For public sector buildings, the least significant barriers were those that related to market demand. This information also contradicts the data from **Paper III**, where bureaucracy was a significant notable challenge in some of the projects noted by interviewees, particularly in the context of the BREEAM certification process.

Green Leases

In this section of the paper, 50% of respondents had considered Green Leases in their properties. When considering this number by sector, 46.4% of public sector respondents did consider a Green Lease option, which increased to more than 50% in the case the private sector. When it came to Green Lease implementation, however, the statistics were reflective of an opposing level of interest. 46.4% of public sector respondents had employed Green Leases in their properties, as opposed to only 14.8% in the private sector. This is representative of a considerable chasm between considerations of Green Lease proposals, and their real-world implementation.

In terms of marketing their building, 25% of public sector respondents marketed their building as sustainable to their prospective tenants, with 18.5% of private sector respondents doing the same. In terms of these respondents involving their tenants in the sustainability efforts in their building, 57.1% of public sectors responds involved their tenants, and 29.6% of private sector respondents did the same. Interestingly, these figures also correspond to the level of Green Lease implementation in each sector.

Sustainable Facilities Management

Overall, more than 80% of the respondents considered the FM they operated in their building portfolios to be sustainable. In terms of what elements this consisted of more specifically, this mostly took the form energy management initiatives. Much of the data in this section indicated that the majority of the respondent's SFM approach was technical in nature, with the other significant initiatives being sustainable maintenance and sustainable technical installations. The lesser used initiatives were mostly strategic and tactical and consisted of contractually based initiatives such as energy performance contracting. This is indicative of a need for good technical competencies amongst FM's in higher performing sustainable office buildings.

4.8. Paper VIII – Bridging the Gap Between Sustainable FM and Sustainable Buildings: An exploratory study of six public sector buildings in Norway

The eighth paper in this thesis whilst not directly on Green Leases (but to a minor extent Green Leasing), is a contextual contribution to the research and findings presented in this thesis. What this means more directly, is that the paper addresses issues relevant to both terms, both in the context of their development and matters than impact Green Lease and Green Leasing development. With this in mind, this paper contributes findings relevant to all of the research questions, but particularly *Research Question 1*.

This paper endeavours to better understand the degree to which there is a gap between SFM and sustainable buildings. The data for this paper is a combination of literature research along with interview data collected by Master Students on NTNU's 'Eiendomsutvikling og Forvaltning' (Real Estate Development and Facilities Management) master program as a part of the work on a course titled 'Sustainable Facilities Management'. The data was collected from six Norwegian public buildings, and interviews were conducted primarily with facilities managers and building managers.

The aim of this paper is to answer and address the following questions:

- For the buildings studied, what were their sustainability goals for both the SFM and the Sustainable Building?
- How were the performance goals set out and later implemented at all the strategic and tactical OM levels and what criteria did they use to evaluate their sustainable approach?
- What are the gaps between SFM and sustainable buildings in these projects, and what possible measures are for bridging them?

Sustainability Goals

The sustainability goals for each of the projects in this paper varied. Many used multi-stakeholder approaches by which to meet these goals, an approach reminiscent of some of the approaches found in Green Lease and Green Leasing initiatives. The size of an organisation made an impact on how this was done, with larger organisations having larger overarching goals with more realistic possibilities for the implementation of these Goals. Many of these goals were not simply CSR orientated, but also technical in nature. Many of the projects saw the 'thermal envelope' and its associated thermal quality as an area of improvement that

would positively impact the sustainability of the building, as well as (from an SFM perspective) improving comfort and wellbeing that in turn would be a positive contribution to the social leg of the triple bottom line.

Performance Goals and Organisational Management

In terms of performance goals and their implementation at the strategic and tactical levels of organisational management, this was also a question that saw variety across the cases. At the strategic level, one of the cases used a 'top-down' approach heavily involving management in their sustainability goals, including financing the project themselves to keep it as an internal University project. Many of the other strategic level goals and their efforts at implementation focused on a guiding policy bend, often taking the form of CSR initiatives, the triple bottom line and other concepts with limited to no KPI's. Some of the initiatives also straddled into the tactical level, such as thinking more broadly about future work involving later stages of the building's lifecycle.

At the tactical level, considerations were found to come more equally from SFM and the sustainable building. Sustainable procurement formed a part of many of these strategies, ranging from details decisions in the purchasing of building materials, down to procurement decisions (such as electronics) that are seen during the later operational phase. In the realm of SFM considerations, implementation strategies were focused on usability in many of the cases, in order to improve the user experience and their associate comfort. The flexibility of the building was also considered by SFM's, which is a key element of future thinking about the building and also has elements found in considerations about circular economy.

Bridging the Gap

In terms of attempts to bridge the gap between sustainable buildings and the SFM employed in them, this has seen mixed levels of success. Whilst overall sustainability strategies may hint at a holistic approach to address both elements, a strong SFM maintenance infrastructure that works alongside the budget and maintenance needs of the building need to be in place in order for this to work. A lack of considerations for FM teams risks making the gap more profound, as this can negatively impact both the technical potential and technical performance of the building. The study demonstrated that there was little to no consistency in the approach to eliminate this gap across all six of the participating buildings. Where gaps were less profound, this was representative of a more integrated approach that considered

SFM and sustainable buildings more holistically, which improved further where a broader stakeholder and lifecycle approach was implemented.

5. Integration of the Research Findings: Answering Research Question 1, Research Question 2 and Research Question 3

In terms of the aim and scope of this research project, it had three expressed aims each corresponding to a research question. The objective of RQ1 was to better understand the development of research within this area and the degree to which it is given attention in academia and practice, along with the use and development of terminology. The objective of RQ2 was to establish the barriers and drivers of Green Leases and Green Leasing in practical application in order to provide indications to foster their increased application and the development, along with reducing the likelihood of these developments being stifled. The objective of RQ3 was to establish how existing research and development (both in and outside of the research scope of this thesis) can provide challenges and opportunities for facilities management and facilities management services.

The objectives of this thesis were met through the previously discussed three-phased approaches to empirical data collection. This data collection was mixed method in its approach, combining interviews and a survey along with mixing quantitative and qualitative questioning used where it could be best utilised. The first phase of empirical research consisted of 5 qualitative interviews with expert witnesses in energy efficiency and sustainability in buildings in Norway and the UK. The second phase consisted of interviews with both quantitative and qualitative elements conducted with owners and tenants of BREEAM or LEED-certified office buildings in Norway, the UK and the USA. The final round of data collection was a survey that that was mostly quantitative in nature but contained qualitative elements. The survey was conducted with owners and tenants of office buildings in Norway that the respondents considered to be sustainable.

In this chapter, the findings from the papers and chapter 4 of this thesis will be brought together in order to answer the questions that both motivated and provided structure for this research project.

5.1. RQ1 – To what extent is research and the implementation of Green Leases and Green Leasing is being given attention by academia and practice in the context of Sustainable Corporate Real Estate and Facilities Management?

In order to answer this question with sufficient levels of detail and clarity, it has been divided into two separate sections. *1) Research and attention given to Green Leases and Green Leasing in Academia 2) Research and attention given to Green Leases and Green Leasing in Practice.*

5.1.1. Academia

The information gathered in this thesis presents an eclectic overview as to the current state of research in academia with regards to Green Leases and Green Leasing.

Green Leases

In terms of the length of time that this has been a feature of the field and the RE industry, the first uses of the term '*Green Lease*' began to enter scholarly attention in and around 2007, although some older concepts reminiscent of this term existed sometime before that. Since the genesis of the term, growth has been expediential in comparison to each passing year, however, it is still very much a fringe discussion in studies of the built environment. In academic studies, the main disciplines dealing with Green Leases are primarily from the built environment, architecture, facilities management and business publications. Despite Green Leases being a more obvious candidate for legal discussion, it is only sparsely written about in law orientated publications. The 'newness' of the term has yet to result in the existence of journals (even as special editions) and academic publications solely about Green Leases, however, there are an increasing amount of Green Lease focused articles that contain co-authors from different disciplines, implying an increasingly cross-disciplinary narrative in this topic overall. In terms of key authors, the majority of these are from the UK and Australia at present, with some scattered attention from the USA, Sweden and Finland as well as Norway. In terms of the overall scene, the researcher has been one of the more prolific authors in this field since 2014 when considering this in the context of the number of publications on Green Leases.

When considering terminological usage, although a more standardised definition of a Green Lease eludes academia, there is a significant degree of consistency in how the terms are being used. For the most part (although exceptions occur), scholars and academics are using the term '*Green Lease*' in the context of a lease document. With this in mind, the data in this thesis is indicative of a Green Lease being defined as a *lease for a building that contains*

clauses that are aimed at positively impacting the sustainability and environmental footprint of that building. In terms of how this reflects elements of the theoretical framework, this mostly holds true to the definition offered by the 'Green Lease Toolkit' (Bugden et a., 2013, p.2) in the sense that is a lease document that reflects the sustainability aspect of its clauses. It is also important for research to be conducted as to what degree a clause has to be sustainable before it can be considered a bonafide Green Lease clause. Owing to the realistic possibilities of the scope this thesis was restricted by, this aspect was not covered here and would be interesting to consider in a future research project. There is a significant possibility for the academic fields of law, architecture, business and facilities management not just better universalise and solidify the term but also to expand it further to encompass technical elements, the social sciences and other aspects that will offer the possibility for Green Leases to be more holistic in their scope. What needs to be clear however is that such an expansion needs to be understandable and feasible for implementation by practice.

In terms of issues and challenges in the built environment gained from interview data, for a Green Lease this can come from a lack of understanding as to what the term means, and the risks that it can be burdensome which can impact the attractiveness of this option. However, the image of Green Leases is not entirely negative. Successful case examples exist and the Australian government at one point even legislating to support them. An increase in sustainable certifications such as BREEAM is also likely to be positive in the long-term potential of Green Leases, as such a lease program can in some cases help to improve or maintain such certifications. Wider legislation, however, remains weak in encouraging Green Lease development. There is also a need to ensure that Green Leases are eventually normalised, with all leases becoming green, thus eliminating Green Leases as a separate product in of themselves. This is a longer-term goal, and an understanding as to what constitutes the barriers and drivers for this leasing product need to be researched and overcome in order to improve their attractiveness and feasibility. What this thesis has illustrated is that this chasm can be bridged by having a better dialogue between academia and practice institutions. The relationship between research and industry in institutions such as Enova are notable examples of this, where through research tangible solutions (in the form of products, services and funding) improvements to the sustainability of the built environment can be achieved.

With regards to research gaps in Green Lease research, these are primarily evident in the lack of case studies that exist within research in this field. This makes for challenges in terms of

the scope to better understand the level of market penetration and types of Green Lease that exist, as well as the degree to which they are successful. Secondly, current literature does not have a case study focused approach to understanding the barriers and drivers. The barriers and drivers are not ignored in the literature, however, they are either not given a case study orientated focus, or are using more generic discussions about the barriers and drivers for the development of sustainable RE, and attaching them to discussions surrounding Green Leases. This is also representative of the previously noted 'chasm' between the research conducted academic institutions that result in tangible benefits to the implementation of Green Leases. This is a research gap that this thesis attempts in part to address.

Green Leasing

The state of Green Leasing research is a patchier affair overall when compared to Green Leases, mainly due to the immaturity of the terminology. Whilst the first instance of the term can be considered to emerge at around the same time as Green Leases, its establishment as a separate term in of itself does not yield enough occurrences in academia to warrant any solid or scientifically robust definition or understanding of the concept. The attention given to this term is close to non-existent in academia and scholarly writing, featuring mostly and passingly in conjunction with mentions of Green Leases. Although the author has attempted to contribute to discussions on this topic by writing and publishing the first known study of the concept in isolation, further research beyond the work in this thesis is necessary for Green Leasing to be further matured, which in turn will 'flesh out' the term for the needs of further research. This study does not eliminate McKinley's (2007) claim that a lack of consistent terminological usage poses a risk to the cross accumulation study of knowledge (McKinley, 2007, p. 123), however, the research hopes that they have begun the process of diminishing the terminological fragmentation for '*Green Leasing'*. The researcher at no point in this thesis makes any claim to creating the term '*Green Leasing*', but instead take a degree of credit for its definition in the form it takes in this thesis in the absence of the awareness of similar or competing definitions. In terms of defining Green Leasing as the letting out of a building in a sustainable way, the researcher is unaware of an existing term that is defined in the same way from the perspective of leasing, with other terms instead focusing on occupancy options more broadly (such as the term '*Green Property Management*'). In terms of academias engagement in this, this thesis has attempted to define this term in the absence of such a term definition in academic publications as far as the author is aware. This definition has a secondary intention of simplifying the scope of the term in order to make other researchers (and interested

stakeholders in the industry) are of these words as having one definition, as well as uniting all research on this topic into one term of understanding to afford greater synergy in this field. In terms of how this reflects back to the theoretical framework, the researchers definition follows to a large extent the '*leasing*' definition from the Free Dictionary ("Leasing" 2018) mentioned earlier, as this differentiates the terms '*lease*' and '*leasing*' in a manner suitable to that of the needs of the built environment.

Despite its lack of terminological penetration, the few instances of the term in academia that do exist lead it towards being a term that describes the leasing out of a building in a green or sustainable manner. Where literature in academia is lacking on this topic, the researcher hopes that their research will offer some of the first substantial efforts in defining Green Leasing as a separate concept from Green Leases. With this in mind, as far as research can be sure, Green Leasing is the leasing out of a building in a way that considers the needs and requirements of sustainable development. A building employing Green Leasing does not have to have a Green Lease in order for it to be considered Green Leasing, however, both initiatives are compatible with one another. From the perspective of academia, this is important to understand when considering building lifecycles, where a Green Lease can be a mechanism by which to achieve Green Leasing, which further cements the necessity of cross-disciplinary research into these issues.

When considering the lack of attention and terminological standardisation that is evident in academic discussions on Green Leasing, the research gaps are both stark and to an extent urgent. Further terminological standardisation is needed in order to foster some form of common conceptual understanding. This thesis has attempted to make a contribution to this research gap, however, more work is clearly needed in the longer term. Along with standardisation from a terminological perspective, it is also important to better solidify what constitutes the difference between Green Leasing and standard leasing. Whilst the definition proposed by the researcher earlier in this section may imply that such an answer to this question is obvious, this is not the case when considering 'degrees of sustainability'. More research is needed to find out if a building can be considered to operate Green Leasing if they only, for example, have the infrastructure for recycling, or if sustainable initiatives need to be more substantial for Green Leasing to be considered to be in operation in such a building. The two further research questions and their associated empirical studies have attempted to uncover this to a degree, although a study focusing on this alone is required in order to make more substantial contributions to Green Leasing in the field more widely.

5.1.2. Practice

Green Leases

In practice and other industry orientated publications, Green Leases began to be discussed around the time academia was doing the same in 2007. Whilst Green Leases have begun to increase in the rate of adoption, it was not until around 2010 that more formalised and legally binding Green Lease agreement was beginning to enter the marketplace. Prior to this, similar initiatives were being tried and tested, although often were not legally binding. They mostly took the form of memorandums of understanding (MOU) which contained clauses reminiscent of some of the clauses later found in full-blown Green Leases, however without the legal repercussions for breaking these clauses. Although Green Leases have seen an increase in uptake, they have not experienced a growth trajectory in terms of format, or level of success in tandem with this. High investment costs in certain leases along with concern from landlords and tenants over their potentially burdensome nature have been some of the challenges found in the literature on this topic. In terms of which areas industry are looking at Green Leases in their literature, these are mostly from documentation from portfolio owners, industry think tanks who are supporting their development, non-governmental organisations, green certification bodies such a BREEAM along with FM service providers. Few tenant publications are discussing Green Leases with any significant level of detail. As opposed to academia, in the industry, law firms are taking an increasing interest in Green Leases and what this might mean for their clients and relevant stakeholders.

In terms of terminology, the degree of synergy is similar to that of academia. Whilst academia presented more consistency, industry publications broadly (but not exclusively) look at a Green Lease as a leasing document with added environmental clauses. Whilst some exceptions did exist, for the most part, industrial publications experience a common understanding as to what constituted a Green Lease. In practice, Green Leases are primarily a term mostly associated with the law and are treated very much in the same context as a regular lease in that regard. Research into **RQ1** did not link directly into CSR being a part of this terms industrial coverage, however much of the industry focused literature envisaged CSR and other related factors as elements that may encourage tenants to consider a Green Lease option. This very much keeps a Green Lease within the scope of being a ‘product’, as has been mentioned earlier in this thesis.

For the built environment from the perspective of practice, Green Leases have seen growth but also have an image problem (such as its perceived burdensome nature) that are currently restricting the possibilities for growth in Green Leases in the wider marketplace. Legislative attempts have been mostly ineffective or scrapped, however, the private sectors use of instruments such as BREEAM have ensured that growth has not completely stagnated. Earlier in the theoretical framework, however, it was stated that BREEAM had previously afforded consideration of Green Leases, before removing them from their certification documentation (Global, 2011). Despite this, operational phase considerations in BREEAM, as well as the more overtly operational 'BREEAM In-Use' certification, mean that Green Leases may still have a place in BREEAM certification outside of the formal handbook.

Co-investment initiatives from landlords and tenants (with an aim of sharing the savings) have seen mixed success, with reluctance coming either from the upfront costs required, or the lack of incentive with regards to the savings. This is particularly the case in a country like Norway due to low energy costs, resulting in operational cost saving based incentives being not overly attractive to tenants. These challenges represent some of the challenges the author aimed to address in the other research questions, with a focus on looking at the barriers and drivers and better understanding the degree to which practice represented aspects suggested in the literature. The theoretical discussions in this thesis heavily link to Green Leases being a part of a contractual regulatory framework (Langley et al., 2009, p.7) which may also be a challenge in incentivising Green Lease uptake.

Practice-based literature on Green Leases also presents with it significant research gaps. The drivers and barriers for these leases (as well as their rate of success) are seldom recorded, providing little data for the industry to use to improve these leasing agreements. An understanding of the difference in incentives between landlords and tenants is also lacking in research, as well as a better understanding as to what kind of leases are out there. In terms of the aims of this thesis, later research questions aim to fill many of these research gaps, particularly those of barriers and drivers. The rates of Green Lease implementation and a typology of the kinds of leases out in practice, however, are beyond the scope of this thesis.

Green Leasing

As was the case also for academia, Green Leasing is a term that has been given only limited coverage. As with Green Leases in both academia and practice, this is a term that has developed in tandem with Green Leases, but with only a fraction of the attention. Whilst

practice has marginally more examples of Green Leasing than in academia, the attention given in industry is still low overall. As with Green Leases, industry attention comes primarily from the buildings developers, think tanks, non-governmental bodies and sustainable certification organisations. FM organisations also deal with some of these issues, however, there is much more limited attention and discussion from the law. The terminological chasm for this term is vast and mostly unexplored prior to this research project, with one major hope being that definition can be considered a road more travelled and offer practical usage to an industrial implementation of Green Leasing. The aspects of stakeholder engagement cannot be ignored. Janda *et al.,* (2016) noted that Green Leasing involved "*engagement and practices*" in order to function (Janda et al., 2016, p.2), which implies not just engagement with owners and tenants, but possible also FM. *Figures 21* and *22* in the theoretical framework also reflect this aspect, with a buildings operational efficiency being a cross-stakeholder process.

In terms of any kind of definition standardisation, the case remains the same as in academia in that there are insufficient references to '*Green Leasing*' to warrant a common understanding that is scientifically watertight. Despite this, the few references that do exist elude to a definition of a leasing process. As far as can be ascertained from the limited data available, Green Leasing can be considered in practice to be the letting out of a building that is conducted with an understanding as to the needs and requirements of sustainable development. As has been previously mentioned, this is a definition that has been lacking previously. This definition is considered by the author to be one of the more profound findings of this project with the hope of it resulting in usage in both academia and practice.

In terms of the built environment, Green Leasing is becoming more commonly implemented, even if many of the practitioners are unaware of the existence of such a term. Initiatives and infrastructure such as passive houses and BREEAM require a degree of Green Leasing in order to operate. Green Leasing initiatives are also evident in other high performing sustainable buildings, which according to literature, require different levels of engagement from tenants. This aspect is something covered by later research questions. FM is also key to this initiative, however, broad Green Leasing FM plans are yet to be widespread. FM's are in some cases also changing their competencies in tandem with these changes, such as needing better skills in computer-aided FM in order to meet the need of BMS systems. Green Leasing also presents an opportunity to develop new FM and FM related products and services, some of which were uncovered and published in papers included in this thesis.

There are however gaps in research that exist in this area. The barriers and drivers for adopting buildings that operate Green Leasing are currently not known comprehensively, and this thesis attempts to uncover some of those in later research questions. The degree to which SFM is deployed and in what form it takes is also not known and was part of the focus for one of the later pieces of research that feature in this thesis. The degree to which Green Leasing involves Green Leases and vice versa is also unknown. Whilst this thesis attempts to uncover this to a degree, to answer this comprehensively is an objective for a future research project.

5.1.3. Concluding Thoughts

To conclude this question, Green Leasing and Green Leases are relatively new concepts in the study of Green Buildings and the built environment, however, they are experiencing varying degrees of growth. Whilst there is no universally accepted definition of either term, the sources accumulated as data for this indicate that a degree of common understanding does exist. A more universally accepted definition, however, would only benefit the field to avoid terminological misunderstandings and ensure that research is united under common terminology. Green Leasing is of particular note here, as it has yet to be given much in the way of significant attention in either academia or practice.

An understanding as to what constitute the barriers and drivers of both is also important to establish, and this thesis in its later questions attempts to make sense of some of these barriers and drivers. There are also barriers that need to be addressed even on an individual country focus. For example, in Norway electricity prices are relatively cheap, meaning that for the Norwegian RE industry to be incentivised to develop it's Green Lease and Green Leasing arrangements further, they may have to develop attractive options that go beyond those related to energy. There are however research gaps that need addressing that fall outside of the scope of this thesis and will require bespoke research projects in order to address them comprehensively.

5.2. RQ2 – What are the barriers and drivers for the development and lease up of sustainable and Green Leased office buildings from the perspective of owners and tenants?

For this research question, the findings will be divided by *1) The barriers and drivers for the development and lease up of sustainable Green Leased office buildings from the perspective of owners 2) The barriers and drivers for the development and lease up of sustainable Green Leased office buildings from the perspective of tenants*. This section will be further sub-divided between the findings in Norway, the UK and the USA (as reflected in the study '*Second Phase: Interviews with Qualitative and Quantitative Elements*') and those simply for the study conducted just in Norway (as reflected in the study '*Third Phase: Quantitative Survey with Limited Qualitative Elements*').

5.2.1. The barriers and drivers for the development and lease up of sustainable Green Leased office buildings from the perspective of owners

Drivers

The data gathered in this thesis give indicative results for the drivers and barriers for the lease up and development of sustainable buildings from the perspective of building owners and landlords. When looking at the results from Norway, the UK and USA, it indicates that the drivers are primarily market focused. Demand from customers was very much a high priority, with these being reflective of a more sustainability-minded and focused tenant base. Their tenants were looking for green office space (with or without a BREEAM or LEED rating) and building owners were motivated to offer building stock reflective of these values. Many of the owners were mindful of ensuring that sustainable office space did not result in a rent premium that would put tenants off, or ensured that cost savings resulting from energy efficiency would result in positive economic return. This thought process was driven by the understanding that even the most sustainable tenants still focused on costs to a greater or lesser degree. This way of marketing their RE assets also was often reflected in their corporate CSR policies, which they also considered to be high-value drivers. Owners were also keen to stress that BREEAM and LEED certifications were an important factor to them, with some having these certifications conducted a means by which to gain tenants and ensure that the building was adequately marketed as sustainable. The substantial coverage of BREEAM, for example, which has 80% of the market share (BREEAM, 2015), may also be

an aspect as to why certifications were popular. According to an aspect of the theoretical framework, BREEAM and CSR considerations may be to a degree intertwined, with BREEAM claiming that 40% of their developers citing CSR as a factor in choosing to certify their building (Soulti et al., 2016, p.8). Due to weak legislation, legislative compliance was the least important driving factor. An important outcome of this study was that the most valued drivers are not purely economic but are representative of a more holistic approach to sustainable development. Whilst naturally the owner is keen to ensure their spaces are occupied and financially profitable, doing good business by '*going green*' is done through a more holistic set of drivers that cover certification as means of communicating this, corporate image (both theirs and their tenants) and other factors that all lead towards their business goals. Whilst costs mattered, costs in of themselves were not the solution to profit.

When looking at drivers in the Norwegian specific study, there proved to be marked differences from the data gathered in the study with a broader country focus. For Norwegian buildings owners, the construction costs were the factor most important for them to consider in their building projects, with CSR initiatives being of least importance. When looking at the sector-specific data, this result was also representative of private sector high priorities, however, in the case of this sector, a Green Certification was the lowest priority driver. In the case of the public sector, costs were also the highest priority factor, with CSR being of a much lower priority.

This data is representative of a diverse range of drivers that are difficult to generalise based upon the data yielded from these studies alone, not just on a '*country by country*' basis, but also '*sector by sector*'. This also represents the complexity of the task facing governments, certification bodies, property owners and commercial entities, where a pan-international and pan-sector strategy might not be the most beneficial solution to encouraging building owners to increase their sustainable building stock.

Barriers

In the study featuring Norway, the UK and the USA, the majority of barriers yielded from qualitative questioning are indicative of such barriers being technical and structural in nature. From a technological perspective, BMS systems proved to be particularly problematic. Whilst some of the usability and outputs of these systems could be put down to '*teething problems*' with new buildings, many of the owners were concerned that these problems could be longer-term problems due to the unavoidable complexity of smart and high performing

buildings. Some the more notable and repeated challenges came from the BREEAM certification process. Clarity on the balanced scoresheet methodology meant that some project leaders felt that they were receiving mixed messages on what alterations needed to be made, and this concerned project leaders that these changes may negatively impact the certification process. The bureaucratic challenges of having to go by the BREEAM UK office for certification (in the case of Norwegian buildings) was also considered to be a barrier by some. Some technical challenges also existed with the building structures, such as grade listings for historic buildings preventing some buildings from receiving higher BREEAM scores than they had hoped for. Interestingly, LEED-certified buildings did not experience many of these challenges, although the reason why was not obtained during the study. Due to LEED being an American certification and all LEED-certified buildings in the study also being based in the USA, the barrier of cross/country certification was not present. It would be interesting in further studies however to establish how this would be if a building was LEED certified in a country outside the USA.

In the Norwegian specific study, the private sector found that the technical barriers in the development, planning, engineering and concept phases proved to be the most significant barriers in their projects. As opposed to the multi-country study, the bureaucratic barriers were the least significant overall, despite these being of note for Norwegian interviewees in the previous study. For the public sector, construction stage challenges were the most significant barrier, with bureaucratic barriers being equally as significant. Market barriers were the least significant barrier for public sector owners, presumably due to the less market focused aspect of their business model.

As with the drivers, these barriers are representative of important and difficult to generalise sets of barriers.

5.2.2. The barriers and drivers for the development and lease up of sustainable Green Leased office buildings from the perspective of tenants

Drivers

For tenants, there were noticeable differences in the drivers for those landlords in the multi-country interviews. Tenants valued a BREEAM or LEED certification more highly than other factors, viewing this as a form of CSR and a benchmark to ensure the sustainability of their buildings. This is in many respects coupled with the second highest priority and driver, that

of costs. The tenants interviewed did mention costs reductions as drivers to occupy their BREEAM or LEED-certified office space, however, they appreciated the value that lower operational costs provided, particularly if this remained cheaper overall even if the rent was higher due to the premium nature of their building. This was not always the case, as one interviewee even went as far as to pay for their BREEAM certification themselves, and not their landlord. This significant outlay was primarily reflective of their own CSR policies, which in their eyes superseded the excessive costs such a decision warranted. Despite this, the respondents placed CSR lower down their list of priorities. In terms of operational costs reductions, the interviewees noted that this was not just due to the more energy efficient infrastructure within the building, but also due to new ways of working. Most new buildings featured in this study were open plan, which in turn reduced their working space without (in most cases) as a significant loss of personnel being required. One of the interviewees noted that open plan working combined with energy efficient facilities resulted in operational cost reduction of around 50% compared with the same time of years in their previous non-energy efficient and cell office focused building. A welcomed factor for tenants in many of the projects was the degree to which they became involved in the design stages of their building. This was particularly of note in new buildings, where at times the tenant was a part of the project before the building was even built. They felt that this did not only allowed them to occupy a more suitable facility when the project was completed, but also improved their relationship with their landlord, a finding that was contradicted in some of the state of the art literature research for this project. To tenants, this was a key element what they perceived as '*added value*' in their rental space. The positive attitude to this sort of initiative could be also considered a driver, and an avenue of enquiry that could be interesting to pursue in further research. This also could be considered reminiscent of some of the aspects found in the nested TBL ("Nested Triple Bottom Line", 2013), with a need to reduce the environmental impact resulting social sustainability changes (the move an open office and thus less floor space) resulting in added value, of which one aspect may be economic sustainability (less floor space needed rent, and lower operational costs).

In the Norwegian focused study, the drivers were quite different. Whilst the broader country focus placed a Green Certification as their primary driver, in Norway this was at the bottom of their list of drivers. Instead, costs dominated as the highest driver, which to some degree offers scope for synergy between Norwegian tenants, and those from the broader study of countries. In terms of how this differs for individual sectors, the overall drivers match those

with private sector tenants, with costs being the most important factor, and a Green Certification being the least important. For public sector tenants, costs were also the most significant driver with market demand being equally as important to them. Also, in synergy with the broader study, CSR was the least important driver, despite BREEAM certifications (that some of the data suggested could be used a part of broader CSR strategy) featuring higher up the list.

Although it would be incorrect to claim there was agreement across both studies, the importance of costs in both studies and for both the private and public sectors in Norway go some way towards finding grounds to claim it as a generalisable driver. This cannot be said for the other factors, although all results indicate that CSR is low (if not in some cases at the bottom) of the priority list. Whilst the study did not directly indicate as to why this was the case, it could be speculated that the possibility of CSR policies having a smaller financial yield than direct cost-saving measures could offer a possible reason.

Barriers

The barriers for tenants come primarily bureaucratic and technical. With regards to the technical challenges, many of the users found (as did the owners), that usability of technology was a problem at times. The buildings occasionally had challenges adjusting to the correct temperature, some technology did not work, and some of it was too difficult to use by occupants. Whilst some of this was eventually fixed, some of the tenants felt that whilst lots of advanced technology was installed in the building, the integration of that technology was either too poorly implemented or was felt to be an 'afterthought'. Some tenants noted bureaucratic challenges, mainly in the early stages of the building's development. The tenants attended meetings where design choices were either poorly recorded or misunderstood, resulting in building alterations, not in keeping with their initial hopes. This could be reminiscent of some of the discussions surrounding '*split incentive*s'. Whilst the split incentives often look at challenges in this regard from the perspective of both stakeholders having different incentives ("Overcoming Split Incentives" 2013, p.1), these finding were more reminiscent of 'misaligned incentives' due to poor communication and challenges in fully understanding these needs, processes and challenges these types of dialogues would require. Whilst this risked some landlord-tenant tensions, this remained either temporary or easily resolved.

5.2.3. Concluding Thoughts

To conclude this question, the findings of these studies are indicative of a broad spectrum of barriers and drivers for the interviewees and respondents. The diversity of the drivers and barriers for owners offers little hope in the ways of generalisable factors that can be used by institutions to develop further means by which to promote the development of sustainable buildings. This indicated a need for green building councils, BREEAM and other appropriate stakeholders to develop the sector and country-specific strategies in order to foster growth in sustainable building stock. The results also indicate the weakness of legislation in this movement, a reversal of which may result in an increase in the development of sustainable office buildings. Further research would be needed however in order to establish the nature of such regulation and the degree to which this should be an incentive or penalty based. This data also illuminates the need to overcome technological barriers, both in terms of usability and implementation. This can offer an opportunity not just for improvement in this area, but also possibilities to create jobs and income from the products and services that would be required to make this happen.

In terms of tenants, the commonality of the importance of costs does offer possibilities to further these drivers across sectors and countries. This can offer possibilities for governments and other sustainability-focused institutions to appeal to this driving factor with financial incentives. This also offers possibilities for building owners, who can lower vacancy rates by ensuring their marketing and operational strategies appeal to this driver, whilst also meeting some of the communication challenges yielded from the interview data. There is also scope for innovation off the back of these results. The barriers and drivers featured in this study not only reflect that we now know more about these issues, but also offer possibilities for further research in academia to understand these matters in more detail, and for the industry to create potentially lucrative solutions to meet the challenges. It is uncertain at present as to the degree to which the '*Green Shift*' has made an impact on either the barriers or the drivers. Whilst the increasing emphasis on sustainability in Norwegian building codes (such as Tek 10 and Tek 17) could be considered an aspect of this shift, the degree to which this is already changing or creating new barriers and drivers is difficult to determine, and would be an interesting and useful focus for a future research project.

5.3. RQ3 - What are the challenges and opportunities for Facilities Management in the context of the development of sustainable office buildings?

This final research question will look at data primarily from the second and third studies and present data on the challenges and opportunities for FM in sustainable RE. This section will be structured into the following categories: *1) What are the forms and coverage of FM and SFM in sustainable buildings in the scope of this project in conjunction with Green Leases and Green Leasing? 2) How can these be or could be addressed by academia and practice?*

5.3.1. What are the forms and coverage of FM and SFM in sustainable buildings in the scope of this project in conjunction with Green Leases and Green Leasing?

Facilities Management

In this project, the respondents in the studies have indicated in most cases that they employ SFM in the buildings and see this as a core concern with regards to how they address sustainable-based issues in their portfolio. The findings in the papers and empirical studies indicate that SFM is primarily technical in nature regardless of whether it is being employed in a new or an existing building. This project illustrates the reliance on technological solutions to meet the needs of sustainable real estate, primarily through solutions such as BMS systems and other CAFM orientated technologies. Although usability and system resilience pose a risk to their effectiveness, the research is indicative of an automation-based focus on facilities management in sustainable offices. In terms of the sustainable considerations that are the focus of these technological initiatives, their primary focus is on the management of energy, which given that Norwegian offices consume nearly 20% of the energy from non-residential buildings in 2011 figures ("Energy consumption in service industries (discontinued), 2011, final figures," 2011), this is an understandable aspect of sustainable that building owners want to tackle. What this thesis has not established however is the degree to which these energy management goals were met without using primarily CAFM and technological means (and so more substantial and proactive user engagement). This reliance on technological solutions also offers possibilities for innovation and business initiatives to not only ensure the availability of the best possible solutions for these solutions but to invent options that do not currently exist to meet these needs. This is also a case for ensuring that FM's have a high level of relevant competencies to meet these objects with respect to engineering and computing skills, as well as scope to innovate. This aspect could be an interesting focus for further study by the researcher or other interested stakeholders.

Despite the prevalence of SFM reducing energy consumption as a primary FM initiative, other less energy and technologically focused initiatives were also important to participants in this project. Many of the participants recognised the importance of considering sustainable maintenance initiatives (an aspect that was considered the most important factor after '*energy management*' in the Norwegian survey study). Sustainable cleaning initiatives were also a factor of value to respondents, as well as environmental management. Despite these other aspects of SFM, energy management is and remains the aspect of FM given the most consideration by building owners and tenants in sustainable offices, despite the possibilities for the likes of waste management offered by FM aspects such as sustainable cleaning operations. It is these areas outside of energy management that appear to be the most neglected by practice in this study, which in turn may offer so-called '*low hanging fruit*' to improve waste management infrastructure, water management and other areas, whilst also communicate the importance of these aspects to relevant stakeholders. An aspect of this could be due to SFM research and development still remaining 'niche' to comes extent (Nielsen et al., 2016, p.10) resulting in SFM services being considering individual services closely aligned with energy management, and not a holistic form of FM in of itself. The lack of incentives for these aspects is also an important area in urgent need of further research and innovation.

Green Leasing and Green Leases

Green Leasing and Green Leases offer new possibilities and potential challenges to a sustainable built environment, and naturally also present the same possibilities and challenges to FM. When considering Green Leases, this thesis indicated that this places new and emerging responsibilities for facilities managers in buildings that offer such a lease. A Green Lease may contain clauses that mandate energy caps on users, which (depending on the nature of the clauses) may result in penalties if these clauses are broken. This places new responsibilities on FM's on two very distinct fronts. The primary change here is that of data accumulation and management associated with such a lease. This management of data (in the form of energy consumption records or other KPI's) can be met through CAFM solutions, or through sub-meter checking. This approach requires a new form of workload for FM's, as well as relevant technological and analytical competencies in order to ensure that the data accumulated is useful. The second new working element for FM's in a building with a Green Lease is that of a new consulting role FM's may have to fulfil. In order for tenants to meet the challenges posed by some Green Lease clauses, FM teams may have to engage with tenants

in order to teach them how to meet these challenges, use the buildings technology to support it, as well a constantly appraise the clauses feasibility and pass this feedback to landlords to allow them to make adjustments if this is possible. This requires increased personnel competencies, as well as previously mentioned CAFM, focused technical skills. This is also reflected in some current research, where building operators need to be "*masters of communication*" in order to do their jobs most effectively (Meier, 2014, p.41). Despite this emerging consultancy role, the project indicated that this was considered a lower priority and seldom employed SFM initiative. The reasons for this were not ascertained in this study, however, the emerging nature of the role, as well as the low rate of Green Lease uptake at present, may go some way towards explaining this.

In the case of Green Leasing, sustainable leasing initiatives often require sustainable FM initiatives to support them. To a degree, this thesis has demonstrated that the needs of Green Leases and Green Leasing from an FM perspective are remarkably similar, with the primary difference being that Green Leases have a more substantial codified element. Green leasing has the added complication as it is still an emerging term, resulting in uncertainty as to at what point sustainable initiatives in a leasing arrangement make a building become one that is operating Green Leasing, as opposed to one that is not. Green Leases primarily focus on energy management, however, Green Leasing has the potential to have broader FM scope. Considering that emissions in a buildings construction, operational and demolition cycles constitute around 33% of emissions globally (Forsythe et al., 2015, p. 262), using Green Leasing a Green Leases to help reduce some of these emissions is a crucial aspect of their role in the sustainable development of the built environment. Green Leasing can feature waste management initiatives, user engagement in energy and waste management, as well as be supported through technological solutions such as BMS systems. Green Leasing can place new pressures on FM if there is a degree of codification, even if a Green Lease is not present. A BREEAM certification, for example, may require a degree of data management, as well as strong technical management competencies. The personnel competencies needed in Green Leases can also be key in Green Leasing, as the needs of a BREEAM/ LEED certification or a Passive House building may result in some of the same FM and user interface challenges met by the nature of these lease clauses. Green Leasing would also benefit from a broader acknowledgement and understanding as a term.

Green Leasing requires a broad range of different buildings elements to come together, and as such is not a specific 'product', as is the case of a Green Lease. Green Leasing requires the

melding of the technological solutions (e.g. passive houses), operational solutions (optimised FM and supporting services), legal solutions (such as regulation or a Green Lease) as well as personnel momentum (appropriately trained and motivated users) in order for it to be successful. This complex cocktail of elements needs well briefed, appropriately skilled and well-resourced FM's in order meet the demands Green Leasing requires in order to an effective tool in the mission to improve the sustainable credibility of the modern built environment. These are needs that can be met through a combination of dialogue between academia and practice in order to share research, commercial incentives, and well educated and trained facilities management.

5.3.2. How can these be or could be addressed by academia and practice?

The challenges and opportunities that Green Leasing and SFM also present offer possibilities to address these aspects from both the perspectives of academia and practice.

Academia

From the perspective of academia, many of the challenges can be addressed through the opportunities that are presented by change. Although FM is not entirely ignored in University level education, it is still not as well established nor as common as architectural studies, despite the importance of FM from a building lifecycle perspective (CEN, 2011). Institutions such as NTNU are teaching FM (and SFM) as a part of their Master courses in 'Real Estate and Facilities Management', however, this sort of program structure is not commonplace as in 2019. Considering the importance of FM education not just from the perspective of sustainable building operations, but also building operations more generally and the value of an FM perspective in earlier design stages, there is an important and vital opportunity here to educate the next generation of FM's. When considering that FM has increasing computer-based competencies, a deep and holistic FM education up as far as Masters degree level and beyond is not without significant need. From the perspective of academic research, this project has demonstrated that FM and SFM are becoming increasingly recognised by the field, with a growing body of publications now available at a growing and exponential rate. This is now also being seen in the kind of conferences that currently exist, such as the European Facilities Management Conference (EFMC) celebrating more than 25 years of consistent patronage by FM researchers. Whilst a clear opportunity exists in ensuring that this momentum continues, there is also an opportunity to ensure that the diversity of research areas in FM research increase. Contributions to an FM body of research can come from

engineering, law, architecture, social sciences and computing, amongst many others. It is only by understanding FM from a holistic field perspective, that it will continue to grow as a field. Not all needs of FM in the future need to be met through education in the university system. Vocational training and apprentices in FM could be vital in creating advanced practical and technical skill sets that are essential if the field wants to become competent not just for the technological and systemic needs for today, but to also be flexible enough (also at University level) to meet the needs of tomorrow and to innovate to face those challenges.

Green Leases and Green Leasing currently experience relatively minimal attention from academics, although the body of research in this area is growling, albeit slower that of FM. In terms of educational opportunities, there is a possibility in the case of Green Lease to integrate this concept into real estate education, law, FM, and to an extent architectural education. For Green Leasing, this would primarily benefit from integration into FM education, however, architects could benefit from sustainable operational phase considerations that Green Leasing is likely to encourage. Whilst the number of publications is growing, this researcher has published more academic material on this topic than the other vast majority of researchers in academia since 2014. A growing body and network of researchers in this area could lead to the level of growth seen in the study of FM. With '*Green Leasing*' still not yet considered to be a fully-fledged term, this is an area that would benefit the most from greater attention from researchers.

In the case of these considerations, research and education from academia can do some of its best work by ensuring that its outcomes are industry relevant. This will not only afford better opportunities for academic intervention but also ensures that these outcomes end up in the hands of those who can most benefit from them.

Practice

For practice, there are opportunities not just to optimise their existing processes and technologies, but also to create new products and services, and see new commercial opportunities in this area. In the case of FM and SFM, ensuring that the competencies of their FM staff are in tandem with their technologies is vital. This is particularly the case when considering the barriers and drivers noted in this project. Many of these can be met by better integration of FM and SFM related considerations at various stages of the building's lifecycle. In the case of early-stage technical challenges, FM along with the normal stakeholders associated with design teams could work towards more usable and less technically

challenging projects. Similarly, better utilisation of FM's can result in a more functional operational stage in a high performing building (combined with more CAFM and user interaction competent FM's). Whilst some of the technology and infrastructure exists to employ SFM and Green Leasing, there is also an opportunity to develop these possibilities further. There is considerable commercial potential to develop better energy and waste management systems, smarter buildings and even Green Lease and Green Leasing bespoke FM services. As the publications in this project demonstrate, some of these services are already beginning to appear, and the industry is not ignorant of the potential to expand on these products and services. This project also demonstrates a need for further development in the areas of usability and technological integration, something that would go some way towards removing some of the more substantial barriers noted by tenants. This is a challenge that can only be met through a cross-disciplinary approach to development, as well as institutional support.

There are also opportunities to involve users more substantially in the sustainable processes of a building. Green Leasing is naturally one of the ways to engage this. There is an opportunity here for the industry to further develop Green Leasing as a concept, balanced with the challenges associated with making it sufficiently attractive to their tenants. Green Leasing projects have a chequered history in this regard, with the industry in a well-placed position to employ the drivers featured in this project, and capitalise on them to increase their coverage of and Green Leasing (and Green Leases) in office projects. It is not just building owners that need to meet this challenge. This project demonstrates the weakness of existing legislation, which is an area of need to be addressed by governments. There is also a need for the industry to innovate with new products and services to make Green Leasing more attractive, less burdensome and more economically viable for prospective stakeholders. Certifications bodies like BREEAM and LEED are also well placed to not only encourage and increase in sustainable building stock through their methodologies but also to take stock of the barriers and drivers mentioned here and in other research and adjust their certification processes accordingly.

6. Conclusion

The findings contained in this thesis and its connected publications indicate an increasing level of attention being given to Green Leasing and SFM. Sustainability in the context of offices is being given a noticeable amount of attention in both academia and practice, with Green Leasing being considered a viable method by which to address this. The barriers and drivers associated with the development and lease out of sustainable office spaces, however, need to be better understood and recognised by the stakeholders best placed to impact in the most positive and proactive ways, those being landlords, owners, politicians, FM service providers, and increasingly tenants. This project has provided insight into the barriers and drivers that exist, the types of SFM employed in these buildings, and the degree within the context of the samples that they utilise Green Leases and Green Leasing.

6.1. Contribution

In terms of its contribution to the fields of FM and built environment, this thesis claims to offer three major contributions to the wider body of knowledge and research.

Firstly, this study offers the first investigation of its kind into the academic study of the term '*Green Lease*', in order to better understand the potential diversity of meaning that this term could stimulate. A more profound result, however, came in the form of the term '*Green Leasing*'. Whilst this term is not new with regards to its use in academia and practice, its definition as a separate term from '*Green Lease*' is a newer development. The researcher has attempted to define '*Green Leasing*' as a separate term in of itself, with it referring to the leasing out of a building in a sustainable manner, with SFM being a vital component. A Green Lease does not need to be a part of this arrangement. The definition of this term by the researcher offers scope to add a new term to the FM and RE lexicon which in turn can offer possibilities not just to linguistically express the sustainable leasing of a building, but also to offer scope to expand the concept of Green Leasing further, which may include the development of new products and services. Wider use of such a term could be a catalyst for the further development of Green Leasing, particularly from the perspective of SFM services and personnel that can support it. Wider usage and understanding of this term will also aid in terminological constancy ensuring that researcher and practice-based actors will find it easier to gain access to existing and developing research, innovation and implementation of Green Leasing. The potential for a new term introduced to the lexicon of FM and the built

environment will also contribute to the ability of stakeholders to express the concept of sustainable leasing better, and hopefully, continue to develop this term far beyond the scope of this thesis. With a definition of Green Leasing in place, the components needed in order to achieve it can also be better communicated to the likes of FM, as well offer possibilities to impart knowledge of this to students and other studying issues related to FM and the built environment.

The second major contribution of this study is the better understanding of the barriers and drivers for the development and occupancy of sustainable offices, both internationally and in Norway. It is only through understanding such challenges and opportunities that buildings can be better designed and operated for those that use them, that successful and appropriate legislation can be formed, as well as more dynamic and attractive adjustments be made to the likes of BREEAM and LEED certifications. This study demonstrated that on an international scale, those less tangible drivers such as CSR are incredibly important, a fact that needs to be taken advantage of by stakeholders who could benefit the most from it. On a Norwegian level, it showed that costs still matter for most stakeholders, although secondary motivators that are less tangible are still highly valued. This is another side finding of this project, the indication that there is little in the way of generalisable drivers for the development and lease up of sustainable offices. This finding makes a contribution to academia and practice in the form of demonstrating the clear need for '*country by country*' research into these barriers and drivers, as individual countries may have their own sets of motivators and challenges that are formed through a variety of legislative, climatic and cultural reasons. Despite the attempts by institutions such as BREEAM to go as far as they can to globalise their certification, the challenges and opportunities do not offer the same globalised possibilities that would assist in the development of strategies. In order for the green development and leasing of sustainable building to continue on an upward swing, and understanding as to the factors that drive and hinder their development are crucial. These drivers and barriers also have a secondary function of offering opportunities to stakeholders to improve upon existing incentives, as well as meet some of the challenges. Whether this is achieved through the further development of technological means, skill, infrastructure or legislation, it is only by studying these drivers and barriers and illuminating what they are that they can be sufficiently tackled. The scope of this research should also be a catalyst to take a further examination there is scope to generalise some of these barriers and drivers in some way with a larger sample and possibly a different methodological approach.

The third contribution that this study offers is to demonstrate a greater understanding as to the coverage of Green Leases in Norway, and what SFM exists to support it (in many respects in the context of 'Green Leasing'). The findings have shown that as is the case with much of the current research in this field – energy management is still where much of the attention is currently focused and that the supporting services are primarily technologically driven. Energy management was also the key focus of Green Lease clauses in the same sample. Other areas (such as sustainable cleaning) also matter but are valued considerably less than energy management. This outcome is also considered to be interesting when considering that Norwegian energy prices are already relatively low. Whilst incentives to encourage Green Leasing and similar concepts may beyond energy efficiency due to this reason, energy efficiency is still an aspect at the forefront of attention for stakeholders focusing on sustainable real estate. Despite the need for consultancy-oriented FM services in buildings with a Green Lease, this seldom featured in the buildings studied. A contribution that forms a part of this, is that of Green Lease coverage. The results showed a marked difference between awareness and implementation of Green Leases in the private and public sectors. This manifested in an interesting contradiction (possibly due to the different business objectives of each sector), with the private sector considering using them more than the public sector, however in terms of implementation, the public sector had considerably more Green Leases in operation. Whilst the study showed that Green Lease coverage is low at present, it also offers possibilities to find ways of addressing the gap in implementation between the private and public sectors either by aligning possible incentives, or marketing them bespoke on a '*sector by sector*' basis. This is a demonstration that despite the fact that Green Leases are more defined as a term than Green Leasing, their implementation is still minimal at best. Deeper and further development of Green Leasing could go some way towards improving this, as Green Leases can be a useful support mechanism for Green Leasing. Whilst the 'lease' format aspect of a Green Lease is not disputed, its development in terms of clause content is less universally accepted.

Aside from the three major contributions this thesis offers, it is also important to recognise the contributions to academia and practice that this project has intended to stimulate. In terms of what academia can take away from this project, there is clearly a case for increased momentum. This momentum is key in terms of looking more closely at the barriers and drivers in more details and with a wider scope, as well ensuring that SFM and Green Leasing research penetrates other fields of study more substantially, such as the social sciences, law

and architecture which all offer possibilities in innovating in Green Leasing research. Practice needs to take more substantial stock of the barriers and drivers and apply them to development of their stock, and associated services and certifications. This melding of interests can be even more potent if this can be twinned with a more substantial level of cooperation between both academia and practice.

6.2. Recommendations and Opportunities for further research

Whilst this study offers significant possibilities to break new ground and offer new knowledge in the fields of FM and the built environment, it is only one step on a larger journey to push these issues even further.

In terms of further study from the perspective of academia, this study should stimulate a larger and more detailed study on the barriers and drivers. This study indicated that the barriers and drivers were hard to generalise, however, a wider multi-country study has the potential to discover the degree to which this is true more definitively. A further research project would need to focus not just on seeing if the barriers and drivers in this could be generalised on a larger scale, but also establish if there are other more valued ones to consider, such grants or support from governments and other funding bodies. It is also recommended that this study be more qualitative in nature in order to better look at the reasoning behind why these drivers and barriers are important, particularly to provide more information regarding the impact of barriers. The same possibilities also exist for more detailed studies of the coverage of Green Leases on an international scale. This would permeate into practice as a means by which to improve their implementation through richer data from a considerably larger sample. A study into the types of SFM that is employed in buildings operating Green Leasing would also be an important focus of a future study. Whilst the researcher has established a degree of findings on this in a Norwegian sample, the degree to which energy management, for example, is the primary focus of SFM in other territories would be useful in developing products and serves that move beyond simply energy management. The work on the terminological investigation (more specifically that of ‘Green Leasing’) need to maintain momentum, as a more holistic and recognised usage of terms such as Green Leasing is essential in order to have legitimacy, as well as seem any degree of understanding and utilisation beyond the scope of this thesis.

There are also possibilities for further research and development outside of the realms of academic institutions. This study presents the needs of governments, property developers and sustainable certifications to do extensive research into how to encourage developers to develop sustainable office buildings, encourage tenants to occupy them, and prevent some of the challenges that are holding these aspects back. A lack of generalisable drivers ensures that this will remain a challenging, but a vital piece of research to conduct going forward. Given some of the barriers featured in this project, it is also important for the industry to ensure a better implementation rate of Green Leases and Green Leasing by improving the user experience, both in terms of usability and building quality. This in turn also results in recommendations for the FM industry. Many of the challenges posed by sustainable buildings, Green Leases and Green Leasing can be met by FM. The FM service industry needs to diversify its personnel skill set to meet these challenges, as well as offer services to support them that may not currently exist. These challenges are also presented in the form of possibilities, and innovation and keen entrepreneurship that is vitally important in order to ensure that the FM service industry can develop in tandem with sustainable development, as well as the demand that this study shows are becoming increasingly more profound from their customer base.

In terms of the final word on this project, a consolidated body of work is needed from both academia and practice in order to ensure that any kind of momentum can resemble any form of productive symmetry. Whilst this thesis, over more than four years, has generated new knowledge and filled knowledge gaps on Green Leasing and the built environment, an aspect of this thesis legacy is that there is much more work that needs to be done through research, innovation and education across the institutional divide of academia and practice. Terminological consistency, a cross-fertilisation of knowledge between industrial and academic institutes are key highways in the development not just of SFM, Green Leases and Green Leasing, but any avenue where the world can benefit from the multi-faceted and diverse entity that is science.

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Paper I

The Users Impact on Buildings' Sustainability – A Qualitative Approach

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Abstract

With the built environment responsible for up to 40% of energy consumption, building sustainability is a topic of considerable discussion and research. Sustainability should also be considered in the context of a building's operational phase. Some claim that the 'in-use' phase is ignored in the larger context of energy consumption. Regarding practical concerns, there have been suggestions that the impact of users should be better accounted for, as energy consumption is essential for facilities managers (FMs) and building owners to consider.

The purpose of this paper is to illustrate the impact of users on the sustainability of workplaces, and to contribute to future research. This paper summarises related literature, as well as including further primary research in the form of interviews with experts. The paper organises the data into topic based sections, as well as summarising the treatment of usage and sustainability by the interviewees.

The data and literature provide an outline of the degree to which there is consideration for how a building's 'in-use' phase impacts on building's sustainability. Indicators of impact were also identified, as well as suggestions offered by the interviewees as to how to manage usage and sustainability.

Interviewees identified the factors of personal control vs FM, technology, and cooperation as key. There was also a commonality of approach with regards to many of the strategies. There was however, a disjuncture between the approaches of personal control vs FM. This came down to concerns over employee cooperation when faced with personal control and downfalls where cooperation is low, and FM infrastructure is poor. The interviewees also differentiated on the degree to which their organisations approached sustainability and usage.

Keywords: sustainable facilities management, green buildings, usage, sustainable buildings, sustainability strategy

1 Introduction

In today's changing and evolving working environment, workplaces face new challenges that demand the attention of the management, the community along with influencing stakeholders. Sustainability is one challenge, and comes from overall political and societal activities, environmental protection and numerous corners of the industry. Green leases, corporate social responsibility (CSR), along with schemes assessing the sustainability of buildings, such as the internationally recognised Building Research Establishment Environmental Assessment Methodology (BREEAM), all have sustainability at the heart of what they demand from buildings. These and other factors, mandate workplaces and other non-residential buildings to rethink how buildings are developed, designed, construct and operated. Whilst contributing mechanisms like lighting, good insulation and low-energy electronics play their part; the impact of user's cannot be ignored. An example of this could be a computer monitor. Assume a user keeps their monitor on 24 hours a day 7 days a week, yet works for 8 hours a day for 5 days of the week. This results in 75% of that monitors energy use occurring when it is not being used (Bray, 2006, p.2). Computer equipment is only second highest in terms of energy consumption to lighting (Picklum et al: 1999. Roth et al: 2002, cited in Bray, 2006, p.6).

Usage also impacts on facilities managers (FM's), whose role is to keep buildings well maintained to a high operational standard, and also to potentially ensure that their role is compatible with sustainability factors influenced by users.

The purpose of this paper is to answer the question:

How does usage impact on the sustainability of an office building, with a focus on the environmental performance?

This paper will consider the research question by looking both at literature as well as interviews from expert witnesses procured from previous research done by the author. The paper is structured by looking at core issues that relate to sustainability, usability and FM. The main topics are 1. user intervention and FM, 2. user behaviour and attitudes, and 3. building technology, users and FM. The intention is that through a combination of interview data and literature, a clearer picture can be made of the users' impact and the challenges that exist for FM's, building owners and workplace managers.

For usability, a definition is offered by the International Organisation for Standardisation (ISO), describing usability as the "*extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use*" (ISO 9241-11:1998, definition 3.1). Using ISO as a starting point, Hansen *et al* (2011), gave it a more societal bend, saying that "*that usability evaluations should be based on different user's experiences and assessments of how well buildings perform. In order to assess usability one has to focus on the effect of a building in relation to the core business's fulfillment of goals as well as the end user's satisfaction and experience*" (Hansen, Blakstad, & Olsson, 2012, p.179). What is meant by the 'user' is that of those involved in using the building. A more literal definition is offered by the European Committee for Standardization, who describe it as being "*first, the client, with whom the service provider has a contract (e.g. building owner) and second, the customer, who acts on a tactical level (organisational unit that specifies and orders the services) and the end-user, who receives the services*" (CEN 2006, cited in Määttänen, 2014, p. 3).

What is meant by 'sustainability' is also important. Here, the Brundtland definition will be used stating that it is "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (Brundtland, 1987, p.15). This however, is not tangible enough in the context of workplace sustainability. Surrogate measures found in environmental performance indicators focusing on energy efficiency, are used instead. Roaf (2005) described some relevant indicators, including '*how much energy does the property use?*', '*how durable are the buildings functions?*', '*how adaptable are these functions over time?' and 'how happy are its occupant, and how much happier can they be made?*' (Roaf, 2005, p.100).

What is meant by sustainable services also needs defining. According to Eva Määttänen (2011), sustainable/green property services are defined as: "*services that reduce negative impacts to the environment and human health while fulfilling the needs of the occupants and maintaining the property's conditions and characteristics*" (Määttänen, 2014, p.2). This could be demonstrated through energy efficient technologies such as occupancy sensitive lighting, or FM that operates with the intention of improving energy efficiency and environmental performance.

2 Research Design

The much of the data in this paper comes from existing literature from 2000 onwards, with only limited exceptions made for appropriate earlier material published prior to this.

The interview data was taken from one of the author's Master thesis. The thesis was titled "*How Does Usage Affect the Sustainability and Environmental Footprint of an Office Building*"(Collins, 2014). In the thesis however, the topic was approached from a broader perspective with less of an emphasis on FM. The interview subjects were selected from contacts known within the occupational circle of the author. This allowed for the use of both Norwegian and British contacts, which in turn offered a more international perspective on the data collection. Interviewees were selected due to the significant level of attention to workplace sustainability that their positions mandated. Prior to the interviews, interviewee's were made aware of the subject matter with an offer to decline involvement should they feel they have inappropriate experience. On this basis, the Welsh Assembly Government declined to be interviewed. The data was collected in the form of qualitative partially structured interviews with expert witnesses from Norway and Britain. The interviews were conducted in February and April 2014. The questions related to how they and their organisations approached usage and sustainability, and how they felt this impacted sustainability of an office building.

The participants interviewed were:

1. The Chief Executive of Sustain Wales,
2. The Director of Sustainability at BREEAM,
3. A scientist at the Norwegian Research Centre for Zero Emission Buildings (ZEB)
4. Leaders from the Norwegian energy body Enova.
5. The Managing Director of Building Use Studies.

Interviewees

The participants were approached as experts. The following paragraphs are based on information collected by the author (Collins, 2014), with the aim of better illustrating to the reader why these individuals and their organisations warranted recognition as experts.

1 The Chief Executive – Sustain Wales

Interviewed 26/03/14

He has been the Chief Executive of Sustain Wales since 2012. Throughout his career his interests have remained in the area of sustainable development, including government panels and work with the United Nations. He also has competencies in building design, and was formerly head of

the Royal Institute of Chartered Surveyors (RICS). Sustain Wales was established as a sustainability network as opposed to a funding or assessment body.

2 The Director – BREEAM

Interviewed 27/03/14

The interviewee has been the Director of Sustainability at BREEAM since 2008. His career has mostly focused on environmental issues, and has worked for the Environment Agency. He has also been involved in pioneering the 'BREEAM In-Use' scheme, designed to assess and improve the environmental status of the operational phase of buildings'. BREEAM is an international organisation that has developed an assessment system for grading the sustainability of buildings (BREEAM, 2014).

3 The Researcher – The Centre for Zero Emission Buildings (ZEB)

Interviewed 02/04/14

The interviewee is a Professor at the Department for Interdisciplinary Studies at the Norwegian University of Science and Technology (NTNU), focusing on technology and its implementation in everyday use. He is also a scientist for ZEB, with a focus that includes the usage and operation of buildings. He is currently working on the Methodologies for Improvement of Non-residential Buildings' Daily Energy Efficiency Reliability (MINDER) project, dealing with how buildings are used in their operational phase and buildings' interface with their occupants (Berker *et al,* 2014. Valle *et al,* 2014*)*.

4A The Head – Enova

Interviewed 23/04/14

She is the head of Unit Buildings and Heating at Enova, and has worked in the energy business since 2005. Her role is to promote and devise energy efficiency schemes for the building industry, along with renewable heating. Her team are responsible for the follow up and promotion of the buildings that have adopted these initiatives.

4B Head of Marketing – Enova

Interviewed 23/04/14

He has been the head of Marketing for the Unit for Non-Residential Buildings at Enova since January 2013. He was formally a lecturer at NTNU, and was originally trained as an architect. He takes a particular interest in sustainability concerning building lifecycles, new construction and building refits.

Enova is dedicated to encouraging better energy consumption, and is owned by the Norwegian Ministry for Petroleum and Energy (Enova, 2013).

5 The Manager

Interviewed 07/04/14

The Managing Director has been the head Building Use Studies since 1987, and specialises in office buildings' occupant feedback. He pioneered work on building productivity and building studies in the 1990s, and has co-authoring seminal works in this field. He is the secretary of the Usable Buildings Trust that focuses not just on building productivity, but also sustainability. He stated in the interview that he was representing himself, and not Building Use Studies.

3 Discussion

3.1 Intervention of Users, and FM

Technology is not as easy to control as often intended, however the unpredictable behaviour of human users is a more difficult factor to make compatible with a sustainable workplace. This topic was touched on in the work done by Leaman and Bordass (1999), who viewed the topic from the perspective of office productivity, a variable difficult to define. When interviewed, the Manager agreed that in this context, productivity and sustainability were interchangeable when looking in the context of usage. According to Leaman and Bordass (1999), buildings that performed best (in the context of productivity) did so when they had efficient and well-resourced FM. What they meant, was that in these buildings problems were resolved promptly, with many resolved before the occupants knew they existed. When issues could not be solved immediately, dialogue was kept with the user informing them of its progress (Leaman & Bordass, 1999, p.11). The Manager said that if good FM can solve building problems, they can also solve energy and performance issues. This covers many areas of building usage, from monitoring and adjusting the workplace temperature, to ensuring the likes of computer monitors are turned off (Interview 05).

The impact of strong FM on the user experience was highlighted by the Researcher in a PhD project he was involved with. The student interviewed a caretaker responsible for a building where users had a degree of environmental control. The caretaker was the head of a larger FM team, where they had technologies that allowed some remote environmental control. He was an electrician by education, but also possessed good people skills. He also accepted that the '*intelligent machines*' could not solve all of the environmental problems, meaning that a degree of interaction with building users was essential. The caretaker knew the buildings sustainable performance expectations, and was concerned to ensure the best user environmental comfort. By combining his technical and people skills, he and his team were able to create a high level of comfort for users' as well as ensure the building was energy efficient (Interview 03). This also alluded to the MINDER project, where the report stated that "*facility managers should be key members of the design team*" (Berker et al., 2014, p.3).

Removing much of the sustainability burden from the user may pose risks. The researcher claimed that there is the possibility through technology and good FM, that building users could be just "*cogs in a perfect machine*" where the user has little control, but the building has much greater control over its sustainability. The effect of this however could be the potential for lower user satisfaction. This is further complicated by the perceptive nature of satisfaction, something also noted by the Researcher (Interview 03) as well as 15 years earlier (Leaman & Bordass, 1999, p.7).

The opposite, would be providing greater control to users, with systems in place to counteract potential sustainability problems. The Director championed personal control, and gave an example of a BREEAM project (Interview 02). The recently opened Co-operative Group Headquarters in Manchester is a BREEAM 'Outstanding' project, achieving a score of 95.16% ("One Angel Square, Co-operative Group HQ, Manchester," 2013). According to the Director, the Cooperative went down to a massive level of detail in designing their building, even down to staffing. Along with the advanced technical systems, employee enthusiasm and cooperation were essential in ensuring that the building performed sustainably. This included adjusting how staff worked, even looking at their travel plans (Interview 02). To the Co-operative, sustainability involved all of their staff from the board room, down. To quote the Director, "*they want to lead by example and now as a consequence when you talk to the staff and the people who visited the building, it is inspiring, because they truly understand that sustainability isn't just a 'nice thing',*

it's not just about being green, it's about a business philosophy." (Interview 02). It is hoped that the building that with correct education, employee autonomy would be less of a risk the buildings sustainability. This is important, given that there is "*some evidence that giving occupants a more active role and responsibility for changing their behaviour in environmentally sustainable buildings is a necessary condition for success*" (Vischer, 2008, p.106).

Elements of the example above are seen in literature. Rohracher (2001) states that the role of building users is essential for a building's sustainability. Building users need to be educated in how their building is expected to perform, and need to have an understanding of their role, conducting their behaviour in a "*compatible way*" (Rohracher, 2001, p.139). This is especially significant when looking at statistics connected with building usage. In many countries, buildings account for up to 40% of energy consumption ("Sustainable Buildings," 2014), and there are also claims that the 'in-use' phase is often ignored in the larger context of energy consumption, with instead focuses veering more towards combining it with factors such as construction and maintenance (Dutil et al 2011, p.445). User-building engagement has also been given attention in other studies, such as Piccolo *et al* (2014) who suggest the installation of tangible technological devices in buildings to better encourage the user engagement (Piccolo *et al* 2014, p.10).

3.2 User Behaviour and Attitudes

Whilst the Co-operative sets an example as how to encourage better user behaviour, technical elements and FM, disjointed sustainability values can cause problems where education isn't sufficient. The Chief Executive saw this as vital, especially regarding attitudes. He noted an example of a journalist at BBC Radio 4, and how his daughters approached resource use. They did not leave the bathroom taps running after they left, because they knew it was wasteful. Despite this, they regularly left their bedroom lights on and music playing when they were not present (Interview 01). They didn't realise that both were wasteful. This can related to the example from Bray (2006), and how monitors are left on because users may not see this is as wasteful. The Researcher acknowledged this, as even if people exhibit sustainable behaviour in their own homes, they don't always transfer this attitude to their workplaces. We operate buildings in different ways, whether it is a home, hospital, or office, with little scope to create common behavioural currency that will positively impact the sustainability of every building (Interview 03). This, also relates to elements found in behavioural theory such as Reeve's (2009)

claim that motivation itself channels behaviour, and that social and cultural reasons can impact on a person's rationale for their actions (Reeve 2009 cited in Piccolo *et al 2014, P.7)*

The Chief Executive related to how this impacts on FM, and to some extent control. He claimed we rely too much on technology to make our environment comfortable, and less on adapting our practises, saying "*we have forgotten that we all don't have to be wandering around in shorts for 24 hours a day, 365 days a year, that we can respond better by using better clothing, and we don't. Particularly, dare I say, in offices*." (Interview 01). In essence, a shift in behaviour combined with receptive FM, can result in a positive outcome for workplace sustainability.

3.3 Building Technology, Users , and FM

Technology and FM go together in ensuring the optimal operation of a workplace environment. Although certain technical systems such as computer cooling are not impacted by users, other technologies can pose challenges for FMs. The Head agreed, stating that FMs' and assistive technologies were better for sustainability. The example she gave was that of user preferences regarding environmental comfort. In her workplace, she felt that her preference for more warmth could cause 'environmental conflict' with her colleagues. This could cause technologies to be used poorly and inefficiently, and the responsibility for energy efficiency and sustainability would be better placed in the hands of FMs and technology. To quote, "*I favour technology, as then we can be better at looking how much energy these buildings will be using. We need peoples help though, buildings cannot operate by themselves*" (Interview 4A). There has however, to be an understanding that user satisfaction can be negatively impacted if buildings have "*innovative sustainable design features that occupants have either not wanted or not been able to use*" (Vischer, 2008, p.106).

The Head of Marketing had a different view. He gave the example of an Enova project, that of the passive house Sparebanken Headquarters in Trondheim. Despite the technology in a passive house, and the design elements that are aimed at reducing energy consumption in the building, the role of the user was still important. To the Head of Marketing, a passive house will have a greater likelihood of operating correctly if users' operate it in a manner that is compatible with its performance values. The Head of Marketing hoped however that *"the building itself will do most of the work*" (Interview 4B).

The Researcher and his colleagues at MINDER have attempted to improve the user experience and their relationship with designers and FMs. This is project aims to try and reduce the reliability gap in non-residential buildings (Berker et al., 2014, P.1). The main concepts associated with this project on an interdisciplinary level are continuous commissioning (CC), energy performance contracting (EPC), building performance evaluation (BPE) and soft landings (SL). EPC is aimed at optimising buildings environmental technologies. This involves a third party energy company monitoring a buildings energy use during a buildings operational phase, resulting in the opportunity for the company to alter and fine tune the buildings energy consuming processes (Berker et al., 2014, p.4). If this provides opportunities for FMs to improve their buildings, SL works similarly for users. SL is when members of the team involved in the design and construction remain at the building for a time after it begins its operational phase. This provides users opportunities to provide feedback on the buildings processes, resulting in feasible building alterations, which can allow FM's to work in a building more likely to operate at its optimum (Berker et al., 2014, pp.3-4) (Valle & Junghans, 2014, p.244).

4 Concluding Remarks

To conclude, this paper reconfirms the belief that usage has an impact on the sustainability of an office building, and that FM and building design are crucial to ensuring that this challenge can be better met.

Across the spectrum of interviewees, there was general consensus that user impact was significant. There was also consensus that buildings should be more cohesive and considerate in their approach towards the user experience. This was stated more bluntly by the Head of Marketing, who felt that "*sustainability will 'fix' architecture*" (Interview 4B). There was also agreement on the significance of getting environmental conditions correct, although opinions differed on how easy this would be to achieve or who is responsible.

Their main differences were mostly demonstrated by differing approaches to the weighting of responsibility. The Director championed user control, although this could only successful if users were sufficiently trained. The Chief Executive to some extent shared this view. The Marketing Manager and the Head were clear that technology should take up a bigger role, but this had to be combined with good maintenance and efficiency through FM. The Researcher took a broader

view of whom, and what should take on greater responsibility, but felt FM was key regardless of the level of control.

This paper does not offer concrete answers to the usage and sustainability debate, but illuminates the ongoing difficulties. Whilst many involved in workplace sustainability acknowledge the impact of users, the lack of consensus on an overarching strategy has hindered progress. This of course is not the only reason. Poor national and international regulation is partially to blame, with the Chief Executive feeling "*there is no consistency at a political level*"(Interview 01). There are however ongoing efforts to address this issue, but they often come from the private sector. BREEAM In-Use and MINDER are projects also dealing with many of the concerns discussed in this paper regarding user impact in buildings.

Whilst legislation remains weak, there are ongoing developments that offer potential. Green leases can result in changing the behaviour of building users as per the demands of a building lease, with sustainability at its heart. This, according to the Better Building Partnership (BBP), a collaboration of property owners working together to improve the sustainability of existing building stock, is an increasingly recognised requirement that sustainable building performance is "*not an issue that they can ignore and are recognising that it is now an integral element of business risk management*" (Bugden *et al.* 2013, P.1*)*. Such initiatives provide us with optimism that even if consensus is yet to be found, the issues are not being ignored. There is even the possibility of a paradigm shift of operational culture, with users possibly beginning to think more like FM's and vice versa, providing ground for a more consistent and cross disciplinary relationship when it comes to the sustainability of workplaces.

What the future holds for the role of users in this debate is still uncertain; however the role of in workplace sustainability will continue to be discussed whilst there is little doubt of the impact of their actions in a buildings operation.

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Sustainable Facilities Management and Green Leasing:

The Company Strategic Approach

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Abstract

Businesses are becoming more environmentally focused, and interaction between their core processes is essential in adopting a sustainable approach. This can be further complicated in the rental market, where organisational approaches may not be compatible with the sustainable obligations of building owners.

This paper's aim is to discuss the potential of "green leasing" and sustainable facilities management (SFM) in meeting these challenges, through literature and case studies.

The paper demonstrates the differing corporate approaches through a literature search, in the context of corporate social responsibility and obligatory and voluntary motivators, and how they relate to the triple bottom line of economy, environment and society.

Selection and/ peer-review under responsibility of Tampere University of Technology, Department of Civil Engineering.

Keywords: Sustainable facilities management; SFM model; sustainability strategy; sustainable buildings; sustainable facilities and services; green leasing

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Selection and/ peer-review under responsibility of Tampere University of Technology, Department of Civil Engineering.

1 Introduction

With the movement towards a greater emphasis on the 'green', world infrastructure and technology now has the incentive, momentum and occasionally obligation to adapt according to its associated trends. The letting industry is not exempt from this change, with a variety of motivators beginning to result in marked changes to traditional leasing. This in of itself also has had a knock on effect for facilities managers (FMs), who now see their role not just as 'caretakers' keeping their buildings to a good operational standard, but also as caretakers of the sustainable performance of a building. In terms of drivers for this change, they can be found in both obligatory motivators as well as the cultural and corporate social responsibility (CSR) aspirations of building tenants and property owners. Green leases can be considered to be an outcome of sustainability and green trends that have begun to impact on the FM team, tenant and building owner relationship.

The focus of this paper is to show how companies adopt and implement sustainable facilities management (SFM) and green leases in addressing their corporate strategic approach to sustainability. The reason for addressing SFM and green leases together is due to their encompassing and holistically inclined qualities. To an extent, green leases can be considered to be a product of a systematic SFM approach. If SFM can be considered to be responsible for the maintenance and operations of the buildings structure, including building automation and computer aided facilities management (CAFM), then green leases can be considered to be an approach that aims to positively impact on the 'human' factor in buildings. It is important at this stage however to make clear that green leases do not exclusively impact on the human element in buildings, but also the technical systems depending on their lease clauses. This paper also hopes to illuminate this variety of factors to the reader, illustrated through literature research. Case studies in the non-residential building renters market will be used, in order to provide a deeper insight into building owner and building user interaction. The main research questions to be addressed are:

In what ways do green leases, the landlord/tenant relationship and SFM impact on the company strategic approach to sustainability?

Including the following sub questions:
1.1 To what extent are environmental, economic, social criteria considered in green leases?
1.2 What are the similarities and differences between companies in Real Estate and FM sector and other industry sectors in the context of the corporate strategic approach?

An SFM model will provide an overall theoretical approach to the paper and guided the literature search. The literature search was conducted using the keywords 'green leases', 'sustainable facilities management', 'building sustainability' and 'rental properties sustainability'. Some variations on keywords were also used such as 'landlord tenant sustainability' and 'workplace tenant sustainability'. The literature was mostly focused on the period 2000 to present, in the hope of keeping the literature relevant to existing environmental regulations. Journals in property and real estate management along with FM were given particular focus, along with those on sustainable real estate and architecture. Literature and cases were chosen specifically from these searches based around links with green leases and SFM, with limited exceptions to this noted in the text. There has also been an attempt to restrict the green leases to those with binding clauses, avoiding where possible the not legally binding memorandums of understanding (MOU's). In order to appropriately outline the company strategic approach, the paper will follow a traditional case format. By this, it is meant that the paper will discuss case specific examples of SFM and green leases in corporate practise. They will be categorised into motivators, those being CSR, obligatory motivators, and voluntary motivators. The differing approaches will then be compared in the context of the triple bottom line of economy, environment and society, and finishing with concluding remarks where the research questions will be answered.

Whilst research into green leases in conjunction with SFM is a comparatively recent phenomenon, there have been some publications and discussion that have provided some clarity on this issue. Pivo (2010) in his paper on owner tenant engagement, has outlined an extensive case study based state of the art on the topic of green leases and other green owner tenant initiatives, that to some extent deals also with FM (Pivo, 2010). Also from an academic perspective, various works by Hopkinson and Langley of Cardiff University have dealt with green leasing more extensively than most, but mainly from a legislative and regulatory perspective, as opposed to case studies (Langley

& Hopkinson, 2009, Langley et al, 2008). From a more applied perspective, the Better Buildings Partnership (BBP), a collaboration of property owners working together to improve the sustainability of existing building stock, released in 2009 a widely cited document, 'Green Lease Toolkit' which provides a guide to definitions, and model green leases clauses (Bugden et al*, 2013)*. Aside from this, the United Kingdom (UK) and Australia have seen a comparatively vibrant green leasing discussion, in part due to its compatibility with existing emissions legislation.

2 The Theoretical Approach

Defining Sustainability, Green Leases and SFM

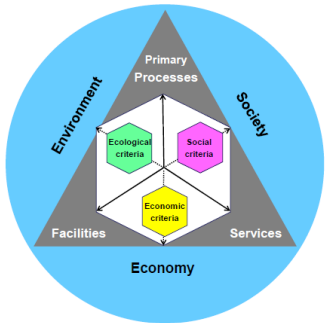
For sustainability, the Brundtland definition will be used stating that it is "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (Brundtland, 1987, p.15). This however, is not sufficiently tangible. Instead, surrogate measures found in environmental performance indicators focusing in part on energy efficiency (which is more easily measurable by tenants and landlords) will be used. Roaf (2005) described relevant indicators, including '*how much energy does the property use?*', '*how durable are the buildings functions?*', '*how adaptable are these functions over time?' and 'how happy are its occupant, and how much happier can they be made?*' (Roaf, 2005, p.100). For green leases, the BBP offer one of the most cited (but not so academic) definitions. They write that *"a green lease is 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, p.2). In terms of a more theoretical perspective, this can be found in Brooks (2008). He views green leases as an opportunity for the traditional lessor and lessee relationship to be "*recast*" in terms of roles, with this change being structured to "*create compulsion, incentive and flexibility for both parties to bring about energy conservation*" (Brook 2008, cited in Christensen & Duncan, 2010, p.3). Example clauses in a green lease could be to "*agree targets and strategies to improve the Environmental Performance of the Premises and/or the Building on a regular basis*", "*reduction in or improved efficiency of water consumption or discharge" or to prevent the tenant and landlord from "not adversely affecting the performance or the life cycle of any mechanical or electrical services*" (Bugden et al., 2013, pp. 14,16 and 22).

It is also important to understand what constitutes SFM. Junghans and Olsson (2014) in their article about FM as a new academic discipline, described FM as the "*the integrated management of the workplace to enhance the performance of the organisation*" (Tay and Ooi, 2001 cited in Junghans & Olsson, 2014, pp., p.71). And, with regards to dealing with non-core services or 'open facilities management', defining it as "*integrated and coordinated design, planning and management of non-core services*" (De Toni and Nonino, 2009 cited in Junghans & Olsson, 2014, pp., p.71). In terms of what differentiates SFM, Elmualim *et al* (2009) states that it evolved in parallel with the overarching influence of sustainable development, along with an increasing appreciation of the impact of climate change (Elmualim 2005, p.95). SFM could also be considered to "*include consideration not only of core business and support functions, but also relations with the local and global society as well as the climate and the eco system*" (Nielsen & Galamba, 2010, p.3). An International Facilities Management Association (IFMA) report in 2007 concluded that sustainable FM involved *"energy management* (Wood, 2006), *waste management and recycling* (Pitt, 2005), *transportation* (Piecyk and Mckinnon, 2010), *carbon footprint* (Wang et al., 2010), *environmental responsibility and community engagement* (Fraser et al., 2006), *and biodiversity* (Halliday, 2007) *are the key sustainability issues being addressed in organisations"* (Elmualim et al 2012, p.18).

Theoretical Model

The SFM model (Junghans, 2011) was developed to show the interrelation between primary processes and supporting the facilities and services of any kind of organisation (public, private, different kind of industry sectors etc.). At the 1st International Conference on Urban Sustainability and Resilience at the University College London (UCL) in November 2012 , it was presented to show how environmental management criteria could be used to structure an SFM approach with a focus on environmental issues, like for example, focusing on energy efficiency

and reduction vs CO2 emissions (Junghans, 2011).



(Junghans, 2011, p.6)

With green buildings as a focus, the triangle expands outwards to integrate primary processes, facilities and services. These also link to some of the core themes of green leasing and SFM. The model encompass some of the more common elements associated with sustainability, but in the context of how SFM operates in relation to building sustainability. It is also suitable for linking the discussions to socio-economic and socio-technical factors. In the outer later, the inner elements of the model are placed in the wider context of the triple bottom line of the environment, economy and society. The model outlines how the paper will be approached in a larger context and how the primary processes, facilities and supporting services are impacted by SFM, green leases, the landlord/tenant relationship and how this is further integrated into the triple bottom line in the outer layer of the model, which will also act as key performance indicators in the analysis. In defining key topics, the definition by Keith Alexander (1992) will be used stating that *"facilities refer to the range of buildings, services and systems that support an enterprise. In the broadest sense facilities include the infrastructure, space, environment, information and support services*" (Alexander, 1992). Core processes refer to the core functions and roles of the tenants and landlords.

Looking at the Real Estate and FM sector, the main stakeholders are building owners, users and managers (Haugen, 2008). Leasing and renting can be considered to be the contractual relationship between owners and users, and between users and FM's, whilst also being one of the main services provided. Sustainability is also becoming a core part of landlords' primary functions. This can cause potential frictions in the owner/user relationship, which could pose problems for negotiating or implementing green leases or more costly SFM services. A landlord's primary process is to accrue revenue from their tenants, whilst tenants hope to secure an affordable rent. This, for example, can result in making "*it difficult for the landlord to make upgrades to equipment if this has significant costs*" or even passing on the costs to the tenant through a service charge or amortisation in excess of the face rent, which could impact on the attractiveness of a tenancy (Hinnells et al., 2008, p.544). This also needs to be accounted for in the context of critical success factors (such as reduction in energy consumption, or meeting waste disposal targets) linked to a corporate sustainable approach. Many companies have already begun to implemented "green leasing", for example the Norwegian state property owner Statsbygg, and American commercial real estate owners Akridge.

3 The Company Strategic Approach

Whilst uptake of green leases is not yet a widespread, there are notable trials and examples that have taken place in recent years, with different motivators and approaches to implementation that have impact on organisations strategic approaches to both green leases and SFM.

Corporate Social Responsibility

CSR can be considered to be at the core of some company's business identity, with some customers viewing CSR as a reason to do business with an organisation and could be considered a strategic approach in of itself. The American

organic supermarket chain 'Whole Foods', for example has ethics and sustainability at the heart of how it does business, and "*servicing customers' desire for delicious food they can feel good about*" (Johnston, 2008). For Whole Foods, CSR goes beyond just trade and branding, it also moves into employing SFM in their stores. For example, they use heat recovery systems to store waste heat from refrigerators (Ankenmann & Myers, 2011). The Australian property group Investa on the other hand, has attempted green type leases in their properties, using the strategy of appealing to CSR and brand enhancement (Pivo, 2010, p.190). Their so called 'Ecospaces' are newly refitted and refurbished office spaces, with energy management and increased employee productivity being key motivators for adoption (Pivo, 2010, pp.190-191). Whilst SFM takes the responsibility for caring for the buildings processes that support the Ecospace working environments, the tenants fulfil their sustainable obligations through, for example, choosing Energy Star certified office equipment, or organising a sustainable policy implementation plan (Investa, 2007, pp.26, 38). There is however potential that green leases can also be hindered in their uptake if they disrupt or are burdensome to a tenants primary operations, especially if tenants see little incentive to increase the sustainability of their landlords property asset (Christensen & Duncan, 2010, p.5). With Investa however, they adopted a strategy of utilising the energy saving elements of their leases combined with FM supported systems to reduce energy bills by nearly 50% per square metre per annum (Pivo, 2010, p.190). Where other incentives may struggle to make an impact on tenants to encourage adoption of a greener lease, the economic incentives through the likes of energy saving may be sufficient for businesses to choose a more sustainable approach (Christensen & Duncan, 2010, p.5).

Obligatory Motivators

There are also legislative examples of buildings now being required to adopt a more sustainable strategy in their workspaces. In the UK, the Carbon Reduction Commitment (CRC) has mandated qualifying properties to better consider their energy usage in order to meet their obligations. Green leases, potentially offer a route by which to divide this burden between landlords and their tenants as "*a formal, sustainable method for commercial landlords and tenants to adopt mutual obligations aimed at improving environmental performance and energy efficiency whilst minimising adverse impacts on the environment*" (Langley & Hopkinson, 2009, p.3). Whilst well-resourced SFM can help meet these obligations through optimised and well maintained facilities, tenant cooperation is also important. Agreeing with tenants to carry out the likes of energy performance reviews and meeting energy targets (Bugden et al., 2013, p.19), can assist owners in ensuring that the building performs as needed. These types of green lease clauses however cannot be achieved without SFM. Accurate energy monitoring, maintenance and sustainable asset management will also assist tenants in fulfilling green type leases. This is more essential in some countries, given that the CRC for example demands the installation of meters with 'half hour' monitoring capabilities (DECC, 2012). UK property portfolio owners Land Securities offer tenants services provided by in-house environmental teams as a part of their sustainability strategy which is designed to assist with the CRC, mostly in the form of energy audits or condition appraisal. Whilst Land Securities don't offer tenants full green leases, they offer separate agreements in the form of memorandums of understanding (MOU's) (Pivo, 2010, p.185). On the other hand, European real estate managers Prudential Property Investment Managers (PRUPIM) (now M&G Real Estate), offer a different strategy with their green leases and MOU's, that can also help with CRC obligations. The tenants and external FM teams in their Atlantic Quay location agreed on a collaborative sustainable strategy. This for example, resulted in sharing single recycling facilities, and better coordination and collaboration with tenants and FM through the transition process in the hope of avoiding tertiary churn and other problems. This, saw building recycling rates increase to 70% over the previous 40%, along with cost reductions for all parties (Pivo, 2010, p.193).

Voluntary Motivators

Some organisations also set their own sustainability standards. This could be to exceed national standards, or to put the company in the position of being industry leaders. This differentiates from CSR in the sense that it is part of their corporate strategy, and less about their brand. In Norway there is the example of the state property portfolio owner Statsbygg, and their own project entitled 'green lease riders'. Statsbygg have chosen to reduce emissions further than national requirements demand (Statsbygg, 2013, p.3). As a result, they trialed the riders in five existing properties from 2011-2014 (Statsbygg, 2013, p.4). Their report implies a more behavioral approach to these leases,

encouraging tenants to be more aware of and reduce energy consumption (Statsbygg, 2013, p.4). New buildings however, are not being offered trial, because Statsbygg hope that their newer assets will already be designed for optimum energy usage (Statsbygg, 2013, p.5). Green leases can also be used to assist in helping obtain or retain a rating from an environmental assessment scheme. The two major schemes are the British 'Building Research Establishment Environmental Assessment Methodology' (BREEAM), and the USA's 'Leadership in Energy and Environmental Design' (LEED). Sharp and Rives (2009) demonstrate how model green lease clauses can help with LEED. This could be clauses demanding tenants only make alterations to their property that can be LEED certified, with potential third party qualification. There could even be clauses that stipulate the manner by which waste from alterations is handled (Sharp, 2009, p.9). A case example is the 4,460 square metre Orb office building under construction in Newport in Wales. The building has been designed in tandem with BREEAM from the design stage onwards, emphasising that "*that our buildings need to be occupied in a sustainable manner*". They will be using green leases with their tenants to assure a sustainable outlook, which even includes an environmental checklist to assess the environmental credentials of prospective tenants. One of the building's owners, the Welsh Assembly Government, hope to that this will set an example to be used in occupational leases in other buildings in their asset register (Welsh Assembly Government, 2014). There is the risk however that the cost of a certification may be passed on to the tenant as part of the lease, which could be unattractive to tenants (Sharp, 2009, p.8).

4 Analysis

In terms of how best to compare the cases in the previous chapter, this will be done in the context of the triple bottom line, mainly due to their existing influence on many companies' corporate sustainability strategies. The cases considered in this analysis will be Investa, Land Securities, PRUPIM and Statsbygg, with consideration of their overall strategic approach.With regards to economic indicators, the financial factors in green leases and SFM can considered to be an important potential driver for adoption. Green leases have significant potential in allowing landlords and tenants to jointly invest in a building sustainability and SFM infrastructure. In the case of Investa's scheme, their tenants enjoyed significant costs savings in terms of energy bills. Energy savings accrued from these types of initiatives also impact on the type of green leases employed. With Investa, this involved spaces both adapted to work well with SFM, as well as more sustainable tenant behaviour (Investa, 2007, pp.26-28). In terms of the economic approach, this is an aspect of the triple bottom that can also be considered to be a potential source of tension between landlords and tenants. The differing economic priorities of both tenant and landlord are important factors for consideration in the strategic approach, mainly because landlords need to offer leases and conditions of engagement that are attractive to prospective tenants, whilst also securing revenue for themselves. A corporate strategic approach to SFM and green leasing from the perspective of economy has to combine the needs and expectations of the SFM team, landlord and tenant, whilst ensuring a productive and attractive financial solution. In the corporate strategic approach, value management is both a core and motivating factor.

The societal approach to green leases and SFM seems, from the case examples, to be reflected more strongly in the CSR and voluntary motivator factors. This could be customer driven like the organic supermarket Whole Foods, or the desire to be industry leaders like 'Statsbygg'. The intricacies of approach however vary significantly, with no clear benchmark strategy. In the case of Statsbygg, 'green lease riders' were approached both from an SFM and tenant perspective, but dealt with in the form of a pilot study to see how this could be adapted to their wider building assets. Assessment schemes also impact on this societal leg, with green leases and SFM being seen as having significant potential in approaching the likes of BREEAM. The balance between occupant behaviour and the weighing on SFM is at times inconsistent, although there are some emerging trends, as demonstrated by Whole Foods. From the perspective of corporate strategy, this could imply something more tenant driven, as the environmental credentials in the outcome could be potentially as attractive to tenants as it is to the landlord.

In considering the environmental leg, this indicator spreads across all of the motivators. In one context, the obligatory motivators of the likes of the policy CRC, place significant pressure on landlords and tenants to improve their environmental practices. In terms of operations, landlords like PRUPIM are offering tenants programs to assist them in fulfilling their environmental obligations which can take the form of SFM, green leases and MOU's. The

FM team assisted in installing the likes of new environmentally friendly waste disposal infrastructure, with cooperation between the landlord, tenant and FM team being crucial to helping the building adapt, in an approach that is arguably more holistic and overarching. Other motivators also impact on this leg. The energy savings resulting from some leases will inevitably decrease those buildings emissions from power consumption, and good SFM will optimise building performance during their operational lifecycle. Whilst the environment is arguably the core of a sustainable approach in terms of outcome, this paper has shown that it isn't necessarily a primary motivator. The corporate approach is varied at best, but the environmental impact is in some ways only as profound as the detail of the SFM or green lease initiatives that may come with it.

5 Discussion

There are several ways in which green leases, the landlord/tenant relationship and SFM impact on the company approach to sustainability. This can range from the will of the actors, to the approach of FM. Motivators can also be considered to be key impact factors, as this can determine the approach and direction of a company's strategic approach. A cross discipline relationship seemed to be key from the evidence presented here. SFM cannot operate without the sanctioning power of the landlord, and a sustainable approach in a rental property cannot be carried out without tenants occupying the properties. SFM can impact the sustainability of the day to day technical and maintenance fabric of a building, a tenant can impact the primary process sustainability of the property, whilst the landlord has a significant impact on the approach. This is further complicated by the cross actor variable of cost benefit analysis associated with the sustainability strategy that is chosen. There is also the uncertainty as to SFM's role, due to the differences in their responsibilities over both primary and secondary circulation space. Better cooperation between all of the actors however, may positively impact a more holistic sustainable approach.

To what extent the economic, social and environmental approaches were considered in green leases is also important. To the level to which it is demonstrated by the case examples, the triple bottom line seems to broadly cover many of the key components found in a green lease. The cases focus on ways to control value management through the likes of energy cost savings for example, improve branding for both tenant and landlord, along with complying with mandatory regulations such as the CRC, or potentially attractive voluntary assessments such as BREEAM. Although the triple bottom line can be considered broadly representative of the main considerations of a green lease, this may better reflect the recognition and influence of the triple bottom line in the industry as opposed to its broader utility. The triple bottom line could be considered to be too restrictive, mainly due its focus on outcomes as opposed to implementation. It can influence whether the likes of economy, environment or society will motivate an organisation to adopt a sustainable approach, but doesn't guide the landlord, tenant or FM team as to how to approach it, whether green leases are considered or otherwise. The SFM model (Junghans 2011, p.6) also attempts to visualise the integration of sustainability into a corporate strategy with regards to primary processes, SFM (facilities and services), and on a strategic level with regards to life cycle phases and the triple bottom line. This could also be applied to public and private organisations on a regional, national or international level. As with any narrative of this scope, the balance between these three legs have to also be weighed in the overarching context of cost benefit analysis, and the critical success factors at the core of a corporate strategic approach.

The similarities between the FM and real estate sectors to other industries are a matter that can only be partially resolved in a paper of this size. There could, for example, be potential for green type leases and SFM models to be implemented in the residential sector. Both the residential and non-residential sectors see an increasing trend towards adopting sustainable strategies. Whilst function differs, a more overarching services\tenant cooperative structure may positively impact both sectors. It is however, the difference in how buildings are used across both sectors that can prevent a cross residential\non-residential approach. Whilst primary processes on a corporate level are easier to define, this is more difficult in residential properties. This could prevent a more universal approach to a green leasing system, whilst FM may share some roles in both sectors. Landlord\tenant frictions could also be likely in residential and non-residential properties. The manufacturing industry could potentially benefit from some of the points raised in this paper. With increasing scrutiny over the environmental impact of industry, a more sustainable approach to their building operations would ease some of these concerns if better implemented.

6 Concluding Remarks

Whilst this paper addresses the company strategic process, it cannot cover all of the issues associated with green leases, SFM and the landlord/relationship. The conundrum of definition and benchmarking of green leases could warrant a study in of itself, and a better understanding of how to improve the landlord/tenant relationship would also be a subject important for future research. The road map for green leases and other environmental initiatives remains uncertain. The current low uptake (Willans LLP solicitors, 2013), combined with the recent scrapping of Australia's carbon tax (Cox, 2014), are examples of how approaches are not yet benchmarked by key players, whether from the real estate stakeholder or regulatory sectors. What is less debated is that building operations and their link with sustainability will further impact the corporate strategic approach. This may in turn result in green leases no longer being considered as separate leasing products, but rather leases generally becoming green leases through having sustainable clauses. Progression and strategy is presently uneven, but it is hoped that the paper has demonstrated that landlords, tenants and FM's can all be considered to be a part of the story of sustainability.

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Paper III

Paper IV

Green and Sustainable – How are these terms reflected in the context of facilities management?

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ABSTRACT

Purpose: This paper evaluates how the terms '*Green*' and '*Sustainable*' are used in facilities management (FM) and FM relevant literature. The purpose is to develop a deeper understanding of the use of terms in new emerging products such as "green leasing" and make a contribution to terminological consistency.

Background: In sustainable development, the use of terminology is both important and a point of debate for scholars and practitioners. Owing partially to sustainability's relatively recent position as a research topic of academic interest, in addition to a series of fragmented efforts for standardisation, this has resulted in a multitude of uses for seemingly similar terminology. This conundrum of definition is especially prevalent in facilities management (FM). In a field and industry that is increasingly striving to adopt a coherent and consistent approach to its development, agreeing on standard usage of key terminology is of the upmost importance.

Approach: Using desk research and document analysis, this paper evaluates how the terms and terminology surrounding '*Green*' and '*Sustainable*' are used in academic FM publications, along with relevant literature from practice. The usage of each term will be categorised using the levels of organisation management (OM) consisting of the '*strategic*', '*tactical*' and '*operational*' levels. Findings will be discussed aiming to identify the consistencies and inconsistencies that are present in scientific and non-scientific literature in the use of terminology.

Results: The paper provides an overview and discussion into how the terms 'green' and 'sustainable' are utilised and applied in FM. The paper concludes by compiling the data found in the literature, and offers suggestions as to how these terms are used in the context of FM.

Practical implications: This paper will contribute to further developing and agreeing on standard usage of key terminology in FM along with further developing the state of the art in FM. This paper also offers scope by which to further develop the understanding of what is '*Green*' and '*Sustainable*'.

Keywords

Sustainable facilities management, green buildings, sustainable buildings, sustainability strategy, green leasing

1. INTRODUCTION

With facilities management (FM) being recognised as an important academic discipline integrating fields of real estate development, building science, and management of property, construction and services, it is nonetheless in its early years as a bona fide discipline in the study of the sustainable development of the built environment and green buildings operation and usability. FM has been discussed as an academic discipline referring to six main criteria, and considering: its particular object of research, the body of accumulated specialist knowledge, theories and concepts, the use of specific terminologies, specific research methods, and institutional manifestation (Junghans & Olsson, 2014, p.70) . Nonetheless, FM is in its early years, with some of the earliest research done by Professor Keith Alexander in the early 1990's (Alexander, 1992). A driver of the progression and growth in FM is the implementation of new theories and business concepts, is seen in many respects to be evolving in tandem with that of sustainable development and discussions on the sustainable built environment and green buildings (Elmualim et al., 2010, p.59) . Whilst academic and practice based research and development in FM is reaching maturity, a fully-fledged definition of terms is an ongoing process, much like the change in the role and competencies of Facility Managers (FMs) themselves. The importance of terminological development and language to adjust to research objects and develop knowledge has also been noted (Junghans & Olsson, 2014, p.72).

When considering sustainable facilities management (SFM), green property services, and the need for terminological development, an understanding as to what constitutes the terms '*Green*' and constitutes '*Sustainable*' is important for both consistency in understanding, and for providing a further contribution to the body of knowledge in the field of FM. Other fields have already taken steps towards understanding a difference between both terms. From the political sciences, Yanarella et al. (2009) made an investigation looking the same terms, concluding that '*Green*' was associated with products and processes associated with "*low hanging fruit*", whilst '*Sustainability*', they imply, is more closely tied to whole systems (Yanarella et al., 2009, p.296). Until now however, the authors have not found a similar discussion in the field of FM.

This paper addresses the following research questions:

- How are the terms '*Green*' and '*Sustainable*' understood and utilised in existing FM relevant literature from journals and practice literature?
- To what extent is there a common understanding of the use of "Green" and "Sustainable"?
- How can the findings contribute to a deeper understanding of FM relevant terminology like "green leasing"?
- Does literature from journals and practice lead to a better understanding of where sustainable decisions are being made within an organisation?

These questions will be addressed using FM relevant literature from academic journals along with relevant literature from practice and environmental certifications. A look at each terms position in FM organisational management will form the analytical approach, and will be used to assess the variation in the application of the terms, as well as similarities between the

usages of both. This paper is a study on the contextual focus of the terms with regards to their positioning in organisational management levels. This also affords a 'critical eye' into how the usage of both terms is reflected in the decision making processes found in a formal organisational structure. The results section of this paper will present a terminological investigation addressing the existing usage and understanding of the terms '*Green*' and *'Sustainable*', before finally moving on to the discussion addressing the interchangeability and specificity of each term in the context of the research questions.

A Preliminary Understanding of the terms Sustainable, FM and Green

An initial understanding of what constitutes the terms FM, '*Sustainable*' and some extent '*Green*' is necessary for a contextual understanding of the goal of this paper. FM has been described as "*the integrated management of the workplace to enhance the performance of the organisation*" (Tay and Ooi, 2001 cited in Junghans & Olsson, 2014, p.71). With regards to FM interaction with non-core services or 'open facilities management', it is defined as "*integrated and coordinated design, planning and management of non-core services*" (De Toni and Nonino, 2009 cited in Junghans & Olsson, 2014, p.71). In terms of what differentiates sustainable facilities management (SFM), it could also be considered to "*include consideration not only of core business and support functions, but also relations with the local and global society as well as the climate and the eco system*" (Nielsen & Galamba, 2010, p.3). Sustainable FM can be considered a part of a growing body of research which includes: *"energy management* (Wood, 2006), *waste management and recycling* (Pitt, 2005), *transportation* (Piecyk et al., 2010), *carbon footprint* (Wang et al., 2010), *environmental responsibility and community engagement* (Fraser et al., 2006), *and biodiversity* (Halliday, 2007) *are the key sustainability issues being addressed in organisations"* (Elmualim et al. 2012, p.18). Similar terms occasionally used in literature are '*green property services*' (Määttänen, 2014) '*green property operations'* (Tobias et al., 2012) or '*green property management*.

2. Research Design

This paper brings together evidence from an extensive literature search from academia, as well as FM practice and environmental certifications. The literature review approach was chosen due the cross-sectional qualities such an approach can provide, as well as determine the questions that are most pressing in this field overall (Yin, 2014, p.14). Furthermore, a review provides scope to develop the definitions of both terms further in the doctoral research of one of the authors, and illustrate "*challenging questions*" (Yin, 2014, p.39). Attempting to understand the differences between '*Green*' and '*Sustainable*' could be considered one such question due to the importance in research of having a common and more widely accepted definition of terms, concepts and terminology.

Literature and Sources

Literature has been sourced from books, journals and websites from the fields of FM from the early 1990's to the present, along with other relevant fields such as property management, building design, leasing, architecture and engineering. Whilst these other fields are not considered sub categories for analysis in of themselves, they will be considered alongside literature directly from FM due to their relevance. Academic literature was sourced from Google Scholar, and came from journals and renowned conferences. The decision to use Google Scholar as a source of academic material is due to the availability of material and extensive size of their library as opposed to rival online academic paper sources such as the digital library Jstor. The literature from this search was chosen based in its conjunctive use of the search term within the first ten results pages on Google Scholar. The first ten pages was the scope barrier in order to account for the most popular uses of the terms. For practice

literature, a normal Google search was conducted, organised by 'popularity' and using 'incognito' mode on the internet browser 'Google Chrome' to remove a cookie based browser bias. There nonetheless however exists some bias due to geographical location. Although Google may not be considered the most scientific means to accumulate literature, it can be nonetheless considered important due its presence in the internet search engine industry from the perspective of a web presence of FM providers. The decision to use Google over other search engines such as Yahoo! is also a reflection on the popularity of Google and the related Google Scholar over their competitors. The chosen sites from this search were also based on their conjunctive terminological relevance within the first ten pages of the results. Both academia and practice searches used the conjunctive keywords searches of: '*facilities management green sustainable*', '*sustainable green property services*', '*green sustainable buildings property management*' and '*facilities management sustainable green development*', with some refinement (e.g. removing 'golf turf management') where necessary.

In order provide a more holistic approach to green and sustainable issues in FM, relevant technical documentation from two of the world's foremost environmental certifications/ assessment methodologies for the built environmental will be investigated, using the same analytical approach as the academic and practice literature. One methodology is the British founded but globally franchised Building Research Establishment Assessment Methodology (BREEAM), which dominates the European certification market. Owing to the location of the authors, the BREEAM standard for Norway (known as BREEAM-NOR) will be the franchised documentation of choice. The National Scheme Operator (NSO) for BREEAM-NOR is the Norwegian Green Building Council (NGBC). The second certification is the United States of America (USA) centric Leadership in Energy and Environmental Design (LEED), operated by the United States Green Building Council (USGBC).

Analytical Approach

This paper will analyse the literature by looking at the extent to which each usage of the terms '*Green*' and '*Sustainable*' are at the organisational management (OM) levels of '*Strategic*', '*Tactical*' and '*Operational*'. This was chosen due to the organisational efficiency implied by the categories in translating sustainable agendas into "*measurable operational targets"* (Elmualim et al., 2010, p.59). This framework is also used in FM practice, and, for example, is at the heart of the EN 15221-1 standard for 'terms and definitions' in FM (BIFM, 2015). Atkin and Brooks (2015) provide a definition of the three management levels in an FM context. According to Atkin and Brooks the **Strategic Level** "*is largely about setting the direction for the organisation and ensuring that the means for achieving its objectives are in place*". The **Tactical Level** is the "*organisations broad intentions to be turned into workable plans, and might call for new processes and procedures as well as changes to those that exist*". Finally, the **Operational Level** aims to "*perform work according to laid-down procedures and not to deviate*" (Atkins and Brooks et al., 2015, pp. 46-47). The management levels will be used as a framework that will assist in a more tangible understanding of the scope of the usage of the terminology, through an approach that can be understood by academia and practice. The literature was then analysed by taking references referring directly to '*Green*' and '*Sustainable*' terminologically, then placing them at each of the management levels depending on their contextual placing considering the management level descriptions by Atkin and Brooks. It is hoped that this approach will further an understanding as to the organisational relevance of each term in order to better facilitate a more commonly accepted understanding of the '*Green*' and '*Sustainable*' in both academia and practice.

The use of organisational management as a categorising tool was also chosen due its usefulness in the categorising of the decision making processes in organisations. An understanding of the term and terminological placing of '*green*' and '*sustainable*' in an

organisational structure can allow for a more clear understanding as where in the '*strategic*', '*tactical*' and '*operational*' levels of an organisation are decisions on a sustainable approach being made. The importance of correct decision making procedures in this context is already recognised in literature, where Epstein and Buhovac (2014) for example state that in order to integrate such an approach into day to day decision making there needs to be the "*combination of a clear and well-articulated and communicated sustainability strategy, senior management commitment to a broader set of objectives than profit alone, and utilising appropriate structures and systems to drive sustainability through the organisation*" (Epstein & Buhovac, 2014, pp.23-24)

The process of 'per text' analysis was also critical in order to understand the usage of both terms. The 25 texts chosen for analysis were read in their entirety, and it was noted how they used '*Green*' and '*Sustainable*' along with the contextual intention of their meaning. They were then categorised as to whether they were 'practice' or 'academic' in nature (often in relation to category of the overall text). Finally, any relevant use of the terminology was placed at one of the OM levels based upon how closely the specific reference to either term fitted the descriptions of each level noted in the previous impact. The authors were also mindful of the more directed FM specific meaning in FM literature, as well as the indirect references and relevance to FM in literature not directly on the topic. This could be in the form of literature on the likes of 'sustainable building management' or 'corporate sustainable decision making'. An approach like this was necessary in order to understand the nuances in context and meaning that could be lost out outside of immediate references to FM, or even '*Green*' and '*Sustainable*'. This analytic approach also guided the direction and process of the literature research before the analysis and discussion were formally conducted.

3. RESULTS

3.1 The Usage and Definition of 'Green'

Academia

At the time of writing in December 2015, a Google Scholar search of '*Green Facilities Management*' will generate 924,000 hits (Google, 2015a) . The search does not generate results that use the search term conjunctively. Whilst many of the hits do not directly relate to FM, there are nonetheless numerous relevant documents included. Baharum *et al.* (2009) in their work on 'green FM intellectual capital' associate the term '*Green*' as an active term in their context, associating it repeatedly in their work with the terms "strategic" and "practice" (Baharum et al., 2009,p.268). Hodges (2005) used the term in a similar manner, with the word "practice" being coupled with the term '*Green*' throughout the majority of his paper. Due their use of 'practice' in the context of energy reduction measures, this can be considered to be at the '*Operational level*'. That being said, he also uses the phrase "*green and sustainable*" together in much of the paper, using it 16 times out of 45 mentions of '*Green'*. Whilst this could imply that the author feels that both terms are broadly interchangeable, the solo usage of '*Green*' is used when the terms 'practice' and 'building' are mentioned in the text. The word '*sustainable*' is also often used separately in the context of practices on the '*Operational level*', with 2 references of it the context of 'sustainability strategy'. To this end, it can be considered that Hodges (2005) sees little separation between each term (Hodges, 2005). Dixon *et al.* (2014) in their work on energy management, mention FM in the context of the emerging leasing product 'green leasing' in the sphere of "*the extent to which they allow alterations and data sharing*" (Dixon et al., 2014, p. 428). Whilst the definition of green leasing and their scope is currently not standardised (Collins and Junghans, 2015, p.135), the wording implies a focus that leads towards the '*Tactical level*' in the context of data sharing.

Referring to 'Green FM' and it's services as a conjunctive term in academic literature, Jensen *et al.* (2012) offer one of the few instances of Sustainable FM being referred to as "*Green FM*" in scholarly literature, viewing it in tandem with '*Sustainability*' by offering a definition of 'Green FM' that is similar to the earlier Sustainable FM definition, mainly by associating it with the likes of energy reduction, added value and operational cost savings (Jensen, 2012, p.212), placing it at all three levels of the model. A definition as to what constitutes 'Green Property Services' was offered by Määttänen (2014) who described it as "*services that reduce negative impacts to the environment and human health while fulfilling the needs of the occupants and maintaining the property's conditions and characteristics*" (Määttänen, 2014, p.2). This covers two of the OM levels, particularly the '*Tactical*' and '*Operational*' levels when looking at maintaining the needs of users, owners and the building itself. Another rare mention of Green FM can be found in a paper being titled '*End-user requirements for green facility management'*, where the term '*Green*' is mentioned only twice, and not defined or clearly contextualised, with no mentions of the term '*Sustainable*' outside of references (Nousiainen and Junnila, 2008).

Practice

There are numerous examples in FM practice that refer to the term '*Green*'. International law firm DLA Piper in their report entitled '*Green Facilities Management Contracts*' recognise the importance of understanding that 'Sustainable FM' and 'Green FM' are both in need of clarification. They imply early in their document that both terms are used "*synonymously*" and "*environmental friendliness, economic efficiency and social compatibility are to be given equal consideration where possible*" (DLA Piper 2014, p.7) . They effectively reinforce the interchangeability of both later in the report, stating that a "*Green Facility Management Agreement is usually a standard contract which has been extended by individual provisions to achieve sustainability*" (DLA Piper, 2014, p.12). This could imply DLA Piper are associating '*Green*' with '*Tactical level'* considerations on the grounds that it refers to a written agreement that would include requirements, and '*Sustainable*' with more a reference to the '*Operational level*' day to day activities of FM providers due to the 'individual provisions' implications. Regarding the overall report content, much of it is concerned with the contract stage of FM provision, and thus more directly placed at the '*Tactical level*' due to such agreements requiring targets in excess of the strategic approach, yet come before day-to-day operational activities in the OM pyramid. The globally operating FM company ISS has begun to move proactively into Sustainable FM, with its first service marketed as such being that of 'Green Cleaning'. Their promotional material describes the incentive for their clients as "*being green and supporting environmental sustainability may be at the heart of your company brand*" (ISS, 2014, p.2), and their own as "*we are proud to offer you the possibility to take your sustainability ambitions to the next level*" (ISS, 2014, p.5). Their usage of each term provides some contradiction as to what they mean by usage of '*Green*' and '*Sustainable*'. Whilst the latter quote could imply that both are interchangeable, the first part of the citation considers '*Green*' as being a '*Tactical level*' term, whilst '*Sustainability*' appearing to have a more company policy '*Strategic'* quality to its meaning.

Environmental Certifications

The term '*Green*' has been noted in some of the technical documentation available from the leading environmental certification associated methodologies. In the case of the BREEAM-NOR technical manual, there are 104 references to '*Green*'. Aside from reference to the NGBC, the majority of references refer to 'Green Leasing', as a '*Tactical level*' means by which landlords and tenants can improve the environmental credentials of their buildings (NGBC, 2012). Beyond this, there are several mentions of a green lease alternative, that of the 'Green Building Guide', which is a non-legally binding document that requires tenants to

provide fit outs that uphold the BREEAM standards of the building that they occupy (NGBC, 2012, p.21), which can also be considered '*Tactical*' due to be term and target related documentation. Beyond this, the only substantial mentions are of greenhouse gases. BREEAM also offer a certification called 'BREEAM In-Use', which deals with the operational phase of a buildings lifecycle. The international technical manual for this certification notes 33 mentions of '*Green*', but have considerations on several OM levels. Their references to 'sustainable design' and 'sustainable buildings' straddle the both '*Strategic*' and '*Tactical*' level considerations, whilst the more numerous references to 'green procurement' appear to sit more comfortably at the '*Tactical level*' as they describe a policy approach featuring specific targets and requirements (BREEAM, 2015). In the case of the LEED user guide, there are a total of 20 mentions of '*Green*', mostly relating to non-FM relevant issues such as 'Green vehicles'. 'Green Cleaning' is the only other reference to the term that is relevant for this paper, and its used almost exclusively at the '*Operational level*' due to references to cleaning practises on a day to day basis (LEED, 2014). Going more in depth to FM related documentation and looking at their rating documentation on their FM relevant 'Building Operations and Maintenance' program, the only references beyond some patented technologies also refer solely to green cleaning (LEED, 2016).

3.2 The Usage and Definition of 'Sustainable'

Academia

A Google Scholar search of the terms 'Sustainable Facilities Management' in December 2015 generates more than a million hits (Google, 2016b). After some refining of the search terms to remove the likes of 'golf turf management' and other irrelevant terms, it still generates 592,000 hits (Google, 2015c) , although not all of them will be relevant to the intentions of the search. For the sake of clarity, the terms '*Sustainable*' and '*Sustainability*' will be used interchangeably as their literal meaning is virtually the same contextually.

As in the case of the term '*Green*', a popular usage of these terms are also proving to be broad and illusive. Also as in the previous term, it is not difficult to narrow down relevant literature for the purposes of this paper. Valen and Olsson (2012) in their work on FM in Norwegian municipalities refer to Sustainable FM at the '*Operational level*' 'value driven maintenance' in the context of the installation of sustainable technology (i.e. waste management, energy efficiency technologies) during the upgrade of existing buildings (Valen and Olsson, 2012, p.290, 299). Elmualim *et al.* (2010) view the metaphorical 'jumping off point' for *'Sustainability'* being in sustainable development and thus, the '*Strategic level'* (Elmualim et al., 2010, p.58)**.** Much of the article follows this theme, with only passing mentions of deeper in activities in FM, that arguably remain in the '*Strategic*' due the repeated references to a "*sustainable perspective*", and in many respects is to be considered a bona fide business strategy (Elmualim et al., 2010, pp.59,60). Some of the references to '*Sustainable*' and '*Sustainability*' however are context based and cannot be necessarily considered concrete in definition by their respective authors. Enoma (2005) for example, exclusively refer to the term in the context of its '*Strategic level*' importance. This however is due to the paper addressing the role of FM's solely at design stage (Enoma, 2005), an aspect of context that the reader should remain aware of in many publications. There are other examples of an exclusively '*Strategic level*' usage of the terms, with Haugen (2008) for example using them in the context of 'development' during building upgrades (Haugen, 2008).

Practice

In practice based literature, the references to 'SFM' and 'Sustainable Facilities Management' are almost non-existent. A more refined search of terms such as '*sustainable facilities solutions*' and '*sustainable building management*' in a Google search in December 2015

however yields some useful links. American multinational conglomerate 'Honeywell', in the FM and building management part of their company, incorporate '*Sustainability*' in their website advertising literature. Their focus in this regard is mostly on energy management, with some supplementary references to "*green building operations and maintenance*" and behavioural change (Honeywell, 2016). Their references mainly refer to '*Strategic level*' considerations, with arguable considerations also of the '*Tactical level*' due to referrals to the likes of LEED. There is no mention of '*Operational level*' considerations, most likely due to the promotional nature of the website. Examples of Sustainable FM provision can also be found on the European market, like in the case of British FM service providers Almeda. Founded in 1981, they have taken the rare step of using the term of phrase "*sustainable facilities management*" in their promotional materials. Their website not only engages '*Sustainability*' in their companies operating philosophy, but also goes into detail in using terms such as "*soft sustainable facilities management*" and dealing with Energy Performance Certificates (EPC's) (Almeda, 2015). To this end, it could be suggested that Almeda actively refer to all three OM levels. The globally operating construction, building management and FM company VINCI take a more holistic view toward integrating sustainability as a part of their business practises, seemingly covering all of the OM levels in a systematic way. At the '*Strategic level*', they promote their sustainable business model, showing how they integrate their core business philosophies into the triple bottom line of 'economic', 'environmental' and 'societal' sustainability (VINCI, 2015b). At the '*Tactical level*' they have their company sustainability policy that deals with issues such as whole lifecycle sustainability considerations and impact assessments (VINCI, 2015a). Finally at the '*Operational level'* (within the scope of promotional literature) they promote result based key performance indicators (KPI's) showing an 83.7% diversion of waste from landfill, and a 10.1% reduction in CO2, amongst numerous other environmental results (VINCI, 2014, p.24).

Environmental Certifications

Referring once again to BREEAM-NOR, their technical manual offers 39 mentions of '*Sustainable*' and '*Sustainability*', that are presented in a variety of contexts. Good practise on sustainable design and procurement are of particular note, placing them in the '*Strategic*' and '*Tactical*' levels respectively. Sustainable innovation is also given substantial space, which could be considered '*Strategic*' overall, but leading into '*Tactical*' where context relevant. Sustainable water treatment is also given a chapter in the manual. Other notable mentions refer to the *Operationally* focused 'sustainable performance' and *Strategically* important 'corporate social responsibility' (CSR) (NGBC, 2012). In the technical documentation for BREEAM IN-USE, there are 53 references to the term. Once again the '*Tactical level*' procurement and supply chain management are key focuses, but also feature the equally as '*Tactical*' 'sustainable management practises' and the more '*Operationally*' inclined 'sustainable energy management'(BREEAM, 2015). The demands for the '*Strategic level*' CSR are also important in this documentation, noting that for owners, renters and developers, increasing the sustainability of existing building stock is a stakeholder demand that needs consideration (BREEAM, 2015, p.23). The LEED user manual has 12 mentions of the term, the majority of which refer to procurement and purchasing, with one mention once again of cleaning practises, in the form of securing sustainable cleaning equipment (LEED, 2014), placing all of the references firmly at the '*Tactical level*'. Their Building Operations and Maintenance documentation also features 12 references, all of which refer to less relevant 'sustainable agriculture', however, there is one reference to sustainable procurement (LEED, 2016). As per the section on '*Green*', the environmental certification uses the terms '*Sustainability*' and '*Sustainable*' across all three OM levels.

4. DISCUSSION

In this section of the paper, the extent to which each of the terms '*Green*' and '*Sustainable*' touch on the organisational management levels of '*Strategy*', '*Tactical* and '*Operational*' with regards to the results sections categories of 'academia', 'practice' and 'environmental certifications' with be discussed. The implications of the results on research and practice will also be considered.

Defining and Understanding 'Green' and 'Sustainable'

The discussion of the results is presented in table 1 which outlines how the literature has been used both of the terms. Each separate contextual usage of the term has been noted e.g. if a paper uses the term '*gree*n' at the tactical level consistently throughout a paper it only counts once, however if it is used in two separate levels in the same paper it would count twice. This ensures and makes clear that each separate contextual usage was the focus of the study, and not simply the amount of times either term was mentioned.

Table 1 below outlines the degree to which each of the contextual usages of the terms '*Green (G)*' and '*Sustainable (S)*' are noted across the OM levels and where they feature in '*Academia (A)*', '*Practice (P)*' and '*Certification Methodologies (C)*':

Table 1

OM Level	G-A	G-P	G-C	S-A	S-P	S-C	OM Level G Total	OM Level S Total	G + S Total
Strategic	1	1	1	3	2	4	3	9	12
Tactical	2	3	4	0	2	5	9	7	16
Operational	3	1	2	1	2	2	6	5	11

Total Green: 18	**Total Sustainability:** 21

Overall, the literature analysis demonstrates a broad interchangeability between the terms, although some of the weighting of roles differs. In the literature research and document analysis in this paper, '*Green*' has been used the least of the two terms, yet it seems has been used the most malleably. '*Sustainability*' however has been found more widely in both academic and practice literature, yet has seen a more significant OM weighting closer to the '*Strategic*' and '*Operational*' levels. This implies that there is inconsistency in the way that both terms are being utilised when considering both of terms in isolation.

When it comes to the categories of 'academia', 'practice' and 'environmental certification', utilisation is broadly fragmented. For academia, '*Operational level*' considerations seem to dominate in the case of '*Green*' whilst in case of the '*Sustainable*', this is mostly considered '*Strategic level*' in the eyes of academia. Practice spread their usage of '*Sustainable*' equally over the three OM levels in the literature, and is also the dominant term. In practice, the marginally less used '*Green*' is used considerably more at the '*Tactical level'*, with only one usage on each of the other two levels. Environmental certifications mainly use '*Sustainable*', and mostly use it at the '*Tactical level*', although utilise the other two levels substantially. Although they use '*Green*' less, the weighting mirrors that of '*Sustainable*', with the '*Tactical level*' taking the most attention with scattered utilisation across the other OM levels. With regards to a common understanding of both terms, the interchangeability implied in Table 1 and lack of usage consistency between both terms can risk causing difficulties in both

academic research and practice based implementation. When bringing both terms together and combining academic and practice, the results reflect a '*tactical*' focus on shared '*green*' and '*sustainable*' issues within an organisation in the context of FM.

Practical implications and deeper understanding of FM relevant terminology

When discussing sustainable FM it is also important to consider its impact on its sister fields of the 'sustainable built environment', and the study of green buildings. The previously mentioned concept of '*green leasing*' is an example of an FM relevant product that is being hindered by the difficulties in finding more widely accepted definitions of '*Green*' and '*Sustainable*'. Whilst '*green leasing*' is the most commonly used term, a Google search will also illuminate that terms such as '*sustainable leasing*' and '*energy aligned leasing*' are also found in literature from research and practice (Google, 2016). This not only causes difficulties when attempting to source information from the perspective of practice, but also results in difficulties in presenting research in way that will be easily accessible it's intended audience. The interchangeability between usage of terms like '*green property services*' and '*sustainable facilities management*' also risk muddling the decision process for end users, as well ongoing development. Should a potential service user look for '*green*' service provision, this lack of consistency in terminological use may result in the user being unable to find certain service, purely because the more suitable service is instead marketed as '*sustainable*'.

From the perspective of academia more directly, '*SFM*' or '*sustainable facilities management*' dominate as terminologies in research into FM and sustainable development. As noted earlier, Google Scholar does not generate hits for '*green facilities management*' as a conjunctive term, implying that this terminology enjoys a more consistent usage in academia than in practice. That being said, this consistency does not follow through when looking at both '*Green*' and '*Sustainable*' as terms in isolation. This latter inconsistency illuminates an existing research and arguably innovation need in the field of FM and its associated disciplines.

Whilst the authors acknowledge the difficulties in definitively resolving this conundrum in a paper of this size, the different levels of OM and their uses in the covered literature could be a starting point for a more in depth debate on this topic. This approach could also be employed outside of FM. A deeper look at definition conundrum could be useful in the fields of the social sciences, engineering and in architecture, all of whom are grappling with their own debates on the '*Green*' and '*Sustainable*'. There is also scope that further research could help with a more definitive terms standardisation that could be of use in the further development of Sustainable FM from both the perspectives of academia and practice.

Sustainable Decision Making in Organisations

When considering the weighting of both terms from the perspective purely of organisation management, the results illustrate some fragmentation but also a degree of focus with a small margin. In the case of '*green*', the weighing of usage focuses more towards a '*tactical*' application overall, whilst '*sustainable*' is a term that is sees an overall '*strategic*' level focus. When looking at both terms in conjunction, a '*green*' and '*sustainable*' approach is more focused at the '*tactical*' level. Whilst the literature reflects both terms individually at different levels of organisation management, a broader focus on the issues that both terms may share, decision making marginally closer to a '*tactical*' level consideration within an organisation. This can have a direct impact for organisation management. When considering the example of a green lease, the tactical level of organisation management is where the environmental targets, benchmarks and requirements are set within leasing clauses, associated documentation and even negotiations, all of which impact the FM approach and requirements to that tenancy. In a more practical context, this provides cause to reflect on whether it would

be more efficient to move a '*green*' and '*sustainable*' decision and policy based focuses further up the organisational management pyramid to the '*strategic*' at a higher level, or whether the '*tactical*' level is already the optimal stage to consider this type of decision making. It is also important to state however that the results did not indicate that both terms had an ownership of the '*tactical level*', but rather saw a larger contextual weighting.

5. CONCLUDING REMARKS

In concluding this paper, the results and subsequent discussion show a diverse range of usage of the terms '*Green*' and '*Sustainable*' that offer little in the way of overall consistency. Whilst academia is somewhat more consistent in some of its terminological usage (such as in the case of acronyms like 'SFM'), there is a usage chasm in terms of a pan discipline or pan industrial usage of the terms overall.

This paper concludes that despite more than 25 years of FM research, there is still further work that needs to be done by academics and industry leaders to standardise of both terms. Existing standardisation deficits risk slowing or muddling the development of environmental efforts within FM and other industries; however a consistent discussion could go some way towards progress. There is even room to consider that even many of us working actively in this field are not being consistent or noting a difference between the terms '*Green*' and '*Sustainable*' ourselves, and should consider further research provide better clarity and consistency in their usage. For research, practice and organisational decision making, there is a notable research need to better understand how to use these terms. Furthermore, we are reminded that we are still early in the story of sustainable FM, with plenty of work still to do. We should also remain mindful of one more thing, that '*Green*' and '*Sustainable*' development is not an event, but a process that moves incrementally towards its wider intended goals.

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Paper V

Paper VI

Green Leases and Green Leasing: A Terminological Overview of Academia and Practice

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ABSTRACT

Purpose

Through the use of existing literature and desk research from academia and practice, this paper will outline the degree to which there is a difference between the terms '*Green Leasing*' and '*Green Leases*' in academia and practice. Over the last decade, Green Leases have become an increasing recognised and applied method by which to improve the sustainability of building stock. However, a lack of research into the differences between the terms '*Green Leasing*' and '*Green Lease*' have the potential to stifle a consistent use of these terms. This paper endeavours to better establish this difference in order to provide credibility in the usage of both terms.

Methodology

The data for this paper was accumulated through sourcing academic literature (mainly from academic peer reviewed journals) where Green Leasing and Green Leases are of a primary or substantial focus. The analysis establishes how each paper uses each of these terms. Practice based literature will be sourced and analysed similarly in order to establish better definitions of Green Leases and Green Leasing.

Key findings

This paper establishes (with some noted exceptions), that the terms '*Green Leases*' and '*Green Leasing*' are used in both forms of literature in a manner that is relatively close to the dictionary definition terms of '*Lease*' and '*Leasing*'. With these findings in mind, it is established that a Green Lease is the lease document itself, whilst Green Leasing is the process of renting and operating a rented sustainable building that may or may not have a Green Lease.

Impact of Study

This study has the potential to affect the terminological uses of both terms in order to provide consistency that will benefit both market penetration and academic research and dissemination. This study is also applicable outside the field of real estate, as it also has a relevance to the study and practice of law, Sustainable Facilities Management (SFM), architecture and the study of the built environment more broadly.

Keywords

Green Leases, Green Leasing, Sustainable Facilities Management, Corporate Real Estate, Offices

1 INTRODUCTION

In a world that has been focusing increasingly on the environmental impact of our daily activities, the fields of both Real Estate (RE) and Facilities Management (FM) are finding that sustainability and its related issues are having a noticeable impact on the way that they operate and do business. There are numerous drivers for this change, ranging from the likes of demand from customers, to corporate social responsibility (CSR), to the advantages of a Green building certification such as the United Kingdom (UK) founded but globally franchised 'Building Research Establishment Environmental Assessment Method' (BREEAM) (Collins et al., 2016).

A shift to a focus on the likes of issues such as sustainability will require new approaches by which to tackle them effectively. This in of itself is as numerous in approach as it is its scope, ranging from legislative proposals such as the implemented and later repealed 'Carbon Pricing Mechanism' in Australia ("About the carbon pricing mechanism," 2014), to technical solutions such as the development of Passive Houses. Office rentals is one area of the RE sector that offers significant potential in reducing a company's carbon footprint. For example, one of the reasons is due the high level of energy consumption from the likes of computers and lighting, which could see a tangible reduction through the behavioural change of users (Mulville et al., 2013, p.80), which in turn could be an important factor for FM to consider in a wider building context.

Amongst other means by which to consider improving the sustainability of rental offices, is so called '*Green Leasing*' and '*Green Leases*', which have become an increasingly prevalent part of the RE landscape over the past decade (Bright et al., 2014, p.7). These types of leasing agreements are not only challenging to industry and scholars alike to rethink the roles of owners, tenants and their responsibilities, but are also facing new challenges such as those of terminological consistency that risk placing further pressures on Green Lease and Green Leasing development.

2 RESEARCH DESIGN

The purpose of this paper is to establish how the terms '*Green Lease*' and '*Green Leasing*' are being used in both academic and practice, and if there is scope to offer a more consistent definition that could be used by both sectors.

This paper will attempt to answer the following research questions:

1. How is the term '*Green Lease*' being used in literature in both academic and practice?
   - *To what extent are there grounds for a common understanding of this term?*

2. How is the term '*Green Leasing*' being used in both academic and practice?

- To what extent are there grounds for a common understanding of this term?

Each question will be considered in turn, and this paper will then conclude by discussing the extent to which the findings could lead to a more common understanding as to what constitutes the terms '*Green Lease*' and '*Green Leasing*'

The data for this paper was accumulated from existing literature, sourced from the research search engine 'Google Scholar' in the case of academic literature, along with trade publications and the regular Google search engine for practice based literature, along with further literature from the library which the author has amassed over 4 years. The literature used for analysis is dated 2007 until 2018.

3 METHODOLOGY

3.1. Sourcing Literature

The data collected for this paper consists of desk research of existing literature from both academia and practice. The search for industry and academic literature is from 2007 to 2018. These years are important, primarily due to the more common usage of the terms entering RE and FM lexicon in around 2007, as stated by Bright *et al* (2014). In the case of literature from academia, this consists primarily of high impact academic journal articles. The benchmark for the quality of these journals is the 'Norwegian Register for Scientific Journals, Series and Publishers' (NSD), which provides Norwegian academics with a list of acceptable scientific publications for citation. The majority of articles were sourced through Google Scholar using the search terms '*Green Lease*', '*Green Leasing*' and '*Green Leases*'.

In order to reduce the search results, the publications were checked to ensure that they were connected to and directly discussed the sustainable built environment. The articles primarily came from the disciplines of the built environment, law, facilities management and real estate. Literature from books or other texts amassed by the author over 4 years which, adhere to the same academic benchmarks as those sourced from Google Scholar were also included in the analysis.

The standard Google search engine was primarily used to source from practice and the same search terms as the academic literature were used. Similarly as in the search for academic publications, pruning in connection to the built environment was conducted. This ensured that publications on relevant subject matters to study such as the '*leasing of green vehicles*' were not factored in to the results. Almost all of the sources from practice have been procured from online resources. This was due to their availability and the lack of easily accessible hard copies available. In order to ensure their reliability, all of these sources are from organisations and not from private blogs or other less reputable sources.

A vital criteria for all of the literature featured in this article was that it had to feature any of the terms '*Green Lease*', '*Green Leases*', and '*Green Leasing*' in their text. Documents and literature that featured these terms only in their titles, subtitles or literature list were excluded from the results. Documentation and literature that discussed these concepts but did not use the terms were also excluded from analysis in this paper.

3.2. Analytical Framework

The key analytical framework consisted of comparing the usage of each term in the text compared to the preliminary definitions that will be presented in the next section of this paper. The terms '*Green Leases*' and '*Green Lease*' were analysed together due their evident contextual similarity and the likelihood of them being used in the same context. The reasoning behind this approach was to see the extent to which their usages is consistent, and if there is a difference between academia and practice in how such terms are used.

In terms of a definition by which to establish an analytical benchmark, standard dictionary definitions will be used. In the case of '*Green Lease*'/ '*Green Leases*', the Oxford Dictionary definition of "*a contract by which one party conveys land, property, services, etc. to another for a specified time, usually in return for a periodic payment*" ("Definition of 'lease' in English," 2018) will be the benchmark by which to compare the terms in the literature analysed. In the case of '*Green Leasing'*, the 'Free Dictionary' definition of "*the hiring out by one firm (the lessor) of an asset… to another firm (the lessee) in return for the payment of an agreed rental*" ("leasing," 2018) will be the benchmark.

The nature of this analytical framework also presents limitations. The limits of the paper in terms of the word count will limit the depth of possible analysis, and the possibility of thousands of results places restrictions on the feasibility of the scope. With this in mind, the results of this paper are indicative, as opposed to definitive.

4 Literature Review

4.1 A contextual definition of 'Green Lease' and 'Green Leasing'

Although the primary focus of this paper is to unravel the conundrum of definition of both terms, a contextual definition of both is an important basis by which to focus the analytical lens of the results and discussion.

At the present time, there is no universally accepted definition of what constitutes a '*Green Lease*', with many in academia and practice viewing its meaning as fairly malleable. Despite this, the British chapter of the Better Buildings Partnership (BBP), a collaboration of building owners aimed at furthering the sustainable credentials of their buildings stock, created one of the more cited definitions in their 'Green Lease Toolkit'. They define a Green Lease 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, p.2). They state that example Green Lease clauses could consist of "*agree(d) targets and strategies to improve the Environmental Performance of the Premises and/or the Building on a regular basis*", or "*reduction in or improved efficiency of water consumption*" (Bugden et al., 2013, pp. 14,16 and 22).

In the case of '*Green Leasing*', finding any kind of definition at all poses a very sizable challenge to research. One of the only definitions found in literature was offered as a part of Australia's 'National Green Lease Policy', which describes Green Leasing as "*the full set of environmental activities, considerations and impacts that occur throughout the entire leasing process. This process includes the period leading up to the lease agreement, the term of the lease and the end of a lease*" (*National Green Leasing Policy*, 2010, p.5). Much like the case with Green Leases, there is yet to be a definition that is universally accepted.

5 RESULTS

5.1.Green Lease and Green Leases

5.1.1. Academia

In an investigation of academic literature, a Google Scholar search for "*Green Lease*" yields 578 results. In a look through these results, almost all of these hits correlate well with research into buildings ("Google Scholar Search for "Green Lease"," 2018). A search for "*Green Leases*" presents a similar picture with 600 results, almost all of which are relevant to the previously stated benchmarks. The search for both terms also contain the majority of the same documents.

A systematic search through the results shows that the majority of hits have a link in conjunction with discussions on tenancy agreements, as such keeping it mostly in the realms of being a '*lease*' as per the dictionary definition. This is particularly the case where Green Leases are the primary focus of the article. Sayce *et al* (2009) for example states that a Green Lease is a set of environmental obligations that are codified within a lease (Sayce et al., 2009, p.276).

Brooks (2008) claims that the contents of a Green Lease can be variable, but he is specific in its definition. He defines it as a "*lease document*", where the degree of repercussions for breaking a clause is up to the landlord (Brooks, 2008, pp. 8,11). In the academic study of FM, there has been an increased focus on Green Leases. Although Green Leases can be found in many FM publications through various degrees, it is only Atkin *et al* (2015) who appear to provide a definition. They describe a Green Lease as a "*use of incentives to align parties towards sustainable business practices within the terms of a lease agreement*" (Atkin et al., 2015, p 342), keeping it firmly in the realms of being a lease document.

However, not all of the academic references to the terms '*Green Lease*' and '*Green Leases*' are solely about documentation. Whilst looking through the authors library and Google Scholar results, there was a repeated reference to so called '*Green Lease Schedule*s', a term that yields 44 results on Google Scholar ("Google Scholar Search for "Green Lease Schedule"," 2018). Christensen *et al* (2007), states that a Green Lease schedule is an Australian Government invention aimed at setting out the duties, values and step wise processes. In addition they state that they are employed in order to "*use the building in an ecologically sustainable manner by co-operating to directly reduce energy and water consumption and to participate in measures to bring about sustainability in the use and operation of the building in which the tenant is housed*" (Christensen et al., 207, p.2). Whilst the ultimate goal of such a schedule is to create a tenancy agreement of some kind, the fact that it is a set of processes (as opposed to a document) places it more within the realms of the dictionary definition of '*leasing*'.

5.1.2. Practice

On the standard Google search engine, a search of the term "*Green Lease*" yields 49,000 results. Removing terms such as "*bowling green*" reduces this by nearly 1000, meaning that a sizable amount of the original results are not relevant to the study of buildings *("Google Search for "Green Lease"," 2018)*. A search for "*Green Leases*" delivers a higher level of hits, with 109,000. Similar levels of pruning reduced this to 30,000 with comparative levels of relevance, broadly speaking ("Google Search for "Green Leases"," 2018). As with academia, a sizable amount of the results showed the same publications for both terms.

A look through some of the most relevant search results also indicate a significant link with that of a lease or other kind of tenancy document. Law firm DLA Piper (2014) for example discusses leases featuring "*Green Lease Provisions*", as a core part of their Green Lease dialogue (Piper, 2015). The United Nations Environment Program (UNEP) also discussed the Green Lease concept in their 'Greening the Buildings Supply Chain' report. Their discussions on the topic feature significantly in the context of Green building lifecycles, and more specifically the 'In Use' phase. They cite two major 'Green Interventions' in this process. Firstly, Green Facilities Management and the benchmarking and follow up associated with this. Secondly, they suggest "Green Leases" to be embedded into the lease structure of a Green building (UNEP, 2014, p.11).

Documentation is once again a concern for the majority of references to landlords. Property owner 'Rom Eiendom' for example view Green Leases as a core part of their sustainability strategy and within this context focus is the tenancy agreement. They endeavour to have such agreements in 30% of their buildings stock by the end of 2015 ("Innfører grønne leiekontrakter," 2014).

There were however some (but ultimately very few) examples where '*Green Lease*' and *'Green Leases*' were used in the context of the dictionary definition of '*leasing*'. To UNEP for example, this kind of agreement in not binary, and is considered to be as much a 'leasing' process as it is a document, stating that this can result in "*best practices in facility management*" as well as simply the lease in isolation (UNEP, 2014, p.14).

5.2.Green Leasing

5.2.1. Academia

A Google Scholar search for the term "*Green Leasing*" returns 216 results. Whilst the vast majority of these results are relevant, a small amount of pruning was required to remove references related to leasing cars. This changed the number of results to 157 ("Google Scholar Search for "Green Leasing"," 2018). In terms of the use of '*Green Leasing*' in academic literature, their use is rarely mentioned in the same terminological context as '*Green Leases*' and '*Green Lease*', but instead has more hits that orientated towards '*Leasing*'.

In terms of examples, Rameezdee *et al* (2017) use the term extensively, primarily in conjunction with what they describe as "*leasing practices*" (Rameezdee et al., 2017, p.10), along with the practices in buildings that include improving employee wellbeing (Rameezdee et al., 2017 p12). In the case of Janda *et al* (2016), they emphasise the separation of terminology and discuss patterns "*of leasing and lease wording*". Indeed they define 'Green Leasing' specifically as "*the environmental processes, engagement and practices adopted by landlords and tenants in relation to the building*" (Janda et al., 2016, p.2), without ever mentioning the lease document. Bright *et al* (2014) use the term in the same context as the previous authors, referring to "*Green lease practices*" in their article (Bright et al., 2014, p. 8).

The author was unable to find any relevant usage of the term '*Green Leasing*' that referred to a lease document.

5.2.2. Practice

A search on the standard Google search engine for the term "*Green Leasing*" returns 110,000 hits. With some pruning to reduce the search terms by removing hits relating to "*cars*" and "*banking*", this reduced to 36,000 hits ("Google Search for "Green Leasing"," 2018). This a number too large to analyse in its entirety, however the first ten search pages which produced relevant results for the study of buildings. Similarly to the terms in academia, almost all results are related to the benchmark dictionary definition of '*Leasing*'. However there are some notable examples that deviate from this.

An example of this usage can be found in 'A Better City' (ABC), a Boston based non-profit organisation that deals with improving the city through sustainability and other initiatives. This organisation is clear on the difference between '*Green Leases*', and '*Green Leasing*, as evident in their work on looking into the barriers and drivers for implementation. They view a lack of knowledge on Green Leases (the document) as one, and unfamiliarity with "*Green Leasing practices*" being the other ((ABC), 2014, p.2). This is an opinion seconded by Craig Roussac of 'Buildings Alive', who when interviewed for TheFifthEstate's Green Leasing guide called 'The Tenants and Landlords Guide to Happiness' notes that the lack of progress in the development of Green Leases is partially due the Green Leasing 'process' itself (Lynn, 2015, p.13).

The 'Institute for Market Transformation'(IMT), an American institution that promotes the energy efficiency and greening of buildings along with founding their own 'Green Lease Leaders' program, has numerous mentions of '*Green Leasing*' in their literature. Their wording however focuses on the benchmark definitions of a '*Lease*' document. In their pamphlet 'What is a Green Lease?' (2015), they describe a lease document as "*high performance leasing*" (Feierman, 2015, p.6) and later in the paragraph they discuss it as a growing practice in real estate, once again referring to it as a document (Feierman, 2015, p,21).

6 DISCUSSION

Although the format imposed limits of this paper place restrictions on depth, a look at the existing literature appears to indicate some degree of terminological consistency in the terms '*Green Lease*' and '*Green Leasing*'. This has been considered within the context of the degree to which the terms have a similarity with the benchmark definitions of the terms '*lease*' and '*leasing*' featured in the methodology section.

When considering '*Green Lease*' and '*Green Leases*', in academia this was focused primarily on lease documents, as opposed to any process related usage. There were some deviations from this in the usage of '*Green Lease Schedules*', however this example was in relative isolation when considering the work overall. When looking at practice literature, the experience was similar to academia. In some practice literature however, there was also a closer link to considerations for FM approaches in some cases. This arguably straddles the benchmark definitions of '*lease*' and '*leasing*'.

There was a common ground in the consistent usage of terms in academic and practice publications. Although there were some stresses towards certain disciplines that were not found in others (such as the case of 'FM' in practice literature), this can be considered to be indicative of the subject matter that is the focus of their writing, and less about a difference in the use of the terms.

When examining the usage of the term '*Green Leasing*' in academic literature, the author found no deviation from the benchmark term of '*leasing*'. All of the citations found through the literature search indicate that the term is used to describe the process of leasing out a building, following the clauses of the lease, or enacting processes that may lead to the development and signing of a Green Lease. In some cases, the lease document was not a goal or a part of the process. The relatively marginal use of the term '*Green Leasing*' however does place restrictions on scope. In practice, the usage of the term was more malleable. Although the usage does weight towards '*leasing*', organisations such as the IMT who have used the term to describe the development and expanded implementation of Green Lease documents.

With regard to consistency between academia and practice, this is less solidified than with a '*Green Lease*'. Although the vast majority of citations are in the context of the benchmark '*leasing*', a deviation on this use in practice mandates the need to be contextually aware when looking at practice documentation.

7 CONCLUSION

In conclusion, the research in this paper seems to indicate that broadly speaking there is a pan discipline understanding to the terms '*Green Lease*' and '*Green Leasing*' across both academia and practice. This however does not cover all of the uses of these terms, as considerations found in literature from the likes of the IMT demonstrate that there are still sectors where the usage of terms are not consistent. In an interesting twist however, there appears to be more consensus on the usage of these terms than there is a universally accepted definition of a '*Green Lease*' itself.

Another curious finding in this terminological discussion is the terms occasional link with FM. Whilst it is already understood that there is a substantial degree of importance for linking FM to a Green building (Collins et al., 2015), there appears to be a strengthening of this link as a literature focus on Green Leases and Green Leasing increases.

As mentioned earlier in this article, these results are 'indicative' and not 'definitive'. An in-depth literary study, which includes a longer publication that could offer possibilities to increase the consistency in the use of these terms in the built environment, architecture and FM.

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Paper VII

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It's Not Easy Being Green:

A Study of the Barriers and Drivers for Green Leased Rental Office in Norway

The purpose of this paper is to explore the barriers and drivers that exist for the development, refurbishment of sustainable office buildings available for rental in Norway. With a move toward the so-called 'Green Shift', the impact of the built environment is considered one of the core elements in discussions on environmentally friendly restructuring. The data collection for this paper takes the form of quantitative data collection (with some limited qualitative elements) in the form of an online survey. The respondents to this survey were individuals involved in the decision-making processes to develop a new and/ or refurbish a sustainable office building available for rental, as well as tenants involved in the decision to rent sustainable office buildings.The findings show a significant difference between in the private and public sector for barriers and drivers of green leased rental offices. This is seen in particular in terms of costs being rated as most valued overall by both sectors and green certification and corporate social responsibility (CSR) being the least valued over both the private and public sectors. In terms of drivers, early stage lifecycle challenges were considered the most significant by all of the sectors featured in the survey.

Keywords: green buildings, SFM, green leases, green leasing, commercial offices, facilities management

Subject classification codes: include these here if the journal requires them

1. Introduction

1.1 Introduction

In Norway and indeed the rest of the world, the barriers and drivers for the development of Green Leasing in today's buildings stock is under-researched. The sustainable built environment field has an often-cited statistic that 40% of energy consumption and 36% of Co2 emissions in the European Union (EU) come from buildings ("Buildings," 2018). The construction industry also generates around 9% of Europe's Gross Domestic

Product (GDP) along with 18 million direct jobs ("Buildings," 2018). These percentages not only show the scope of the emission's problem in Europe but also the potential for the construction and building industries to reduce their impact on world emissions. This type of potential (in the built environment and other areas) has also been recognised by the United Nations (UN), with former Secretary-General Ban Ki-Moon said in 2014 that we should take "*advantage of the opportunities presented by climate action and lay the foundations for a more prosperous and secure future for all*" (Ki-Moon, 2014). This call to action has not been ignored, with the EU seeing a 22% decrease in Greenhouse Gas Emissions (GHG) from 1990 to 2015, which puts the EU on schedule to surpass its target to reduce GHG by 20% by 2020, and 40% by 2030 (based on data from June 2017) ("Greenhouse gas emission statistics - emission inventories," 2018).

Although outside the EU (but instead in the 'European Economic Area' (EEA)), Norway has been receptive to the global discussion surrounding emissions, and the plans for their reduction from the EU, UN and other bodies. Using the 'EU Emissions Trading Market' and other mechanisms, Norway is aiming for climate neutrality by 2030. Norway signed the Paris Agreement in 2016, committing to reducing GHG by at least 40% by 2030 when compared to 1990 levels ("Climate Tracker: Norway," 2017). Speaking of the built environment more directly, Norway has used policy and other mechanisms to try and tackle climate change. Through incorporating standards associated with Passive Houses and other initiatives, Norway has some of strictest building codes of its kind in Europe (Q-Haus, 2015). Another response to sustainable development in the built environment from the private sector has been the explosion of certifications under the 'Building Research Establishment Environmental Assessment Method' (BREEAM) in Norway (locally franchised as 'BREEAM-NOR') along with the existence of state governmental supporting bodies to support an increase in sustainable buildings stock such as ENOVA, demonstrate a commitment to improve the sustainability of domestic building stock. This has in some respects changed the real estate sector's engagement with sustainable development, with BREEAM, in particular, cited as an example of a mechanism that has had a degree of effectiveness in making green building practices more mainstream (Cole et al., 2013, pp. 662-663).

The Norwegian 'Green Shift' offers opportunities for Norwegian building owners to not just improve their buildings sustainable credibility, but also underpin their commercial and corporate social responsibility (CSR). The Green Shift is a government supported movement focusing on environmentally friendly restructuring to tackle challenges

associated with nature's tolerance limitations on resource use, as well as the growth and the development of humanity (Regjeringen, 2014). The emerging concept of 'Green Leasing' presents a new way to attract potential tenants into good quality buildings that are also environmentally conscious in their construction and/ or refurbishment. Whilst no guidelines currently exist as to what definitively constitutes Green Leasing, this paper will to a degree illuminate some of these elements and commonalities. The development of sustainable buildings (in Norway and other countries) is however not without challenges, ranging from high costs (Bond, 2010, p.6), to complications resulting from the bureaucracy associated with a green certification (Collins et al., 2016, p.10). This in turn also places increased pressures on Facilities Management (FM), due to the complexity and different needs of both stakeholders and the building, as well as personnel competencies associated with a green building (Collins, 2016, p.11).

Whilst numerous research projects in ENOVA and academic institutions such as the Norwegian University of Science and Technology (NTNU) are examining how the built environment fits into to the Green Shift (Collins et al., 2017), the barriers and drivers for developing and renting sustainable offices that are a part of this currently allude researchers in this and other fields such as architecture and business studies. The current Norwegian research focuses on building lifecycles (Bygg21, 2015), while a deeper understanding of the decision making processes in earlier lifecycle stages, along with FM focused operational considerations are currently under-researched in Norway.

The aim of the Paper

Through data from a survey conducted in February and March 2018 with Norwegian building owners of sustainable office buildings, this paper answers the following research question:

1) *What are the barriers and drivers for owners and tenants with regards to the development, rental and refurbishment of sustainable rental office buildings in Norway*

2) *Is there a difference between the private and public sectors in the barriers and drivers that exist regarding the development, rental and refurbishment of sustainable rental office buildings?*

3) *To what extent is Green Leasing considered and deployed by building owners in sustainable rental office buildings in Norway, and is there a difference between the private and public sectors?*

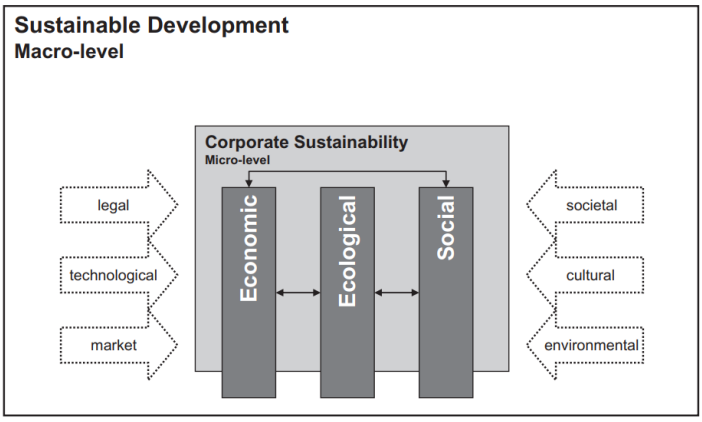
4) *What sustainable facilities management (SFM) is deployed in sustainable rental office buildings in Norway to support the sustainable credibility of buildings in the private and public sectors?*

Combined with desk-based research from academic books and journals to provide contextual definitions, this paper addresses each question in turn before summating the arguments in the conclusions. The intention is to use the survey data to provide a comprehensive understanding as to the drivers and barriers for owners, tenants and FM's in Norway in rental offices. With this in mind along with the surveys relatively small sample size, these results should be considered 'indicative' as opposed to 'definitive'. An investigation into the barriers and drivers offer scope not just to find the motivators to increase the uptake and development of sustainable buildings, green leases and green leasing, but also work towards finding out what aspects are hindering these developments.

2 A Theoretical Framework: Green Leases, Green Leasing Sustainable Buildings and SFM

For the purposes of context and clarity, it is important to establish key definitions and contextual information of green leases, green leasing, sustainable building and SFM. The development of a sustainable building or sustainable building stock cannot be done or motivated entirely by the above criteria alone. Often a more formalised sustainably oriented corporate social responsibility (CSR) program is needed to go alongside it. According to Baumgartner *et al*., (2010), a successful sustainability-focused CSR program needs to be comprised of several key factors:

Figure 1 –



'Sustainable Development' (Baumgartner et al., 2010, p.77)

As illustrated in figure 1, the key elements consist of applying the qualities of the 'Triple Bottom Line' (economic, environmental and social sustainability) with more tangible corporate elements such as the '*legal*', '*technological*', '*market*' and '*cultural*' dimensions (Baumgartner et al., 2010, p.77). Furthermore, they describe dissemination and ideological qualities comprising sustainable CSR consisting of:

• *Introverted – risk mitigation strategy: focus on legal and other external standards concerning environmental and social aspects in order to avoid risks for the company*

• *Extroverted – legitimating strategy: focus on external relationships, license to operate*

• *Conservative – efficiency strategy: focus on eco-efficiency and cleaner production*

• *Visionary – holistic sustainability strategy: focus on sustainability issues within all business activities; competitive advantages are derived from differentiation and innovation, offering customers and stakeholders' unique advantages.* (Baumgartner et al., 2010, p.78)

These qualities aid in developing an understanding of why different sectors have different approaches to CSR policies. For example, the private sector, with sustainability initiatives tend to be motivated by the '*Extroverted*' approach due to the need to proactively gain customers through their own vision of sustainability as the vision is embedded in their corporate strategy and their products. On the other hand, the extroverted approach is less evident in their real estate portfolio which does not operate under a traditional commercial logic. For a public sector real estate owner, their approach tends toward the '*Introverted*' approach in the sense that sustainability

thinking will provide advantages to their organisation (lower maintenance costs, higher building standards) but are less focused on market and commercial pressures.
Sustainable building definition for this paper focuses on Berardi (2013) use of the term "*a healthy facility designed and built in a cradle-to-grave resource-efficient manner, using ecological principles, social equity, and life-cycle quality value, and which promotes a sense of sustainable community*" (Berardi, 2013, p.76). Whilst this covers numerous areas of the lifecycle of a building, the USA's Environmental Protection Agency have produced their own definition that is less technical, but possibly more holistic in a lifecycle context. They claim a sustainable building is "*the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. Green building is also known as a sustainable or high-performance building*" ("Green Building - Basic Information," 2014). Although there is no universal benchmark for what constitutes a sustainable building, certain types of sustainable buildings are leading the way. One such example, is a so-called '*Zero Emission Building*' (ZEB which is a building with a "*greatly reduced energy demand, such that this energy demand can be balanced by an equivalent definition of electricity (or other energy carriers) from renewable resources*" (Hestnes et al., 2017, pp.16-17). Although the quality of the indoor environment has been shown to have a positive impact on the health and well-being of occupants, salary costs are for the most part larger than the investment and operational expenses in buildings, despite humans spending 90% of their time indoors (Altomonte, et al., 2019, p. 254). However, sustainable buildings can require high investment costs to develop and construct, as well as perceived higher risks from the perspective of clients (Häkkinen et al., 2011, p. 242).
When considering a sustainable building, a keen eye on a building lifecycle focus is crucial in assuring any credibility of the term 'sustainable' in the context of the building in mind. Shah (2012) for example states that a sustainable building needs to consider the impact of embodied energy throughout the building's lifecycle in order to secure its sustainability (Shah, 2012, p.188). Life cycle assessments (LCA) are a crucial and critical component of this way of thinking, with such tools offering possibilities to develop strategies to implement and apply more environmentally furniture, materials and associated infrastructure that considers the whole lifetime of the building (Zabalza et al., 2009, p.2511). Multi-tenanted offices, however, present challenges of their own

however when looking at energy efficiency, particularly in current market conditions. Many institutional investors are not yet convinced by the need to upgrade the sustainable credibility of their building, even though possibilities exist in passing this on to tenants.

When it comes to a sustainable building, there is now increasing discussion of this in conjunction with SFM. Hinnells et al., (2008) stating, for example that sustainable leasing initiatives need to work in tandem with FM services who can support it (Hinnells et al., p2008, p.543) which can in term offer the potential to create bespoke Green Leasing (and Green Leases) specific SFM products and services. Tay *et al.,* (2001) define FM as "*the integrated management of the workplace to enhance the performance of the organisation*" (Tay and Ooi, 2001 cited in Junghans et al., 2014, p.71), which can also be considered to be ensuring the appropriate management, design and planning of an organisations non-core services (Toni and Nonino 2009, cited in Junghans et al., 2014, p.71). SFM takes the same concept as standard FM, but with its considerations conducted in the context of sustainability. Nielsen *et al.,* (2010) summed up the overall concept by stating that SFM is a form of FM that also "*include(s) consideration not only of core business and support functions but also relations with the local and global society as well as the climate and the ecosystem*" (Nielsen et al., 2010, p.3). Green Leasing fits comfortably into this SFM way of thinking. Whilst Green Leasing naturally requires SFM as a core component of its management, the appeal to the likes of corporate strategy and supporting core business objectives has been recognised in some recent research (Collins et al., 2018, p. 255).

Green Leases are an emerging leasing concept that has only begun to enter the lexicon of real estate (RE) in the past decade. They bridge the gap between sustainable buildings and sustainable FM, primarily by being the means by which a sustainable building can be managed through its leasing structure through supportive sustainably orientated FM (UNEP, 2014, p.11). They are primarily an occupancy stage Green initiative in real estate that contributes to the development of best practice leasing initiatives (Rameezdee et al., 2017, p.2), but can be negotiated and developed at other building lifecycle stages. There is no firmly established understanding amongst RE in general as to what constitutes a Green Lease, which in of itself may have a barrier in it's wider spread understanding or even a result of it. However, the British chapter of the Better Buildings Partnership (BBP) developed a Green Lease Toolkit that features one of the most widely cited definitions. In the toolkit, they define a Green Lease 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, p.2). These leases can be employed in both new and existing building. They also do not necessarily have employed in a building that is intrinsically designed to be green, such as a passive house. The clauses can be varied in scope and could feature measures to improve energy efficiency, organise targets for environmental performance, or improve the likes of water consumption (Bugden et al., 2013, pp. 14, 16 and 22). Whilst still not widely adopted in the non-residential sector as of yet, they are gaining traction. In the Sydney Chapter of the BBP for example, they quote that 60% of leases that were signed in their region in the financial years 2012/13 to 2013/14 had leases including green clause. This is a substantial increase from the 15% from the financial year 2008/09 (Bright et al., 2015, p.3). However, their implementation is not always straightforward. Axon *et al* (2012) state for example that he so-called 'landlord-tenants divide' is a key barrier to energy efficiency in buildings due to the different incentives of each stakeholder being incompatible with reducing energy consumption (Axon et al., 2012, p. 463.464).

A Green Lease, however, should not always be considered the same as 'Green Leasing', which can describe the process of leasing a building in a sustainable way, as opposed to referring to the lease document itself. Green Leasing has no universally agreed definition in RE lexicon and is still in its early phases of being 'fleshed out' as a concept. Whilst a dictionary definition of 'leasing' can be considered in one source to be that of the act of letting out an asset ("leasing," 2018), this definition alone is not sufficient in its need to define what constitutes a Green Leasing. A terminological investigation by Collins (2018) yielded literature from academia and practice that is indicative of referral to such a term being mostly used in the context of a process or service amongst those who write about Green Leasing (Collins, 2018, p.45). With this in mind, Green Leasing can be considered to be the act of leasing out a building in a sustainable way, which may or may not have a Green Lease document attached to the building. FM services are also a part of the Green Leasing story, with the supporting services that they offer (such as energy management support) being an integral part of Green Lease management. Existing literature has a broad scope of suggested motivations for employing Green Leasing type initiatives. For example, low running costs and a low environmental impact from a BREEAM rating or similar initiative

means that in many respects owners have a vested interesting in employing sustainable initiatives in their buildings (Bartlett et al., 2000, p. 318).

3 Methodology

2.1 Rationale for the Study

This study is a follow-on from a previous piece of research that looked into the barriers and drivers for the development of BREEAM certified offices in Norway, the United Kingdom (UK) and the United States of America (USA) (NOTE TO REVIEWER: Reference omitted for the sake of anonymous peer review). This study consisted of qualitative interviews with owners and tenants of 13 different buildings with a BREEAM certification (or 'Leadership in Energy and Environmental Design (LEED) in the case of the USA) from both the public and private sector, which contained both qualitative and quantitative elements.

This study yields interesting information with regards to the drivers, which were centred on corporate policy drivers for owners, whilst tenants were much more driven by rental and operational costs. For both stakeholders, the barriers were for the most part technical in nature, mostly relating to complex building development needs and bureaucratic challenges surrounding BREEAM certifications. Bureaucratic challenges were particularly noticeable for certifications outside the UK, where documentation had to be the UK BREEAM offices before a certification could be formalised. The importance of less tangible drivers such as CSR was considered to be an important finding of this study, due to the ability to exploit sustainable development to justify leadership in their industry. For a further study, a single country focus was considered more appropriate.

2.2 The Sample and Response Rate

The sample for this survey consisted of Norwegian building owners of rental offices from both the private and public sectors. The reason for the choice of Norwegian respondents was primarily due to the location of the authors and the contacts available to them in order to procure a sample. The choice of focusing on building owners was due to their essential roles in the day to day decision making and their experiences with their building project. Tenants were also included in the sample in order to establish if different barriers and drivers exist for each stakeholder. The choice of commercial offices but with the inclusion of both the private and public sectors was to see if different sectors had different experiences in their projects as far as drivers and barriers were concerned.

The criteria for sample size included networks in Norway that contained only or mostly individuals who were responsible for the decision-making processes in the development and/ or refurbishment of a sustainable office building or were responsible for the choice to rent an office in a sustainable office building. Four potential networks were considered, consisting of targeting individual contacts from a list of past students with relevant backgrounds for contact at a later date, with the other three being networks from professional property associations. Two of the professional networks declined involvement in this study. 'Norges bygg- og eiendomsforening' (NBEF) (in English – 'Norway's Construction and Building Association') chose to become involved and allowed access to their network.

The NBEF distributed the survey in the Norwegian language as part of their member's newsletter via email on 20th February 2018. The list consisted of 1700 email addresses, with 236 of those receiving this email clicking on at least one of the links in that email (with one potential link being the survey). Between February 20th 2018 and 14th March 2018, 55 individual respondents filled out the survey. No further responses were received after this point.

2.3 Choice of Method

One of the main goals for this project to was to try and reach a larger sample than the previous iteration that was done in the form of interviews. The authors were also keen to include more quantitative questioning that could result in responses that would have a usable validity in terms of a comparison between stakeholders. It was felt that an online survey would be the most appropriate approach when considering our research needs. The advantages of an online survey specifically, is outlined by Bryman (2012) who states that this approach (as opposed to a postal survey, for example) is low cost, has a fast response rate, better formatting, no restrictions on geographical coverage along with fewer unanswered questions and the hosting site doing much of the analytics (Bryman, 2012, pp.676-677).

The authors were also mindful of Bryman's stated disadvantages of this approach. Bryman states these as being a low response rate, only those with an internet connection having access to the survey, a potential lack of motivation on the part of the respondent, potential confidentiality and anonymity issues as well as the possibility of respondents giving multiple replies (Bryman, 2012, p.677). The authors weighed up the potential issues and felt that they were not significant enough to warrant a different approach. It was felt that the lack of online access was not an issue of significance to the almost

universal prevalence of internet access in businesses in Norway in 2018, and multiple answers could be somewhat avoided by asking for the occupation of the respondent to give some indication (although voluntary) as to who is responding to the survey. Confidentially issues can be addressed by not naming the organisations responding to the survey. The other disadvantages were addressed by procuring as large a valid a sample as is possible considering the resources and timeframe available.

The hosting medium chosen by the authors was Google Forms. This was chosen due to its ease of use, its ability to do some of the analytics to a high standard, along with the author's previous experience in this medium.

2.4 Survey Structure

The authors developed the survey over 7 months to give careful consideration in choosing an appropriate structure for the survey. Questions were decided based upon the research questions and were made quantitative where possible in order to provide appropriate and useful comparable data. The survey was eventually structured into the 4 sections - *'Respondent and Company Information', 'Drivers and Barriers', 'Green Leasing' and 'Sustainable FM'*.

For '*Respondent and Company Information*' it was important to understand what kind of companies they were, how big they were, where they had buildings and to know if they were from the public or private sectors. This section was important firstly to ensure we had valid respondents, and secondly to allow for stakeholder division for comparable data analysis of the other sections. Unlike the other three sections, this was divided in half and featured at the beginning and end of the survey in order to keep the respondents more motivated. The opening sections primarily focused on the company itself, whilst the latter sections concerned finding out information on the building they chose as an example for the later questions in earlier sections of the survey.

In the section on '*Barriers and Drivers*', stakeholders were asked to focus on one building in their portfolio that they considered being sustainable. They were then asked about the motivating factors for the development of the building, and what problems they faced. The choice of the specific drivers reflected drivers that were deemed important from the previous study ((NOTE TO REVIEWER: Reference omitted for the sake of anonymous peer review), motivated in this case by the possibility of doing a study in only Norway and with a larger sample.

The section on '*Green Leases*' asked for a portfolio-wide perspective and asked the respondents if they had heard of Green Leases if they use them, and which of the clauses they employ if they do.

In the final core section on '*Sustainable Facilities Management*', respondents were asked (primarily on portfolio level) if they use SFM, and if so in what form it took.

Prior to its distribution, the survey was tested with academic and practice-based colleagues, who provided feedback on structure and question clarity. Originally both an English and Norwegian language version was produced, however owing to the likely native language of the respondents, only the Norwegian language version was used. The completion time was around 7 minutes based upon feedback. Although the survey is designed and analysed with these definitions in mind, it is important to understand that the respondent answered the questions based on their own understanding of the term.

2.5 Analytical Framework

In terms of analysis, some of this was conducted by Google Forms, providing a variety of charts and graphs. However, this is not detailed enough for the needs of this survey, so the 'Statistical Package for the Social Sciences' (SPSS) was used. SPSS is a software package that has a primary function of providing statistical analysis for both interactive and batched approaches to data. The choice of this approach was primarily due to its respectability and relative standardisation in social science research, as well as the pre-existing skills of one of the authors. SPSS also provides several possibilities with regards to analysis. Furthermore, SPSS provides various functions such a Mean analysis, T-Table analysis and will also generate a variety of graphs, histograms and charts.

Descriptive statistics formed the primary form of analysis featured in this study. Whilst this was ultimately question dependent, the analysis consisted of either Descriptives (mean, median and mode, as well as variance and standard deviation) as well as Frequencies, which also provide the possibility to produce charts and graphs. Owing to the sample size, statistical significance tests such as Bootstrapping were not included. Also due to space requirements for this publication, not all of the result have been included, however, they may be published in another article at a later date.

4 Results

In this section, the results of the survey will be presented. Firstly, a brief overview of the respondents of the survey will be stated and then, a presentation of findings, those

being '*Barriers and Drivers*', '*Green Leases*' and ending with '*Sustainable Facilities Management*'.

4.1 Respondents

In terms of the gender demographic, 87.3% of respondents were Male, and 12.7% were Female. Respondents from the public and private sectors were evenly split, with 50% of respondents being from each sector. The employee numbers of companies varied from 1 to 25,000 with an average company size of 1070.44. For private sector respondents, the largest majority (37.9%) worked in guidance and planning of building projects. In the public sector, most of the respondents (44.8%) worked for a government agency, 41.4% worked for local and city councils, and 13.8% worked for county councils and municipalities. For both sectors, the highest majority of respondents (54 responses in total) were from project management, with equally weighted percentages (16.7%) were operations and technical leaders, property and project directors, as well as administrative and assistant directors. Of this total, 37% worked in real estate development and facilities management as an industry. Whilst to have complete certainty on the validity of the respondent's answers in relation to their roles, none of the job titles were removed enough from the criteria to warrant exclusion in the eyes of the authors.

Regarding the number of square metres the respondents had in their portfolio's, the highest incremental average was between 100,000 to 250,000 metres squared. In term of their portfolio's location, the vast majority (40.4%) were located in Oslo county, with the second highest split between Hordaland county and Akerhus county at (both at 8.5%). The rest of the respondents were from other areas of Norway.

For the single buildings in their portfolios, 62.8 % were older than 5 years and 37.2% were less than 5 years since their construction or last major refurbishment. 26.2% were built to Passivhaus standard. 18.6% of the buildings in the survey of the 42 who responded to the question were BREEAM-NOR certified, and of this figure, 62.5% were BREEAM Excellent certified, 25% were BREEAM Very Good and 12.5% were BREEAM Good certified. 85.7% used the BREEAM-NOR New Construction scheme, whilst the remaining 14.3% used the operational stage certification BREEAM In-Use.

4.2 Barriers and Drivers

In this section, we will look at the responses to the survey related to the barriers and drivers for the development, operation and refurbishment for a sustainable building.

Respondents answers reflect the consideration of just one building in their portfolio which they consider to be sustainable in order to understand the sustainability focuses of one particular project.

When asked which phase of a building's lifecycle is most important for interventions to improve the sustainability of their building, 64.8% of 54 respondents felt that the development and concept phase was the most important, followed by the planning and programming stage (51.9%), management and operations stage (40.7%) and finally the building and construction phase (31.5%). This provides some indication as to where Green Leasing was also considered in the lifecycle of the project, however, this was not dealt with specifically in the questioning. Although Green Leasing is a mostly operational phase concept, it would none the less benefit from consideration at earlier lifecycle phases. This could come in the form of more accurate sub-metering for tenants or improved building usability to better optimise Green Lease and Green Leasing implementation during the building operational phase. The could also be seeing the previous research project. Although the previous research study did not directly deal with Green Leasing's implementation at a specific lifecycle phase, tenants greatly valued being including in the design phases of their building, as having a say in the layout in their office has the possibility of improving their usability (NOTE TO REVIEWER: Reference omitted for the sake of anonymous peer review).

4.2.1 Drivers

Respondents were asked about the motivation and drivers for the development and/or refurbishment of their building, to which 32 respondents answered. From the private sector, 15 respondents answered this question, and 17 were from the public sector. The drivers are shown in table 1.

Factor	**Description**
Costs	Operational costs, construction costs, development and rehab costs
Green Certification	BREEAM, LEED and other sustainable building certifications
Legislative Compliance	Compliance with international, national and local governmental or legal regulations

CSR	Corporate social responsibility and other company orientated social responsible and philanthropic initiatives
Company Policy/ Culture	Policy within the company that is a part of their brand and influences
Industry/ Market Demand	Demand from consumers, clients and other stakeholders that use the services of the interviewee

Table 1 – Drivers for Building Owners and Tenants of Sustainable Buildings

Respondents were asked to rate each of these on the following scale:

1 = Very important 2 = Important 3 = Moderate 4 = of little importance 5 = Not Important

On average, owners believed construction costs were the most important driver, whilst the CSR to be the least important. For owners in the private sector, on average the most significant driver was that of costs, with the least significant being that of a green building certification. For owners in the public sector, the most significant driver is that of costs, and the least significant is that of CSR. The reason for this is unclear, however, costs appear to be the key driving for across both sectors.

The most significant driver for tenants in the context of the development of their building is that of costs in both the public and private sectors. Public sector tenants were also driven by market demand, in the context of expectations from the customers and trends within their industry. For tenants in the private sector, the least significant driver was green certification. For tenants in the public sector, the least significant driver is that of CSR. This represents a synergy in terms of values for both sectors that holds true regardless of stakeholder type, a finding that offers promise in terms of developing drivers that can be used to encourage the uptake of sustainable buildings in terms of their development and occupancy. This common driver also offers the possibility to push for Green Leasing, as by improving the sustainability of an office has scope to lower operational costs, an aspect of sustainable development that would be attractive to both sectors based upon the findings in this study.

4.2.1 Barriers

Respondents were next asked about barriers associated with the development and/ or refurbishment of the same building. A total of 34 of the respondents answered this question, 16 of which were from the Private sector, 18 of which were from the Public sector. Only building owners were asked to respond to this question.

The barriers selected for this section were based on the barriers raised during the qualitative questioning and narrative discussions from the previous study. They were used in this questionnaire in a quantitative form in order to allow them to be more comparable between participants.

The barriers the respondents were asked to consider are found in Table 2.

Factor	**Description**
Technical Barriers in the development, Planning, Engineering and concept phases	Barriers of a technical nature during the earliest phases of the building's lifecycle
Technical Barriers in the detailed design and Construction Stage	Barriers of a technical nature during the early stages of the building's lifecycle after the planning stages have been completed.
Technical Barriers after Construction i.e. BMS or Usability issues	Barriers of a technical nature during the operational phase of the building's lifecycle
Bureaucratic Barriers i.e. BREEAM certifications and local regulations	Barriers related to bureaucratic complications and challenges associated with voluntary or mandatory regulatory compliance.
Market Barriers i.e. problems with demand	Barriers related to marketability and vacancy rate of the building

Table 2 – Barriers for the Development of Sustainable Buildings for Owners

Respondents were asked to place these on a scale as in the previous question, with the scale here being:

1 = Very significant 2 = Significant 3 = Moderate 4 = of little importance 5 = Negligible 6 = Non-Essential

In the private sector, the most significant barriers had two equal averages, and they were those related to the first two stages of a building's lifecycle, those of the planning and concept phases. Bureaucratic barriers were the least significant for private sector actors. In the public sector, the most significant barriers were both construction stage barriers and bureaucratic barriers with equal averages. This is also reflected in the previous multi-country study, where barriers from the likes of BREEAM certification were considered to be overly convoluted for certifications conducted outside the UK. In the previous study, work on listed buildings also resulted in bureaucratic complications (reference removed for the sake of blind peer review). Market barriers were the least significant barrier, presumably due to the less profit focused model of many public sector organisations.

4.3 Green Leases

The emphasis of the awareness of Green Leases requested respondents to state if they were employed in their properties and in what form they took. When answering questions related to this section, the respondents were asked to consider their entire portfolio and not an individual building for the majority of questions.

4.3.1 Green Lease Awareness and Implementation

Respondents were first asked if they had considered using Green Leases in their portfolio, with a simple 'Yes's or 'No' response.

Have you considered using Green Leases/ Environmental Agreements?	**Percentage**
Yes	42%
No	42%
Did not answer	16%

Table 3 – Have you considered using Green Leases/ Environmental Agreements?

50 respondents answered this question, with 42% claiming they had considered using them, 42% claiming they had not, and 16% did not know as shown in Figure 1. In the case of respondents in the public sector (28 respondents), 25% of the respondents said they had considered using Green Leases. 46.4% had not considered using them and 21.4% did not know. 7.1% of the respondents from the public sector did not answer this

question. In the private sector, 27 respondents answered this question. 51.9% have considered using a Green Lease, 29.6% did not. 7.4% did not know, and 11.1% did not answer the question.

Next, respondents were asked if they use Green Leases or environmental agreements in their portfolios, once again with a simple 'Yes' or 'No' response.

Do you use Green Leases or environmental agreements in your organisation?	**Percentage**
Yes	34%
No	66%

Table 4 – Do you use Green leases or environmental agreements in your organisation?

A total of 50 respondents answered this question, with 34% using green leases and agreements, and 66% not, as seen in Table 4.

Do you use Green Leases or environmental agreements in your organisation? (Public Sector)	**Percentage**
Yes	46.4%
No	46.4%
Did not answer	7.1%

Table 5 – Do you use Green Leases for environmental agreements in your organisation? (Public Sector)

In the public sector (28 respondents), equally 46.4% did and did not use these agreements. 7.1% of the public sector respondents did not answer this question.

Did you use Green Leases of environmental arrangements in your organisation? (Private Sector)	**Percentage**
Yes	14.8%
No	74.1%
Did not answer	11.1%

Table 6 - Do you use Green Leases for environmental agreements in your organisation? (Private Sector)

In the private sector, 14.8% used such an agreement, and 74.1 did not. 11.1% did not answer the question.

For the next question, building owners were asked to once again refer to the single building from the previous section. Further to this, respondents were asked to respond 'Yes' or 'No' to a question asking them if they had marketed this building as a sustainable one to prospective tenants. 30 respondents answered the question, and 30.8% claimed to have marketed their buildings as a sustainable one, and 69.2% did not. In the public sector, 28 respondents claimed that 25% marketed their building as sustainable, and 50% did not. 25% of public sector respondents did not answer the question. In the private sector of 27 respondents, 18.5% claimed they did market their building as a sustainable one, 48.1% did not and 33.3% did not answer the question.

4.3.1 Green Lease Clauses

The authors were also interested to find out what kind of clauses the leases contained from the respondents who said 'Yes' to using such a lease in their portfolio. The BBP 'Green Lease Handbook' and information gained from the previous studies interviews was used to form a list of potential clauses. Respondents were asked to tick boxes if their Green Leases and environmental agreements contained these clauses.

The clauses they were asked to consider were:

'Objectives and limits for energy consumption (kwh - CO2 emissions)', 'Obligations and agreements on targets for recycling', 'Use of specialist expertise for analysis of sustainable solutions', 'Systematic data collection and analysis of consumption of energy, water, drainage, etc.', 'Obligatory agreements on sustainable purchasing obligations', Obligatory agreements regarding sustainable maintenance, repair or reconstruction'.

17 respondents answered this question, with 58.8% of respondents (10 respondents) agreements containing objectives for energy usage. 52.9% had both obligations for recycling and systematic data collection. 23.5% had both agreements on sustainable purchase obligations, and sustainable maintenance and repair obligations. 5.9% had other clauses.

The final question of this section asked owners if their tenants were expected to contribute to the daily operation of the building and technical installations to meet sustainability goals. This question required a 'Yes' or 'No' answer and 37 respondents answered the question. 64.9% said yes, and 35.1% said no. In the public sector, of 28 respondents 57.1% said yes, and 25% said no - 17.9% did not answer the question. In the private sector, 29.6% said that their tenants were expected to contribute, 22.2% said that they did not, and 48.1% did not answer the question. All of the respondents from both sectors were asked qualitatively in what ways they were asked to contribute. They stated varied ways by which contributions were made, such as following up on operating procedures, energy monitoring, contributions to the indoor environment, temperature and ventilation. Shared costs and discussions about goals also featured, as well as following the instructions and agreements established for the use of the buildings. Taking responsibility for energy consumption was also cited. This is intrinsically linked with discussions concerning SFM. FM's would need to involved at early design phases of the development of a building, as they not only have the expertise to ensure sustainable management of a building but may also have the competence to ensure that the building is optimised in its design and infrastructure in order to meet these needs.

4.4 Sustainable Facilities Management

When encompassing both the barriers and drivers and Green Leases as sustainable elements of the buildings themselves, SFM is in some cases considered a crucial component of ensuring that such buildings come as close to reaching and maintaining their sustainable credibility as possible. In this section, respondents were asked to take a portfolio-wide perspective.

4.4.1. SFM

To begin with, building owners were asked if they had included FM's and /or members of their technical divisions in the planning, design and later construction of their projects. 51 answered the question, and 82.4% said yes to inclusion, and 17.6% said they did not include them. Respondents were then asked about their FM from a different

perspective, by asking them if they considered the operations of FM in their building stock to be sustainable. 89.6% of the 48 respondents that answered the question claimed they did, and 10.4% said that they did not.

The survey moved on to ask more specifically as to what kind of SFM the respondents employed if they claimed to use it. Respondents were asked to tick a box to acknowledge which elements of SFM they used from a list of potential aspects and could tick all that applied to their case. The SFM aspects were chosen based upon practice literature and from information gained from interviews in the previous study. The elements respondents were asked to consider were:

'Cleaning', 'Procurement and Purchasing', 'Energy Management', 'Building Maintenance', 'Outdoor Maintenance', 'Welfare Facilities', 'Environmental Management', 'Energy Performance Contracting (EPC)', 'Technical Installations', 'Consulting', 'Management, Operations and Maintenance (MOM)'

Service	**Percentage of Respondents Employing Service**
Cleaning	51.2%
Procurement and Purchasing	30.2%
Energy Management	95.3%
Building Maintenance	79.1%
Outdoor Maintenance	39.5%
Welfare Services	7%
Environmental Management	44.2%
Energy Performance Contracting (EPC)	7%
Technical Installations	67.4%
Consulting	14%
Management, Operations and Maintenance (MOM)	2.3%

Table 7 - What types of Sustainable MOM/ Facilities Services do you employ?

Out of the 43 respondents that answered this question, 95.3% has energy management as a part of their SFM infrastructure. 79.1% operated sustainable building maintenance, whilst 67.4% had sustainable considerations in their technical installations as seen in Table 2. 51.2% employed sustainable cleaning operations, and 44.2% employed environmental management. Sustainable outdoor maintenance was used by 39.5% of the respondents, whilst consulting only featured in 14% of respondents portfolios. Welfare facilities and EPC's were at 7%, and the bottom with 2.3 % was the implementation of a new MOM program.

4.4.2 Support for Sustainability

Although not always entirely directed at SFM, support for improving the sustainability of building stock from external organisations is vital for many companies in meeting their goals. Major Norwegian bodies that provide these sorts of support were listed, and respondents were asked if they had received support from any of these groups.

The groups were:

ENOVA – A state-supported consultancy providing guidance and financial support to improve the sustainability of buildings.

Innovation Norway – The Norwegian Government entity that supports companies in developing their competitive advantage through innovation.

The Norwegian Research Council – Norway chief advisory body on issues of research policy

BREEAM – Europes most widely used sustainable certification for buildings

The Norwegian Green Building Council (NGBC) – The Norwegian National Scheme Operator (NSO) for Norwegian BREEAM and LEED Certifications

Norsk Eiendom – An industry association for private property owners in Norway

Of the 46 responses to this question, 78.3% received support from ENOVA, 6.5% from the Norwegian Research Council, 4.3% for both NGBC and Innovation Norway, 2.2% from BREEAM and none for Norsk Eiendom. 21.7% of these respondents received no support from any of these organisations. The dominance of ENOVA is representative of robust state support for sustainable development of the built environment when compared with other organisations. Whilst this could be in part due to the more

stakeholder supportive (and less overtly commercial) characteristics of such an organisation, it could also due to ENOVA's main responsibilities. Whilst the other organisations (which the exception of BREEAM) offer support for sustainable development as an aspect of their many other roles, sustainability in buildings is the primary role of ENOVA.

In order to obtain more detail, respondents were asked about what kind of support they had received from the organisations. They were asked to tick all of the following that applied:

'Finance', 'Consulting Services', 'Networking', 'Access to Technology and Resources'

Of the 35 responses to this question, 88.6% received financial support, 31.4% used consultation services, 11.4% used the networking possibilities available and 5.7% used the access to technology and resources offered to them. This result can be linked to the previous section of this survey where costs were considered an important driver. With organisations such as ENOVA offering financial support, this offers scope to diminish and even possibly eliminate some of the barriers resulting from costs, whilst also offering financial incentives (and thus 'drivers') to improve the sustainable credibility of their building. Sustainability in the built environment is often linked with substantial costs (such as installing an HVAC system) with organisations such as ENOVA having the possibility not just eliminate the costs barriers, but incentivise expensive sustainable renovations and building development.

5 Discussion

In the concluding section of this paper, we will look into how the results of the survey reflect on the research questions. Each question will be considered in turn as per those stated at the beginning of the paper, as well it is hoped to better develop an understanding as to the degree to which this attempts to fill in the knowledge gaps that currently exist not just in academic literature, but also in the marketplace more generally.

5.1 The barriers and drivers for the development, rental and refurbishment of sustainable rental office buildings in Norway

In the case of all of the stakeholders from all sectors, costs were the most important driving factor in developing their building in a sustainable way. This demonstrates not just a common factor, but also possibilities in the context of financing, marketing and certification methodologies it illustrates a possible common language that can be used

in further development in this field. This differed from the results of the previous study, where less tangible drivers such as CSR were the most common driving factors (NOTE TO REVIEWER: Reference omitted for the sake of anonymous peer review). This also links to the previously mentioned work of Baumgartner (2010), in this sense that although CSR was one of the lesser valued drivers, it is none the less linked in the form of Baumgartner's so-called '*Introverted*' CSR strategy. Whilst may not have been a conscious decision by the respondents, this cost focus leads them to make sustainable orientated business decisions, as well seeking motiving financial help from the likes of ENOVA.

When it came to the least significant drivers, these were both stakeholder and actor-specific. In the private sector, both owners and tenants valued green certifications the least overall. For the public sector, both stakeholders equally shared CSR as a lower end driver when compared to other factors such as costs, and a green certification. Whilst not having the same level of commonality as the higher valued drivers, this data shows sector specific commonality that can also be used either to better understand why these drivers are less of a priority or how to make them more valued as sustainable development moves forward.

With regard to barriers, the private sector experienced challenges to the construction stage also, they were equally challenged at the planning stages. Whilst the survey in the study approached this question quantitatively, the previously showed that construction phases barriers were broad in scope, ranging from problems with constructing the building to local regulatory challenges (NOTE TO REVIEWER: Reference omitted for the sake of anonymous peer review). In the public sector, the construction challenges were significant, but also equally weighted with bureaucratic challenges. These findings are indicative of a need for the industry to find ways to overcome construction challenges that may also benefit the difficulties presented in other areas of the building lifecycle, such as commissioning.

A similar pattern can be seen for the least significant barriers. Overall these were bureaucratic, which is shared with the private sector, for the public sector market barriers were the least significant. This also contradicts the results from the interview-based research, where bureaucracy was a significant barrier for many interviewees, particularly in the context of BREEAM certifications (NOTE TO REVIEWER: Reference omitted for the sake of anonymous peer review). This differing of least

significant barriers would benefit from further research to establish as to why there are two different responses for two different sectors.

These findings are indicative of a change of priorities from the interviews in the previous study, as here costs are a significant factor for all stakeholders. In the previous study, the valued drivers were almost opposite, with CSR and green certifications being the more valued of the drivers. Cost was very much a low priority for Owners in the multi-country study, however, they were one of the more valued drivers in the case of tenants (NOTE TO REVIEWER: Reference omitted for the sake of anonymous peer review). The lack of consistency for both sectors in terms of the least significant drivers (CSR in the case of tenants, Green certifications in the case of owners) across stakeholders and sectors represents a challenge in the addressing them due to the degree of fragmentation. Whilst the synergy in terms of the most valued drivers offers positive scope to capitalise on this for interested stakeholders, the fragmentation in the other direction shows that more work needs to be done to demonstrate to stakeholders the sustainability value of some drivers, such as CSR. For barriers, there is an impression in all sectors that construction, planning and bureaucratic barriers should be a priority in moving forward with the development of sustainable rental offices.

5.2 The extent that Green Leasing is understood and deployed in sustainable rental office buildings in Norway

In terms of Green Leases, the 50/50 of public and private sectors split between the sample does not provide much in terms of understanding how it is valued. The public sector, however, a sizable amount of respondents (46.4%) did not consider using them. The private sector however more amenable to the prospect, with more than half considering a Green Lease option. An interesting twist, however, occurs when looking at the data associated with Green Lease implementation. Despite the previous statistic, nearly half of public sector respondents (46.4%) were using Green Leases, with the same percentage not. It was quite different in the private sector, with 14.8% using a Green Lease. This figure appears to be indicative of a sizable gulf between both sectors. The lower percentage of consideration in the public sector could be indicative of an implementation plateau in the current market, whilst the private sector is warming up to the concept which is yet to result in widespread implementation at the present time. It would be interesting in a further research project to establish why this sector difference is so marked. This also links once again to Baumgartner (2010), where the public sector is employing the '*visionary*' quality of CSR implementation. The more corporate

focuses of Baumgartner's work (particularly the 'market' element) may go some way toward explaining this. Whilst Green Leases and Green Leasing represent a visionary perspective on sustainable development in the built environment, this has to be compatible with market-based visions also. With the public sector being in many cases less market focused, this market-based CSR value is diminished. The public sector may also be influenced by national strategies and goals, which in the case of Norway can the previously mentioned 'Green Shift'. With this focus in mind, such a strategy may be expensive and challenging to implement, however, this is not significantly reduced in implementation due to the national interest being considered a greater priority that many markets focused challenges in public sector sustainability strategies.

In terms of marketing their building, there was once again a substantial difference in each sector as to whether they marketed their building in a sustainable way. A quarter of public sector respondents marketed their building this way, as opposed to only 18.5% of private sector participants. There was also a correlation between the implementation of Green Leases with expectations of users participating in a building's sustainability, with 57.1% of respondents in the public sector expecting users participate, as opposed to 29.6% in the private sector. This appears to be indicative of a public sector more extrovert in promoting its sustainability when compared to the private sector.

5.3 *Sustainable facilities management, and how it is deployed in sustainable rental office buildings in Norway*

The implementation of SFM in the building stock of the respondent companies illustrates more than 80% of respondents considered their FM to be sustainable and energy management is the most prominent aspect deployed. The top three SFM aspects were all technical in nature (sustainable maintenance and sustainable technical installations being the other two) which implies that technology management is a major component for SFM in these organisations. Tactical and strategic intervention is lower down the list, as well as contractual level infrastructure like EPC's. These percentages not only illustrate the nature of SFM in the respondent's organisations but is also indicative of the technical competencies required in order for it to be effective. This poses further questions regarding if FM's have the technical competencies to align a building sustainability ambition with the skills necessary to implement them.

With regards to SFM deployment and sustainability support, this data indicates a need for good technical competencies amongst SFM teams and providers to help support the

needs of their organisations. It is also noticeable that perceptively these results indicate that SFM is becoming an important consideration for these organisations as far as implementation is concerned.

6 Conclusion

In conclusion, this paper indicates in its sample a picture of how sustainability considerations are represented in the Norwegian real estate landscape in rental offices. In terms of barriers and drivers, costs are a driving force through each sector. Such a commonality offers scope by which real estate companies and supporting organisations can address not just cost as a driver (i.e. operational savings reductions), but also as a barrier (i.e. high costs of construction). This can also be seen as linking with the fact that 88.6% of respondents received financial support for supporting organisations. Similarly, with barriers, these can be met by better addressing early stage lifecycle challenges.

An interesting result to come out of this project has been the differences between the public and private sectors on Green Leases, which demonstrates how the different the needs are of both sectors. Whilst the private sector is considering this option, the public sector is considerably ahead in terms of their implementation. It would be interesting to see if that pattern would hold true with a larger sample.

SFM appears to be widely adopted by the sample and is primarily technical in its nature. This represents not just the reliance on technology to support the sustainability of their buildings, but also that SFM teams operations are being increasingly supported by more high tech buildings and less so on more traditional techniques in less optimised building stock.

In terms of future research, this study would benefit from a larger sample size and an international survey. This would not only increase the statistical significance but also provide scope to see how generalisable these results could be. The results of this survey are of use not just to property developers and FM companies, but also architects and those working with sustainability support, both from the finance and certification ends of the spectrum. There is still research needed on a broader building level and value, as this will drive how the barriers and drivers are addressed going forward. Brown *et al* (2015) makes this point, stating that a theoretical discussion remains as to how value in

the real estate sector can be linked with absolute measures of sustainability from a global perspective (Brown et al., 2015, p. 11).

In conclusion, whilst the 'green shift' remains a 'shift' and not an 'event', it makes clear that a better understanding as to the opportunities this presents, the challenges that come with it and the market's acceptance of it all must ensure that this 'shift' is one that maintains a forward momentum.

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Paper VIII