

Riina Emilia Meriläinen

THE PROCESS OF CONSTRUCTING GREEN ROOFS

Sustainability and stakeholder engagement

Faculty of Management and Business

Master's Thesis

April, 2020

Supervisors: Anna Heikkinen,

Johanna Kujala

ABSTRACT

Riina Emilia Meriläinen: The process of constructing green roofs – Sustainability and stakeholder engagement
Master's Thesis
Tampere University
Master's Degree Programme in Business Studies, Management and Organizations
April, 2020

Urbanization is rising on a global scale creating both environmental and socioeconomic challenges and increasing threats to human health and the environment. When looking at a traditional city view, buildings' roofs have so far been unused spaces. However, if turned into green roofs they could offer benefits for the urban environment and human quality of life. Despite the known benefits of green roofs, they do not appear widely. In addition, green roofs have been commonly examined through their technical requirements without examining stakeholders and their engagement. Thus, there is a lack of both theoretical and practical research on the process of constructing green roofs from a stakeholder engagement perspective.

The objective of this research is to examine how the process of constructing green roofs can be enhanced through stakeholder engagement. This process consists of the designing, installing and maintaining of green roofs requiring the involvement of multiple stakeholders. The stakeholder engagement perspective focuses on the stakeholders and their relations in this process. Sustainability is closely linked to the process since green roofs are examined as a solution to contributing to sustainability in urban areas.

The theoretical framework utilises previous literature on sustainability, stakeholder engagement and green roofs. It focuses on drawing a synthesis between green roofs and sustainability and stakeholder engagement and sustainability.

This study is based on the qualitative research tradition as the empirical data and its analysis are qualitative in nature. The empirical data consists of six semi-structured interviews of seven green roof stakeholders. The analysis is conducted using an inductive qualitative content analysis.

The empirical observation focuses on the characteristics of the process of constructing green roofs in Finland, examining stakeholder relations and stakeholder engagement in that process.

The empirical findings suggest that city planning is a powerful instrument affecting the process of constructing green roofs. The identified obstacles indicate stakeholder relations and interests slowing down the process of constructing green roofs or preventing it from happening at all. The identified drivers indicate factors which are enabling the process of constructing green roofs whilst contributing to sustainability. Stakeholder engagement ensures that the benefits of green roofs are better understood among stakeholders and taken into account in the different phases of the process. Thus, stakeholder engagement can help to overcome stakeholder conflicts and create mutual stakeholder interest.

This study contributes to increasing understanding of sustainability and stakeholder engagement in the process of constructing green roofs. Since previous literature on green roofs has not examined the process of constructing green roofs from the stakeholder engagement perspective, this study adds valuable knowledge into existing literature and practical research. In addition, this study contributes to examining green roofs' ability to contribute to urban sustainability and possible reasons why green roofs are not common despite their known benefits. This study targets managers and policy makers to understand the process of constructing green roofs from a stakeholder engagement perspective in contributing to sustainability.

Keywords: green roofs, stakeholder engagement, stakeholders, sustainability, urban sustainability, qualitative content analysis, inductive approach

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

TABLE OF CONTENTS

1 INTRODUCTION	4
1.1 Background of the study	4
1.2 Research objective and research questions	6
1.3 Key concepts	7
1.4 Research design and structure	8
2 THEORETICAL FRAMEWORK	11
2.1 Sustainability	11
2.1.1 The concept of sustainability	11
2.1.2 Managing for sustainability	13
2.1.3 Urban sustainability	14
2.1.4 Synthesis of sustainability	16
2.2 Stakeholder engagement	17
2.2.1 Stakeholder approach	17
2.2.2 Stakeholder relations	19
2.2.3 Communicating with stakeholders	22
2.2.4 Learning with and from stakeholders	23
2.2.5 Synthesis of integrative stakeholder engagement.....	24
2.3 Green roofs building resilience in urban areas.....	26
2.3.1 Characterizing green roofs	26
2.3.2 Benefits of green roofs	27
2.3.3 Green roofs as a part of nature-based solutions.....	29
2.3.4 Constrains of green roofs.....	30
2.3.5 Synthesis of green roofs	31
2.4 Synthesis of theoretical framework.....	32
3 RESEARCH METHOD.....	36
3.1 Data collection.....	36
3.2 Analysis of the data	38
4 EMPIRICAL FINDINGS	42
4.1 The process of constructing green roofs in Finland	42
4.1.1 Stakeholders in the process of constructing green roofs	42
4.1.2 Regulation in the process of constructing green roofs	44
4.1.3 Obstacles in the process of constructing green roofs	46
4.1.4 Drivers in the process of constructing green roofs.....	56
4.2 Stakeholder engagement in the process of constructing green roofs	62
4.2.1 Stakeholder engagement activities	62
4.2.2 Stakeholder engagement in contributing to obstacles, drivers and regulation	64
4.3 Summary of the empirical findings.....	66
5 DISCUSSION	68
5.1 Theoretical contribution	68
5.2 Managerial implications	72
5.3 Evaluation of the study and suggestions for future research.....	74
RERERENCES	77
APPENDIX.....	83
APPENDIX 1: Interview guide translated from Finnish	83

LIST OF FIGURES

FIGURE 1 THREE ASPECTS OF SUSTAINABILITY 11

FIGURE 2 STAKEHOLDER ENGAGEMENT FRAMEWORK (FREEMAN ET AL., 2017, 5) 19

FIGURE 3 GREEN ROOF STRUCTURE (GRO, 2014; VIJAYARAGHAVAN, 2016) 26

FIGURE 4 AN ILLUSTRATION OF THE INDUCTIVE ANALYSIS PROCESS 39

FIGURE 5 STAKEHOLDER PARTICIPATION TIMELINE 43

FIGURE 6 STAKEHOLDER ENGAGEMENT ACTIVITIES 62

FIGURE 7 INTERCONNECTEDNESS OF STAKEHOLDER ENGAGEMENT 64

LIST OF TABLES

TABLE 1 SUMMARY OF INTEGRATIVE STAKEHOLDER ENGAGEMENT..... 25

TABLE 2 SUMMARY OF RELATIONS BETWEEN ASPECTS OF SUSTAINABILITY, THE
PROCESS OF CONSTRUCTING GREEN ROOFS AND INTEGRATIVE STAKEHOLDER
ENGAGEMENT 33

TABLE 3 SUMMARY OF THE INTERVIEWS 38

TABLE 4 EXAMPLE OF THE CODING PROCESS 41

TABLE 5 STAKEHOLDER CATEGORIES AND STAKEHOLDER GROUPS 42

TABLE 6 OBSTACLES IN THE PROCESS OF CONSTRUCTING GREEN ROOFS 47

TABLE 7 DRIVERS IN THE PROCESS OF CONSTRUCTING GREEN ROOFS 57

1 INTRODUCTION

1.1 Background of the study

Urbanization is increasing all over the world when people are moving from rural areas into cities. It is estimated that in 2018, 55.3 per cent of the world's population lived in urban areas (United Nations, UN, 2018). In Finland, 61 per cent of people lived in cities in 2018 (Tilastokeskus, 2019). It is expected that globally one in every three people will live in urban areas by 2030 (UN, 2018). Whilst urbanization increases in every part of the world, cities are becoming more crowded and the need for green spaces is rising. This creates both societal and environmental challenges (Martinez-Bravo, Martinez-del-Rio & Antolin-Lopez, 2019) which increase threats to human health and wildlife. Creating healthy and sustainable urban living habitats is a modern-day challenge.

When looking at a traditional city view, buildings' roofs and rooftops have so far been mostly unused space. However, if turned into green roofs, their potential could be realised offering multiple benefits in an urban environment. Green roofs can be used to provide habitats for urban wildlife, thus increasing biodiversity (Francis & Lorimer, 2011) and for stormwater management helping prevent floods and polluted run-offs (Miller, 2008). They can provide savings in energy costs through insulating effects for both cooling and warming (Alexandri & Jones, 2008), the result being a more efficient and cost-effective solution when compared with more traditional approaches, such as air conditioning systems (European Commission, 2015). Green roofs can also be used to mitigate the urban heat island effect and to create amenity values, such as marketing appeal (Snodgrass & McIntyre, 2010). Green roofs can also be a part of the solution to combat climate change, especially when implemented widely (European Commission, 2015).

The process of constructing green roofs requires the involvement of a broad range of stakeholders. The stakeholder approach has become a central approach to addressing and managing sustainability issues (Freeman, Harrison, Wicks, Parmar, & De Colle, 2010) and it is a current topic in management and organizational research. Stakeholders are becoming increasingly interested in the impacts a company has on society and the natural

environment. Companies need their stakeholders in order to exist and perform (Dmytriiev, Freeman, Kujala & Sachs, 2017). Thus, a company needs to understand stakeholder relationships and engage with their stakeholders in sustainability efforts in order to create long-term successes (Freeman et al., 2010). In addition, stakeholder engagement has an important role in contributing initiatives for biodiversity (Boiral & Heras-Saizarbitoria, 2017), thus providing benefits which companies may not have achieved without stakeholder engagement (Stubbs & Cocklin, 2008).

Despite the known benefits of green roofs, the appearance of city roofs has not changed, and many green roof projects still fail and do not see daylight. Even though stakeholders have raised their concerns about climate change and biodiversity loss, together with the need for green spaces in urban environments, green roofs are not common. There have been cases where green roofs appear in illustrations but not in the final completed projects.

Businesses, alongside with regulators and other stakeholders, have an important stake in contributing to sustainability (Freeman et al., 2010; Hörisch, J., Freeman, R. E., & Schaltegger, 2014; Boiral & Heras-Saizarbitoria, 2017) and creating a healthy urban environment (Miller, 2008; European Commission, 2015; Eggermont, et al., 2015). Understanding the process of constructing green roofs from a stakeholder engagement perspective (Freeman et al., 2017; Kujala & Sachs, 2019) may help to increase overall understanding of creating healthy and sustainable urban living habitats (Lorr, 2010; Marans, 2015) for both human and non-human stakeholders (Driscoll & Strarik, 2004; Laine, 2010). Thus, combatting urbanization by addressing societal and environmental challenges.

The topic of this thesis can be considered quite fresh and this is reflected in the sources used in the thesis. On a large scale, the topic is related to climate change, urbanization and biodiversity loss. All of these pose major challenges for businesses and society at large. Green roofs could provide possible solutions to address these global issues on a local scale. However, green roofs have been examined mostly through their technical requirements without paying much attention to stakeholders and their engagement. Consequently, there is a dearth of previous research on how different green roof stakeholders are involved in the process of constructing green roofs. Thus, more

theoretical and practical research is needed from a stakeholder engagement perspective on the process of constructing green roofs.

1.2 Research objective and research questions

The objective of this study is to examine how the process of constructing green roofs can be enhanced through stakeholder engagement. The process consists of designing, installing and maintaining green roofs and requires multiple different stakeholders. The stakeholder engagement perspective focuses on the stakeholders and their relations in this process. Sustainability is closely linked to the process since green roofs are examined as a solution to contributing to sustainability in urban areas. Stakeholder engagement in the process of constructing green roofs is the core of this study.

Therefore, the research question of this study is:

- 1) How can the process of constructing green roofs be enhanced through stakeholder engagement?

To be able to answer the research question combining previous literature with empirical observations is required. The theoretical part of this study examines previous literature on sustainability, stakeholder engagement and green roofs. It focuses on drawing a synthesis between green roofs and sustainability and stakeholder engagement and sustainability since green roofs are examined as a solution to contributing to urban sustainability. The empirical part focuses on examining the process of constructing green roofs from a stakeholder engagement perspective. Thus, the research question will be answered through combining the synthesis of previous literature and the empirical observations of this study.

Therefore, this study contributes to increasing understanding of sustainability and stakeholder engagement in the process of constructing green roofs. Since previous literature on green roofs has not examined the process of constructing green roofs from the stakeholder engagement perspective, this study adds valuable knowledge into existing literature and practical research. In addition, this study contributes to examining green roofs' ability to contribute to sustainability and possible reasons why green roofs are not

common despite their known benefits. This study targets managers and policy makers to understand the process of constructing green roofs from a stakeholder engagement perspective in contributing to sustainability especially in urban areas.

1.3 Key concepts

Sustainability: At its core the concept of sustainability emphasises the use and depletion of natural resources in the Earth's biophysical environment (Portney, 2015). According to Arias-Maldonado (2013) sustainability considers the relations of the environment and society in the long-term, arguing that the key question with sustainability is how to maintain a pool of resources while facing an unknown future. Thus, sustainability is close linked to finding balance between Earth's carrying capacity and economic growth (Portney, 2015). As a result, sustainability incorporates the economic, social, and environmental aspects.

Green roofs: Green roofs, also called vegetated, eco or living roofs, can be defined as roofs of a building covered completely or partly with vegetation on top of a growth medium (Vijayaraghavan, 2016).

Stakeholder: Freeman (1984, 46) has originally defined a stakeholder as 'any group or individual who can affect or is affected by the achievement of organization objectives.' In an issue-based approach, the term stakeholder can also be defined as 'any group or individual who can affect or is affected by the approach to the issues addressed by the network' (Roloff, 2008, 238). Also, it is noted that both human and non-human entities, referred to as 'nature as a stakeholder', can hold stakeholder status (Driscoll & Strarik, 2004; Laine, 2010).

Stakeholder engagement: There exists a diversity of definitions on stakeholder engagement depending on the forms and practices across different industries and areas (Kujala & Sachs, 2019). According to Maak (2017), stakeholder engagement refers to the different forms of stakeholder interactions. Greenwood (2007, 315) refers to stakeholder engagement as the different practices which organizations use for involving stakeholders in a positive way in their undertakings. Thus, stakeholder engagement can be seen as

applying stakeholder theory in practice in businesses and organizations (Freeman, Kujala, Sachs, & Stutz, 2017); Freeman et al., 2010; Greenwood, 2007).

1.4 Research design and structure

This study was initiated in August 2018, as part of the Business to Nature (B2N) research project in Tampere University. The B2N research project aims to develop a stakeholder-driven understanding of ecosystems in urban environments by examining the relationship between businesses and nature. The project is funded by the Academy of Finland for 2016-2020. (Business2Nature, 2020.)

This study is based on the qualitative research tradition as the empirical data and its analysis are qualitative in nature. Qualitative research is being used as a broad term for varying scientific methods. Qualitative research can have at least 34 characteristics, which is a lot more than quantitative research. According to a narrower definition, qualitative research can refer to a method of data collection. (Tuomi & Sarajärvi, 2009.)

Qualitative content analysis is widely used in business and social science research (Koskinen, Alasuutari & Peltonen, 2015). It is considered as a method for assessing theoretical questions and used to increase understanding of both qualitative and quantitative data (Elo & Kyngäs, 2008). Content analysis offers three major benefits: it reduces data, it is systematic, and it is flexible (Schreier, 2013; Elo & Kyngäs, 2008). Since the purpose of this study was to increase understanding of the process of constructing green roofs from a stakeholder engagement perspective, I chose qualitative content analysis as the most suitable method to comply with this aim due to its systematic nature and flexibility.

According to Elo and Kyngäs (2008), content analysis can be used in an inductive or deductive approach to analyse data. For inductive analysis, it is typical that the concepts are derived from the data as a bottom-up approach (Elo & Kyngäs, 2008) using comprehensive readings of the transcribed data to develop new concepts, themes or a model through interpretation (Thomas, 2006). This study was conducted with an inductive approach since the purpose of this study was not to test a theory, but rather to examine the process of constructing green roofs, and to enhance understanding of

stakeholder relations and stakeholder engagement in that process. According to Lauri and Kyngäs (2005), an inductive analysis is commonly used when the previous knowledge about the examined phenomenon is lacking understanding or the knowledge is fragmented. Since previous knowledge about the process of constructing green roofs from a stakeholder engagement perspective is lacking, I decided to derive the research findings from the data using an inductive approach.

After getting familiar and drawing a synthesis between previous literature on sustainability, stakeholder engagement and green roofs, I decided to collect the empirical data using semi-structured interviews. The data collection occurred during a two-month period from April 2019 to May 2019. Later, I combined it with data previously collected by B2N research project members, which was closely interconnected with the area of research of this study. After the collection of the data, I then analysed it during the Autumn of 2019. During the analysis process, I simultaneously examined the existing literature on the topic and the empirical findings to refine the research questions deeper. At the beginning of the year 2020, I wrote down the findings and the conclusion of the study.

The thesis is structured as follows. The first chapter introduces the background of the study, the objective of the study and the research questions, the key concepts used in this study and the research design and structure.

Chapter 2 presents a theoretical framework for this study. It utilises previous academic literature of sustainability, stakeholder engagement and green roofs. The aim of this chapter is not to present a complete literature review, but rather to draw a synthesis between green roofs and sustainability, and stakeholder engagement and sustainability.

Chapter 3 presents the research method. It presents the data collection method of the empirical data and the inductive analysis of said data. The chapter aims to give the reader an understanding of the methodological choices made in this research in accordance with its qualitative nature, as well as describing the analysis process in a detailed way, giving the opportunity for the reader to follow the analysis process, and to thus increase the reliability of the study.

Chapter 4 presents the description of the empirical findings. First, the process of constructing green roofs including: the stakeholders in the process, regulation affecting the process, the obstacles in the process and the drivers in the process. Second, the identified stakeholder engagement activities and a synthesis of these stakeholder engagement activities contributing to regulation, the obstacles and the drivers in the process of constructing green roofs. Third, the presenting of a summary of the empirical findings.

Finally, chapter 5 presents the conclusion and discussion of the study. The chapter comprises three parts, first, a discussion seeking to fit new propositions derived from the main empirical findings of the study into existing academic literature. Second, managerial implications on how managers and policy makers could understand the process of constructing green roofs from the stakeholder engagement perspective contributing to sustainability in cities. And third, evaluation of the study and possible future research opportunities.

2 THEORETICAL FRAMEWORK

2.1 Sustainability

2.1.1 The concept of sustainability

The urgency to pay attention to sustainability issues has been raised globally (Dillard, Dujon & King, 2008). At its core the concept of sustainability emphasises the use and depletion of natural resources in the Earth's biophysical environment (Portney, 2015). According to Arias-Maldonado (2013), sustainability considers the relations of the environment and society in the long-term, arguing that the key question with sustainability is how to maintain a pool of resources while facing an unknown future. Thus, sustainability is close linked to finding balance between Earth's carrying capacity and economic growth (Portney, 2015). As a result, companies across industries are challenged by these sustainability issues incorporating economic, social, and environmental aspects of sustainability as illustrated in figure 1 below.

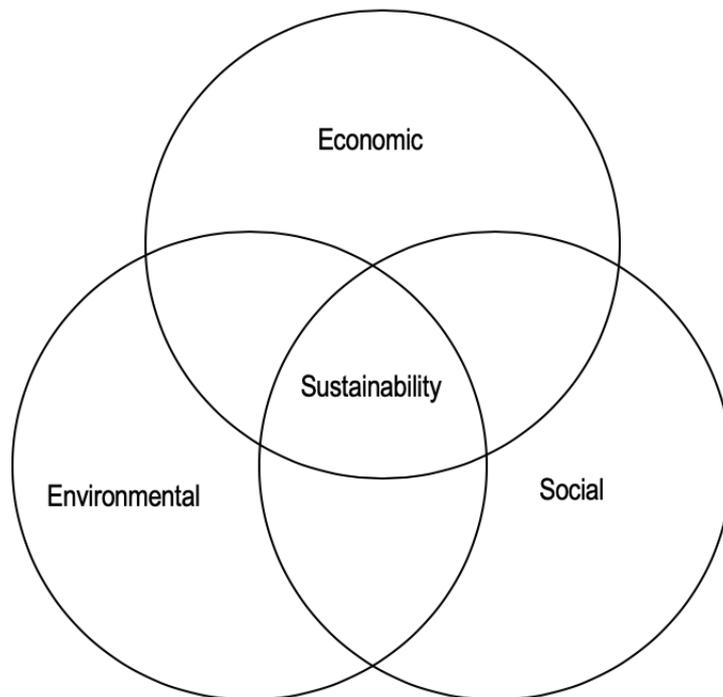


Figure 1 Three aspects of sustainability

Since the 1980's the term sustainable development has also been used progressively (Mathur, Price & Austin, 2008). Sustainable development is commonly defined using the report of the World Commission on Environment and Development's, WCED's (UN, 1987, 37), definition, also known as the Brundtland Report: 'meets the needs of the present without compromising the ability of future generations to meet their own needs.' This definition emphasises the three aspects of sustainability on a larger scale, aiming to secure intergenerational equity (Bansal & DesJarnide, 2014). Thus, in the core of sustainable development is human welfare and environmental concerns as an important part of that, since the environment provides an essential foundation for human development (Meadowcraft, 2000).

Sustainability differs from the conventional ideas of environmental protection by focusing more on long-term processes, being more proactive and holistic, than environmental protection which focuses on specific environmental risks by remediating and preventing them from happening (Portney, 2015).

In addition to the use and depletion of natural resources, environmental sustainability is also inherently linked to biodiversity. Biodiversity is defined as the variety of life on Earth: all living forms, organisms, species and populations in given communities or ecosystems (UN, 1992; United Nations Environment Programme, UNEP, 2010). However, according to World Wildlife Fund (WWF, 2018), between 1970 and 2014 the Living Planet Index recorded an overall decline of 60 per cent in species population sizes. Thus, this dramatic decline in biodiversity threatens the web of life that sustains us all (WWF, 2018).

Portney (2005) emphasises the environmental and economic aspects of sustainability identifying sustainable business as any organization that takes into account environmental issues in its practices, whilst creating profits. Bansal and DesJarnide (2014, 71) define sustainable business in relation to time and the WCED's (1987) definition of sustainable development, as ability of companies to meet the short-term financial needs without compromising the ability to meet the future needs. Hence, time is a crucial element when considering and defining sustainability (Bansal & DesJarnide, 2014).

However, sustainability cannot be reached by only considering one or two of the three aspects. In addition to the environmental and the economic aspects, the social aspect of sustainability needs to be considered. Social aspect of sustainability comprises the processes that create social health and well-being for humans into the future, and institutions that enable economic and environmental sustainability into the future (Dillard et al., 2008, 4). Thus, nature and society cannot be considered as separate things (Arias-Maldonado, 2013) when considering sustainability.

2.1.2 Managing for sustainability

Businesses are challenged to adapt to constantly changing societal expectations (Schaltegger, Hörisch, Freeman, 2017, 191) as well as balancing between the Earth's carrying capacity and economic growth (Portney, 2015). The neoclassical economic view has to be transformed in order for organizations to create sustainable business in the long-term (Stubbs & Cockling, 2008). Bocken, Short, Rana and Evans (2014) argue that the current industrial sustainability agenda is insufficient to deliver both social and environmental long-term sustainability. Thus, managing for sustainability is a central part of sustainable business, and deeply linked to strategic development in an organization (Holton, Glass & Price, 2010).

Starik and Kanashiro (2013, 12) define sustainability management as 'the formulation, implementation and evaluation of both environmental and socioeconomic sustainability-related decisions and actions.' Thus, managing for sustainability consider sustainability from the societal, environmental and economic aspects.

However, Schaltegger and Burritt (2018) state that if sustainability activities are seen as a part of the business' competitiveness and profitability, it creates disagreements between ethical behaviour and profitable business. In other words, balancing a variety of stakeholder claims creates social, ecological and humanitarian challenges which confront businesses with the challenge of sustainability (Maak, 2007, 331). Achieving sustainable business and managing for sustainability are issues within many industries and organizations (Holton et al., 2010).

Thus, Holton et al. (2010) suggest that companies should include broader environmental and social aspects, local community relations, suppliers and develop their products all with regard to managing for sustainability. However, different sustainability management activities lead to different economic outcomes (Schaltegger and Burritt, 2018), which organizations need to take into consideration when seeking long-term sustainability.

Schaltegger and Burritt (2018) examine different ethical motivations behind sustainable practices using business cases of and for sustainability. They state the importance of ethical motivations since they can play an important part when managing an organization's sustainability activities. The goal is to create benefits for these aspects by working with all stakeholders. (Schaltegger and Burritt, 2018.) However, the sustainability mindset has to be ensured to be held throughout the organization and within the minds of all stakeholders in order to manage for sustainability and create long-term sustainability (Freeman et al., 2010; Hörisch et al., 2014).

The conceptual framework developed by Hörisch et al. (2014) offers several benefits from the sustainability management point of view, aiming to facilitate the creation of mutual interest and benefits for stakeholders. The conceptual framework addresses the challenges of a sustainability mindset, creating shared sustainability interest, inspiring stakeholders to act as intermediaries between a company and nature and take into account long-term considerations. The developed conceptual framework defines the three core mechanisms to address these challenges as education, regulation and value creation. Via education not only are the sustainable mindsets of stakeholders strengthened but stakeholders are also empowered to act as intermediaries on behalf of nature. Regulators have to encourage stakeholders to collaborate in order to increase sustainability, whilst governments should facilitate value creation. (Hörisch et al., 2014.) Thus, stakeholders are at the core of sustainability (Freeman et al., 2010; Hörisch et al., 2014; Schaltegger and Burritt, 2018).

2.1.3 Urban sustainability

It is predicted that globally 60 per cent of people will live in urban areas by 2030 (UN, 2018). As urbanization increases in every part of the world, it poses major challenges for cities' ability to maintain healthy living environments and quality of life for city dwellers.

In addition, concerns about the unsustainable use of natural resources and climate change has increased the pressure to consider the sustainability of cities and make them more sustainable (Marans, 2015). Especially if the current predicted trends continue, urban areas such as cities will face vast economic, environmental and social challenges (Martinez-Bravo et al., 2019).

Thus, with a rapidly growing rate of urbanization, cities around the world are facing complex issues with urban sustainability. Oxymorons exist when defining sustainability, and defining urban sustainability is no exception. Jenks and Jones (2010) have defined sustainability in urban areas to depend on three aspects of sustainability: environmental, social and economic. Marans (2015) defines urban sustainability according to the quality of life. However, according to Lorr (2012, 23) urban sustainability can be defined as the future goal of urban sustainable development. Urban sustainable development can be understood as the process of developing urban areas in a way that the urban environment, economy, equity and social justice are being promoted (Lorr, 2012, 23).

Cities can be defined in multiple ways. The United Nations (2018,1) has proposed defining a city in three different ways in relation to their geographical boundaries: city popper, urban agglomeration and metropolitan area. City popper defines a city according to its administrative border, urban agglomeration takes into account a larger developed area to define the city's borders and metropolitan area defines borders according to the socio-economical interconnectedness of close by areas (UN, 2018, 1). Another way of defining cities is according to their physical layout or specific aspects of aesthetic quality, vitality, or functionality (Marans, 2015). In this study, cities are considered as part of urban areas and therefore urban sustainability and referred to in that context.

No matter the definition used for cities and urban areas, their sustainability is a complex issue. Companies and business practices in general are inherently linked in contributing to sustainability (Stubbs & Cocklin, 2008; Freeman et al., 2010; Hörisch et al., 2014) and urban areas are no exception. In the past, many cities have made efforts to become more sustainable by rearranging the energy use, the way to recycle the waste or arrange transport in the city area, with the initial motivation of reducing costs. However, today the driving motivation of city planners and regulators has switched to consider the quality of life of the present population and future generations instead of just 'cost savings.'

(Marans, 2015.) Thus, it is important that different stakeholders, including businesses, commit to sustainable development as part of urban sustainability.

In addition, sustainable buildings can contribute to urban sustainability and are an important part of a broader sustainability agenda (McDonald, 2012). Constructing green roofs can be one solution to make buildings more sustainable in the long-term thus increasing sustainability in urban areas on a local scale. Green roofs are examined in the chapter 2.3 and their ability in contributing to sustainability is examined in the synthesis of theoretical framework 2.4.

2.1.4 Synthesis of sustainability

The key question with sustainability is how to maintain a pool of resources while facing an unknown future (Arias-Maldonado, 2013). Sustainability consists of economic, environmental and societal aspects, emphasising that time is a crucial factor when defining and considering sustainability (Bansal & DesJardine (2014).

When it comes to the urban sustainability it is important to consider the process of developing urban areas in a way that the urban environment, economy, equity and social justice are being promoted (Lorr, 2012, 23). Considering different stakeholders and their interests is important and inherently linked to sustainability and long-term business success (Stubbs & Cocklin, 2008; Freeman et al., 2010; Hörisch et al., 2014). Regulators have to encourage stakeholders to collaborate in order to increase sustainability, whilst governments should facilitate value creation (Hörisch et al., 2014). Thus, stakeholders are at the core of sustainability (Freeman et al., 2010; Hörisch et al., 2014; Schaltegger and Burritt, 2018).

However, multiple studies have recognised the oxymorons related to the definition of sustainability and sustainable development (Lorr, 2012). Thus, it is important to consider the context of each project, including unique characteristics and stakeholders when defining sustainability and sustainable development (Mathur et al., 2008).

2.2 Stakeholder engagement

2.2.1 Stakeholder approach

In recent decades, stakeholder theory, sometimes also referred as the stakeholder approach, has become a central approach of addressing and managing sustainability issues (Freeman et al., 2010). Freeman (1984, 46) has originally defined a stakeholder as ‘any group or individual who can affect or is affected by the achievement of organization objectives.’ According to stakeholder theory, the purpose of a company is to create value for its stakeholders (Freeman, Kujala, Sachs & Stutz, 2017) and ‘business can be understood as a set of relationships among groups which have a stake in the activities that make up the business’ (Freeman et al., 2010, 24). Thus, stakeholder theory is about organizational management and business ethics (Phillips, Freeman & Wicks, 2003, 480), and addresses value maximation for stakeholders whilst avoiding trade-offs (Freeman et al., 2010, 28).

Freeman’s original definition of a stakeholder (1984) puts the centre of focus on the focal organization. However, Roloff (2008) argues that companies can practice two types of stakeholder management, organization-focused and issue-focused approaches. Issue-focused stakeholder approach differs from the organization-focused approach by shifting the focus to the focal issue that affects companies’ relationships with other societal groups and organizations to ‘who and what represents a stakeholder’ (Roloff, 2008). Hence, from this perspective, stakeholders can also be defined as ‘any group or individual who can affect or is affected by the approach to the issues addressed by the network’ (Roloff, 2008, 238).

A network (Roloff, 2008, 238) refers to multi-stakeholder networks which can be defined as ‘networks in which actors from civil society, business and governmental institutions come together in order to find a common approach to an issue that affects them all.’ Thus, by practising these two types of complementary approaches of stakeholder management, companies can overcome challenges with the globalisation process. (Roloff, 2008)

Stakeholder theory (Freeman, 1984) developed the idea of managing stakeholders as ‘stakeholder management.’ However, recent literature has questioned the term

‘stakeholder management’ and changed it to the more relevant ‘stakeholder engagement’ (Freeman et al., 2017). In other words, stakeholder engagement can be seen applying stakeholder theory in practice in businesses and organizations (Greenwood, 2007; Freeman et al., 2010; Freeman et al., 2017).

There exists a diversity of definitions of stakeholder engagement depending on the forms and practices across different industries and areas (Kujala & Sachs, 2019). According to Maak (2017), stakeholder engagement refers to the different forms of stakeholder interactions. Greenwood, (2007, p. 315) refers to stakeholder engagement as different practises which organizations use for involving stakeholders in a positive way in their undertakings. In other words, organizations view engaging stakeholders as a pursuit of developing organizational goals, rather than as a moral responsibility to do so (Greenwood, 2007). Mathur et al. (2008) conceptualise stakeholder engagement from three different perspectives: as a management technique, from an ethical perspective and as a dialogue of values. Dmytriyev et al. (2017) argue that highlighting mutual goals, building trust, soliciting mutually responsible behaviour, and using participatory approach to work with stakeholders enable stakeholder engagement on a larger scale. Hence, stakeholder engagement is both strategical and moral by its nature (Kujala & Sachs, 2019).

Freeman et al. (2017, 5) have proposed a general framework for stakeholder engagement containing four aspects: 1) examining stakeholder relations; 2) communicating with stakeholders; 3) learning with and from stakeholders; and 4) integrative stakeholder engagement as illustrated in figure 2 below.

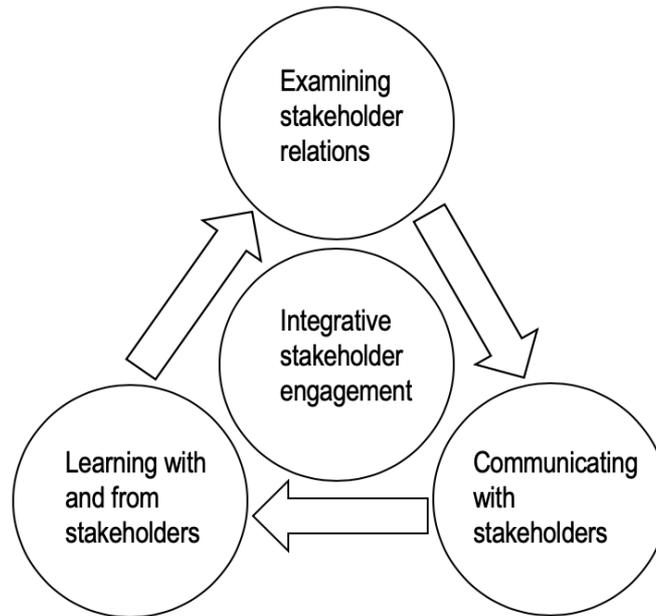


Figure 2 Stakeholder engagement framework (Freeman et al., 2017, 5)

In this research, stakeholder engagement is examined through three aspects of stakeholder engagement examining stakeholder relations, communication with stakeholders and learning with and from stakeholders. A closer examination of these practices is provided in more detail in the following sections. These three aspects incorporate to form integrative stakeholder engagement (Freeman et al., 2017; Kujala & Sachs, 2019) which is examined in the synthesis in chapter 2.2.5.

2.2.2 Stakeholder relations

Examining stakeholder relations requires understanding on who and what counts as a stakeholder. However, there has been an academic debate on this question and different theories have been built on this matter of *who* and *what* counts. For example, Clarkson (1995) divides stakeholders into primary and secondary ones highlighting the importance of creating value for primary stakeholders without whom the organization cannot survive. However, Mitchell, Agle & Wood (1997, 854) define that issue salience will determine stakeholders' importance. In the theory of stakeholder salience (Mitchell et al., 1997) power, legitimacy and urgency are considered as indicators of stakeholders' importance.

In addition, an increased number of studies argue that non-human entities, such as the natural environment, can hold stakeholder status (Driscoll & Starik, 2004; Laine 2010), and have the moral status to be counted as a stakeholder (Freeman et al. 2010, 208). However, Freeman et al. (2010, 209) point out that knowing whether the natural environment is a stakeholder or not does not necessarily make a manager's job easier. On the other hand, if the natural environment has not been recognised as a stakeholder of the company there exists a risk of ignoring it completely and failing to comply with environmental sustainability (Freeman et al., 2010). Thus, the natural environment can hold stakeholder status, however it needs human entities to act for it (Laine, 2010).

However, Myllykangas, Kujala and Lehtimäki (2010) have switched the question of *who* and *what* counts to *how* value is created in stakeholder relationships, arguing that analysing stakeholders is not enough from a value creation point of view. Freeman et al. (2010, 27) note that the issues of stakeholder identification and trade-offs between different stakeholders are secondary problems, not primary, although some researchers (see e.g. Clarkson, 1995; Mitchell et al., 1997) have proposed the importance of their identification. It is worth noting, that the importance of stakeholders can change, and the relevance of stakeholder identification and the importance assessment are highly contextual dependent. Thus, Kujala and Sachs (2019) argue that the importance of mutual understanding in stakeholder relations needs to be clarified.

According to stakeholder theory, value creation is central to business, and created by stakeholders multidimensional and inherently connected relationships (Freeman et al., 2010; Myllykangas et al., 2010). Relations of stakeholders include co-operation, collaboration and network influences (Myllykangas et al., 2010). Maak (2007, 338) argues that stakeholders should not only be included when considering maximising profits, but also when engaging to balance value creation, highlighting the quality of the relationships between stakeholders. Kujala, Lehtimäki, and Myllykangas (2017) suggest that in understanding the stakeholder value creation process it is important to consider the history of the relationship, trust between stakeholders, stakeholders' intentions, interactions in the relationship, learning and information sharing.

Haksever, Chaganti and Cook (2004, 292) define value according to Baier as (1969, 40), 'the capacity to satisfy a need or provide a benefit to a person or a legal entity.' Value can

be addressed from a resource-based view as used value and exchange (Bowman & Ambrosini, 2010) in three different dimensions: financial, non-financial and time related value (Haksever et al., 2004), in which the dimensions either create value or destroy value. According to Freeman et al. (2010), the purpose of a company's existence is important for the sustainable success of its stakeholders as stakeholder theory is about value creation and trade.

It is an interesting question who is responsible for stakeholder relations and thus value creation. Freeman (1984) puts a manager in the centre of attention for analysing stakeholder relations, communication and collaboration. According to Freeman et al. (2010), it is management's main task to maximise value creation to stakeholders without trade-offs. In addition, Maak (2007) highlights the leader's responsibility in building and sustaining trustful stakeholder relationships, emphasizing the importance of creating value for all legitimate stakeholders who have been left out previously, such as future generations. However, Roloff (2008) suggests shifting the focus from the focal organization to the focal issue, pointing out that managers are not always the best to manage their stakeholder relations. Especially in multi-stakeholder networks companies can be participants, without having a full control over the process. Thus, other stakeholders can influence the process even more (Roloff, 2008).

Freeman et al. (2010) argue that sustainable value maximization requires satisfying stakeholder interests. Management should link those unconnected stakeholders by connecting them to mutual goals such as ethical questions or other sustainable business practises (Maak, 2007, 337). Having stakeholders' interests linked together may contribute to company success when compared with a situation where the interests are conflicting. Hörisch et al. (2014) also emphasise the importance of stakeholder cooperation for creating mutual interests and a common foundation for value creation. It is crucial for a business to find a purpose that creates mutuality between stakeholders in order to accomplish this task (Freeman et al. 2010, 28).

From a stakeholder engagement point of view, it is a managers' role to be an enabler or a facilitator in creating mutual goals and connecting stakeholders for sustainable change (Maak, 2007). Harrison and Wicks (2013) propose that the mutual interests of stakeholders contribute to the performance of a company as opposed to a situation in

which there are contradictions between the parties. Constructing and supporting non-hierarchical, trustful stakeholder relationships contributes to building social capital and facilitating for people to act jointly, which is crucial for the success of different stakeholders (Maak, 2007).

2.2.3 Communicating with stakeholders

According to Greenwood (2007, 331–332) stakeholder engagement is ‘a process or processes of consultation communication, dialogue and exchange.’ Thus, informing and communicating with stakeholders is embedded within (Kaptein & Van Tulder, 2003). Freeman et al. (2017) highlight the importance of communicating *with* rather than communicating *to* stakeholders, in order to engage them in an organization’s actions.

One part of communicating with stakeholders is dialogue. Burchell and Cook (2006) identified dialogue as a higher form of engagement and understanding when compared to traditional processes of communication. Kaptein and Van Tulder (2003, 210) define stakeholder dialogue as ‘a structured interactive and proactive process aimed at creating sustainable strategies.’ In other words, the concept of stakeholder dialogue means a two-way dialogue between different stakeholders, instead of merely providing information (Kaptein & Van Tulder, 2003). However, the previous academic literature has highlighted the complexity and diversity of defining the concept of dialogue (Burchell & Cook, 2008).

Stakeholder dialogue provides an opportunity to exchange opinions, interests and expectations for developing standards. Thus, it can help to shift the relationships between the company and its stakeholder to a more inclusive one emphasising cooperation and consultation rather than confrontation and competition. (Kaptein & Van Tulder, 2003, 209.) Hence, open dialogue is a part of the core of stakeholder engagement (Greenwood, 2007).

In addition to open dialogue, another part of communication with stakeholders is reporting. Reporting brings structure to stakeholder dialogue and provides information for various stakeholder groups. It can also be used to see whether relevant perspectives have been taken into account in the dialogue. Reporting supports stakeholder dialogue

and dialogue supports stakeholder engagement. Corporate responsibility reports are examples that are used to evaluate sustainable performance and to set sustainable development practices for the future. However, responsibility reports often contain little of so-called hard data and their reliability and accuracy is therefore difficult to evaluate. (Kaptein & Van Tulder, 2003, 206–209.)

Moreover, sometimes management does not see the benefits of stakeholder dialogue from the company's point of view because of the lack of focus on the dialogue and the conflicting expectations of different stakeholders (Guibert & Roloff, 2017). According to Burchell and Cook (2008, 5), non-profit organizations (NGO) might see stakeholder dialogue as a waste of limited resources and an action against negative publicity without any change to company benefit itself. In addition, it is difficult to define the details of a dialogue between the stakeholders (Kaptein & Van Tulder, 2003, 222), and communicating with stakeholders does not guarantee that the communication fulfils any interests of the other stakeholders' desires or needs (Greenwood, 2007).

However, Roloff (2008) highlights the importance of communication even with conflicting interests. Kujala & Sachs (2019, 232) argue that there are six critical issues to the process of stakeholder dialogue: 1) the concept of the dialogue itself, 2) the motives for engaging in the dialogue, 3) the quality of the dialogue, 4) the outcomes of the dialogic process, 5) stakeholders' expectations for the dialogue, and 6) the role of dialogue in corporate social responsibility implementation and communication. Thus, multiple of studies have highlighted the benefits of stakeholder dialogue when engaging with stakeholders (Kaptein & Van Tulder, 2003; Greenwood, 2007; Roloff; 2008; Freeman et al., 2017).

2.2.4 Learning with and from stakeholders

Learning with and from stakeholders is a part of stakeholder engagement and offers possibilities for companies to learn through stakeholder dialogue and from the process of stakeholder engagement as well as using stakeholders' feedback and criticism as opportunities for value creation (Freeman et al., 2017; Kujala & Sachs, 2019). Hence, stakeholders should be allowed to freely reflect and reconsider their views in relation to other stakeholders including non-expert opinions in a mutually respected forms of

knowledge and understanding (Mathur et al., 2008). This would provide a chance for the stakeholders to learn with and from each other.

Dialogue can be used to enable learning with stakeholders. Dialogue with stakeholders is a part of a company's strategy. Interaction with stakeholders gives a better understanding of the company. This builds trust between stakeholders and business, enabling value creation, competitive advantage and separation from competitors (Kaptein & Van Tulder, 2003). Burchell and Cook (2008) emphasise trust as a key factor to learn with stakeholders as a result of dialogue. Stakeholder trust can be achieved by engaging stakeholders especially with a company's 'dilemmas' (Kaptein & Van Tulder, 2003, 208). Thus, open communication, even with conflicting interest, is the key element in understanding the needs and building trust between different stakeholders (Roloff, 2008). Greenwood (2007) argues that organizations engage their stakeholders in pursuance of developing organizational goals rather than out of a moral responsibility to do so.

Learning with and from stakeholders requires finding mutual understanding. However, this can be challenging. On one hand, if business has a meaningful purpose which speaks to all key stakeholders it is more likely to sustain success in the long-term (Freeman et al., 2010). On the other hand, an issue that is considered relevant, urgent and complex speaks to different stakeholders and is challenging to approach (Roloff, 2008, 243). Thus, establishing strong relationships and trust between different stakeholders helps to create joint understanding and shared strategy (Burchell & Cook, 2008).

2.2.5 Synthesis of integrative stakeholder engagement

Integrative stakeholder engagement incorporates all three previously examined aspects of stakeholder engagement from examining stakeholder relations, communicating with stakeholders, and learning with and from stakeholders. (Freeman et al., 2017; Kujala & Sachs, 2019). These aspects are summarised in table 1 below.

Table 1 Summary of integrative stakeholder engagement

Integrative stakeholder engagement activities	Example of practices	Example of outcomes
Stakeholder relations	<ul style="list-style-type: none"> • Who and what counts as a stakeholder • How value is created in stakeholder relationships • Co-operation, collaboration and network influences • Building and sustaining non-hierarchical trustful stakeholder relationships • Satisfying stakeholder interests 	<ul style="list-style-type: none"> • Understanding stakeholder value creation process • Creating value to all legitimate stakeholder • Sustainable value maximisation • Building social capital • Facilitating people to act jointly
Communicating with stakeholders	<ul style="list-style-type: none"> • Informing and communicating with stakeholders • Exchange opinions, interests and expectations • Open dialogue • Reporting 	<ul style="list-style-type: none"> • Higher form of engagement and understanding • Developing standards • Including more stakeholders • Cooperation and consultation
Learning with and from stakeholders	<ul style="list-style-type: none"> • Including non-expert opinions • Engaging stakeholders with dilemmas • Using stakeholders' feedback and criticism 	<ul style="list-style-type: none"> • Learn through stakeholder dialogue • New opportunities for value creation • Developing organizational goals • Trust, competitive advantage and separation from competitors

Thus, the focus in stakeholder approach has shifted towards examining diverse stakeholder interactions, different forms of communicating with stakeholders and learning with and from multi-stakeholder networks (Freeman et al., 2017; Kujala & Sachs, 2019) embedding collaborative relationships with stakeholders (Kujala & Sachs, 2019).

2.3 Green roofs building resilience in urban areas

2.3.1 Characterizing green roofs

Green roofs have existed throughout history, so they are not a new thing or a modern invention (Dixon & Wilkinson, 2016). According to Vijayaraghavan (2016) green roofs, also called vegetated, eco or living roofs, can be defined as roofs of a building covered completely or partly with vegetation. Today, green roofs are mostly constructed in urban areas where other green space is limited. Green roofs can be designed for different purposes such as recreational areas, visual purposes, or with different ecological features to support flora and fauna. (GRO, 2014, 7.) Thus, in contrast to roof top gardens, green roofs are structurally designed to address the challenges of urbanization (Vijayaraghavan, 2016).

Miller (2008, 174) proposes four functions for green roofs: 1) waterproofing to keep water out of the building, 2) a basal drainage layer that collects rainfall or snow-melt that percolates through the cover, 3) permeable soil-like substrate that promotes plant growth, and 4) ground-covering layer of vegetation. Here, the basic technical requirements for green roof structure have been adapted from Green Roof Organisation (GRO) and by Vijayaraghavan (2016) and are summarised in figure 3 below.

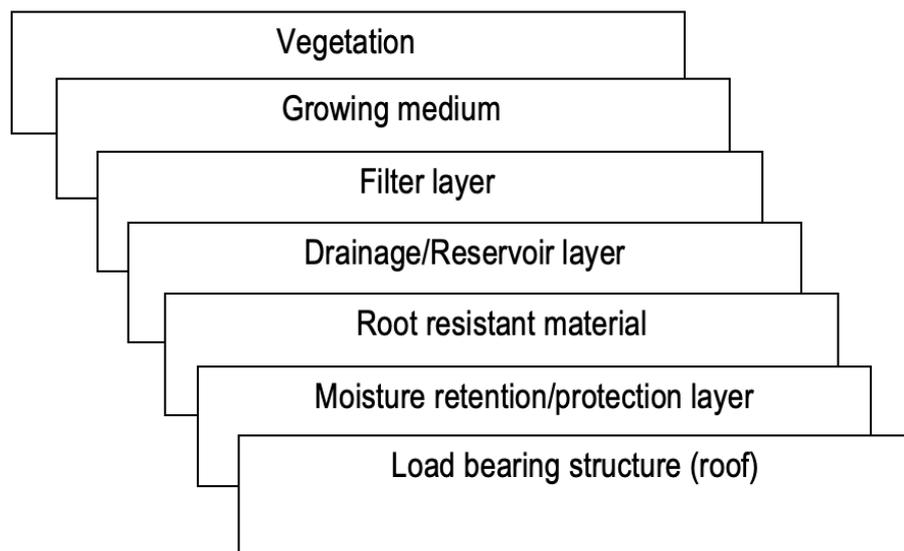


Figure 3 Green roof structure (GRO, 2014; Vijayaraghavan, 2016)

The classification of green roofs varies. The most used classification of green roofs is divided into extensive and intensive green roofs (Snodgrass & McIntyre, 2010). The GRO (2014) classifies green roofs into four categories including biodiverse roofs and semi-intensive green roofs in addition to the intensive-extensive classification. Extensive green roofs are considered to have a less than 15cm growth medium, low weight, low maintenance and low capital cost (Vijayaraghavan, 2016, 741). They are typically viewed from another location as a visual or biodiversity feature, without public access (GRO, 2014).

Intensive green roofs are considered to have 20-200cm growth medium, diversity of plants, high weight, high maintenance and high capital cost (Vijayaraghavan, 2016, 741). Intensive green roof types are usually designed for recreation purposes for people to spend time in. Intensive green roofs can have public access, including garden like features such as trees and water elements. (GRO, 2014.)

Semi-intensive roofs comprise features of both extensive and intensive roof types. Biodiverse roofs are mainly created for biodiversity purposes such as habitat loss, and their maintenance can vary a lot depending on the prevailing conditions. (GRO, 2014, 7.) According to Vijayaraghavan (2016, 741), extensive green roof types are the most common due to their low weight restrictions, maintenance and installation costs.

However, Laurila et al. (2014) challenge the idea of this type of intensive-extensive categorisation of green roofs as a mutually agreed upon clear criterion does not exist and the categorisation varies depending on the researcher. Instead, they propose a categorisation based on the functionality, such as the goals that are set for the performance of green roofs. The resulting categorisation would essentially support the design, productisation and achievement of goals. (Laurila et al., 2014.)

2.3.2 Benefits of green roofs

The surface of the green roof reacts similarly to ground landscapes soaking up rainfall and offers multiple benefits in urban areas. The rainfall supports plants and gets filtered before being released back on the site. Green roof structures also delay and reduce the

amount of runoff water. Runoff or stormwater are here referred to as rain or meltwater accumulating on land, roofs, or other surfaces of a built-up area. Stormwater management is the process of absorbing, delaying, directing, draining and treating stormwater. (Miller, 2008, 174.)

According to Francis and Lorimer (2011), green roofs may be used to support reconciliation ecology which addresses methods to increase biodiversity in urban environments. Valid reconciliation techniques encourage other species to use the space and also allow human use of the space. Thus, green roofs can address biodiversity issues by providing habitats for both urban wildlife and humans. (Francis & Lorimer, 2011.) In addition, different types of plants, fungi and bacteria have a crucial role in nature. They filter water, moderate pH, cool water and remove pollutants. The same consequences happen in integrated green roofs in the built urban environment. Green roofs' ability to filter suspended solids and neutralise acidic rainfall has been well documented. (Miller, 2008, 178–179.)

In addition, green roofs may provide other benefits in savings in energy cost through insulating effects for both cooling and warming (Alexandri and Jones, 2008; Eggermont et al. 2015) since they can be more efficient and cost effective when compared with more traditional approaches, such as air conditioning systems (European Commission, 2015). Climate change and urbanization are closely linked to the concept of the urban heat island effect which occurs in cities making them hotter than the air on countryside. Especially in an urban environment, green roofs can act as mitigator of the urban heat island effect if they are constructed widely (Snodgrass & McIntyre, 2010).

Moreover, green roofs can increase human well-being and quality of life by providing noise reduction and aesthetic views, for example (Eggermont et al., 2015). Moreover, constructing green roofs in urban areas may enhance socioeconomic benefits on the large scale (Maes & Jacobs, 2015), creating amenity values, such as marketing appeal (Snodgrass & McIntyre, 2010).

Thus, green roofs can create multiple benefits, ranging from stormwater management, disaster risk reduction, energy savings, noise reduction, water and air quality improvement, biodiversity support, aesthetics, and social and economic benefits (Miller,

2008; Alexandri & Jones, 2008; Snodgrass & McIntyre, 2010; European Commission 2015; Francis & Lorimer, 2011; Eggermont et al. 2015; Maes & Jacobs 2015; Vijayaraghavan, 2016). However, the most important advantage of green roofs has been proposed to be related specifically to the runoff water as part of stormwater management. It is expected that severe weather events and increased rainfall are becoming more common as a result of climate change. This is likely to cause problems with stormwater management, and green roofs offer potential addressing this issue. (Miller, 2008, 178–179.)

2.3.3 Green roofs as a part of nature-based solutions

The European Commission (2015) has assigned green roofs as a part of Nature-based solutions (NBS). NBS can be defined as sustainable ways of using natural resources in solving societal challenges (Eggermont et al., 2015) that are both inspired and supported by nature (Raymond et al., 2017), cost-effective, help build resilience and provide benefits for environmental, social and economic aspects (European Commission, 2015). Therefore, economy, social assets and sustaining natural environment conditions (European Commission, 2015) along with biodiversity and local communities (Eggermont et al., 2015) are part of the core of NBS.

Green roofs can serve as NBS since they offer the potential to address all four goals addressed by European Commission (2015): improve sustainable urbanization, restore ecosystems, combat climate change and improve risk management and resilience. Local constructions of NBS, such as green roofs, can provide these benefits at global scale.

Raymond et al. (2017) argue that an NBS project should take into account different levels of decision makers and citizens and communicate the benefits of the project's lifespan. In addition, the European Commission (2015) states that NBS need to be developed and installed with stakeholders. This why engaging with stakeholders becomes a crucial part. However, current academic research on NBS focuses more on assessing co-benefits of NBS (Raymond et al., 2017), yet there is uncertainty about the outcomes of stakeholder engagement enhancing sustainable business for NBS, and thus, green roofs.

Kabisch, Frantzeskaki, Pauleit, Naumann, Davis, Artmann and Bonn (2016) argue that a research gaps exists in relation to NBS in urban areas from the societal and constructional perspectives. Especially the role of stakeholder involvement lacks understanding (Kabisch et al., 2016). Practical studies are needed to demonstrate the added value of green roofs as part of NBS for different stakeholders from the societal, environmental and economic aspects.

2.3.4 Constrains of green roofs

Even though there are multiple positive perspectives on green roofs, there are some factors hindering the process of constructing green roofs. Vijayaraghavan (2016, 747–748) argues that the biggest hindrance is the cost of green roofs, as they require major investment and the return of the investment is complex, and we lack understanding of it. Other constraints of green roofs are the right level of maintenance, ultimate disposal which questions the general sustainability of green roofs, non-existent local research which results in a lack of knowledge among developers and policy makers about suitable components for their geographical location, runoff quality, aesthetic issues meaning that depending on the plant selection green roofs are not always aesthetic, structural damage and roof leakage. However, green roofs can protect the roof membrane, and the idea about green roofs leaking is technically incorrect, even though any roof has the potential to leak. (Vijayaraghavan, 2016, 747–748).

In addition to socioeconomic barriers, such as monetary issues and cultural perception of urban nature when installing greens roofs, people might consider green roofs as always being a lush green colour and are disappointed when the roof looks browner than green and does not meet expectations. Moreover, green roofs may attract some uncharismatic species such as spiders or bugs, though these species are important from the biodiversity point of view. (Francis & Lorimer, 2011.) Francis & Lorimer (2011) pointed out that one of the biggest challenges for reconciliation ecology lies in stakeholders' expectations, for example in biodiversity conservation versus aesthetic appeal. It is challenging to gain support for the fact that biodiversity from reconciliation ecology does not always look attractive (Francis & Lorimer, 2011).

Green roofs as part of NBS are created to address environmental, societal and economic issues whilst promoting sustainability (Eggermont et al., 2015; European Commission, 2015; Raymond et al. 2017). This makes them complex and surrounded by uncertainty issues which different parties such as policy makers or stakeholders have to take into consideration (Eggermont et al., 2015). Eggermont et al. (2015) emphasise the importance of evaluating green roofs by considering risk, alternatives and potential impacts since poor evaluation and installation can lead to the creation of issues, such as the spreading of invasive alien species, instead of solutions to biodiversity issues. Education and raising public awareness are important to overcome these challenges (Francis & Lorimer, 2011). However, more research is needed to increase understanding on the process of constructing green roofs and to overcome these complex challenges.

2.3.5 Synthesis of green roofs

The classification of green roofs into intensive-extensive categorisation varies depending on the level of the growth medium, weight, maintenance and capital costs of the green roof (GRO, 2014; Vijayaraghavan, 2016). However, this kind of categorisation does not take into account the different stakeholders of green roofs. Laurila et al. (2014) have proposed a categorisation according to the purpose of the green roof. Thus, this kind of categorisation would consider different stakeholders, such as the end users and natural environment in the process of constructing green roofs.

The benefits of green roofs have been addressed in multiple studies, ranging from stormwater management, disaster risk reduction, energy savings, noise reduction, water and air quality improvement, biodiversity support, aesthetics, and other socio-economic benefits (Miller, 2008; Alexandri & Jones, 2008; Snodgrass & McIntyre, 2010; European Commission 2015; Francis & Lorimer, 2011; Eggermont et al. 2015; Maes & Jacobs 2015; Vijayaraghavan, 2016). The European Commission (2015) has also assigned green roofs as a part of NBS which could improve sustainable urbanization, restore ecosystems, combat climate change and improve risk management and resilience. Thus, local installations of green roofs could provide these benefits on a global scale.

Even though there are multiple positive perspectives on green roofs, there are some factors hindering the process of constructing them. In addition to socioeconomic barriers,

people might consider green roofs as always being a lush green colour and are disappointed when the green roof does not meet expectations (Francis & Lorimer, 2011). Moreover, green roofs as part of NBS are created to address environmental, societal and economic issues whilst promoting sustainability (Eggermont et al., 2015; European Commission, 2015; Raymond et al. 2017). This makes them complex and surrounded by uncertainty issues affecting variety of different stakeholders (Eggermont et al., 2015). This why engaging stakeholders becomes a crucial part. However, there is uncertainty about the outcomes of stakeholder engagement enhancing the process of constructing green roofs.

2.4 Synthesis of theoretical framework

In this theoretical framework previous literature on sustainability, stakeholder engagement and green roofs have been examined and reviewed. The aim has been to generate a synthesis on these matters. In order to tackle global issues such as climate change, urbanization and biodiversity loss by constructing green roofs in urban areas, there is a need to understand the interests and relations of different stakeholders as well as the overall context of sustainability from the economic, social and environmental aspects.

Stakeholder engagement is a significant concept when striving towards sustainable development (Mathur et al., 2008). Stakeholder engagement is the practical implication of stakeholder theory (Freeman et al., 2010; Freeman et al., 2017; Kujala & Sachs, 2019) including practices of examining stakeholder relations, learning with and from stakeholders and communicating with stakeholders (Freeman et al., 2017; Kujala & Sachs, 2019). Altogether, these practices incorporate to integrative stakeholder engagement (Kujala & Sachs, 2019).

Hörisch et al. (2014) argue that applying the integrative version of stakeholder engagement in the framework of sustainability management can be beneficial. Although the terminology of sustainability management and stakeholder theory varies, they share multiple general similarities from the purpose of business to profit-making and complexity of business. The conceptual framework developed by Hörisch et al. (2014) offers several benefits from the sustainability management point of view, aiming to

facilitate the creation of mutual interest and benefits for stakeholders. However, Maak (2007, 331) argues that balancing a variety of stakeholder claims creates social, ecological and humanitarian challenges which confronts businesses with the challenge of sustainability. The conceptual framework by Hörisch et al. (2014) may not work in every single case and needs to be developed.

The process of constructing green roofs involves and affects a broad range of stakeholders and can contribute to the three aspects of sustainability in urban areas. The table 2 summarises relations between the aspects of sustainability and the process of constructing green roofs and integrative stakeholder engagement.

Table 2 Summary of relations between aspects of sustainability, the process of constructing green roofs and integrative stakeholder engagement

Aspect of sustainability	Sustainability in the process of constructing green roofs	Integrative stakeholder engagement
Social	<ul style="list-style-type: none"> • Improvements quality of life and well-being by noise reduction and aesthetic views • Green recreational areas in urban environment 	<ul style="list-style-type: none"> • Collaboration with regulators • Governments facilitating value creation • Creating mutual mindsets
Environmental	<ul style="list-style-type: none"> • Reconciliation techniques for conserving biodiversity • Habitats for wildlife • Delay and reduce the runoff water • Filter suspended solids and neutralise acidic rainfall • Mitigator for urban heat island effect • Part of NBS 	<ul style="list-style-type: none"> • Including stakeholders as data collectors on the green roof • Involving important stakeholders in biodiversity conservation • Educating stakeholders about the benefits of green roofs • Stakeholders as intermediaries on behalf of nature
Economic	<ul style="list-style-type: none"> • Savings in energy cost through insulating • Cost savings in stormwater management • Amenity value such as marketing appeal 	<ul style="list-style-type: none"> • Benefits for all stakeholders • No trade-offs between profits and sustainability

As seen in the table 2 above, first, the process of constructing green roofs contributes to the social aspect of sustainability as improvements on quality of life and well-being in different ways, such as providing noise reduction or aesthetic views recreational areas (Eggermont et al., 2015). Integrative stakeholder engagement highlights collaboration with regulation setters, governments facilitating value creation and creating mutual interest between different stakeholders (Stubbs & Cocklin, 2008; Freeman et al., 2010; Hörisch et al., 2014).

Second in the table, the process of constructing green roofs contributes to the environmental aspect of sustainability in multiple ways. For example, it provides reconciliation techniques for conserving biodiversity and habitats for wildlife (Francis & Lorimer, 2011; Boiral & Heras-Saizarbitoria, 2017). Also, it offers possibilities for treating stormwaters by filtering suspended solids and neutralising acidic rainfalls and delaying and reducing runoff water (Miller, 2008). In addition, it could mitigate urban heat island effect and overall contribute to the environmental aspect of sustainability by being constructed as part of NBS. Integrative stakeholder engagement emphasises including citizens to act as data collectors (Francis & Lorimer, 2011). Combining this with the idea of stakeholder engagement in biodiversity conservation (Boiral & Heras-Saizarbitoria, 2017) may lead to positive outcomes from environmental sustainability point of view. In addition, integrative stakeholder engagement emphasises educating stakeholders and to act as intermediaries on behalf of nature (Hörisch et al., 2014).

Third in the table, the process of constructing green roofs contributes to the economic aspect of sustainability for example in cost savings in energy costs through insulating for heating and cooling (Alexandri and Jones, 2008; European Commission, 2015; Eggermont et al. 2015) and stormwater management (Miller, 2008). In addition, green roofs can increase amenity value such as marketing appeal (Snodgrass & McIntyre, 2010). From integrative stakeholder engagement perspective, there is no trade-offs between a successful business and sustainability (Freeman et al., 2010). Thus, a company needs to understand stakeholder relationships and engage them in its sustainability efforts in order create long-term sustainable success (Stubbs & Cocklin, 2008; Freeman et al., 2010).

Thus, stakeholder consideration is an important part of becoming sustainable since an organization's success is closely related to the success of its stakeholders by stakeholder engagement (Stubbs and Cocklin, 2008). Moreover, constructing green roofs in urban areas may enhance socioeconomic benefits on the large scale (Maes & Jacobs, 2015). In addition, stakeholders are becoming increasingly interested in the impacts which a company has on society and the natural environment (Boiral & Heras-Saizarbitoria, 2017). Furthermore, stakeholder engagement provides benefits which companies may not have achieved without it (Stubbs & Cocklin, 2008).

However, Boiral and Heras-Saizarbitoria, (2017) argue that managers may not understand the importance of stakeholder engagement in biodiversity management. Therefore, the sustainability mindset has to be ensured throughout the organization and within the minds of all stakeholders (Freeman et al., 2010; Hörisch et al., 2014). Yet, the process of constructing green roofs is complex and surrounded by uncertainty issues with different stakeholder groups (Eggermont et al., 2015). Thus, more research is needed to increase understanding of the process of constructing green roofs from the stakeholder engagement perspective.

3 RESEARCH METHOD

3.1 Data collection

I started the empirical data collection process by choosing semi-structured interviews as the method for data collection due to the qualitative nature of the study. As the aim was to gain insights into the subject and research phenomenon, I found semi-structured interviews to also be a suitable method for that. In addition, according to Koskinen et al. (2005, 105) semi-structured interviews are the most broadly used method of collecting qualitative data in business studies. Semi-structured interviews are also considered as an effective way for qualitative data collection as they are flexible in nature and the researcher can direct the interview without fully controlling its direction (Koskinen et al., 2005).

The empirical data collection process continued by selecting suitable candidates for conducting the semi-structured interviews. The primary criteria for selecting the candidates was that they had been working in the process of constructing green roofs which could include designing, installing or the maintaining of green roofs. Thus, the interviewees were considered stakeholders in the process of constructing green roofs.

Interviewees educational background varied including horticulture, landscaping architecture, interior designing, business administration, environmental change politics, engineering, biology and ecology. Interviewees worked in different companies or organizations and in a variety of positions including consultant, project manager, researcher, planning director, entrepreneur and product group manager. Due to the retention of anonymity, more detailed descriptions of the interviewees background are not provided. In addition, more specific explanations are not considered to have significant benefit for the reader.

After I had chosen the interviewees, I made an interview guide (see appendix 1) which I used for guiding the interview process. The interview frame consisted of three main sections: background related questions, research theme related questions and ending

questions. This kind of structure with three main sections is typical in semi-structured interviews (Koskinen et al., 2015, 110). However, the order of the questions varied depending on the natural flow of each interview. All the main questions were open-ended but sometimes I used more specific closed questions in order to understand the meaning correctly.

I started the interview with questions focused on the interviewee's background. For example, their role in the company, educational background and work experience. This was to get an overall understanding of the interviewee, as I did not know the interviewees beforehand. Then, I asked questions related to the research focus in three categories: overall business operations, the process of constructing green roofs and stakeholders. Finally, I finished the interview with questions related to the future of the green roofs.

I conducted four semi-structured interviews between April and May 2019. Three of them on my own and one of them with a member of the B2N research project due to practical reasons. In addition, the B2N research project provided me three separate semi-structured transcribed interviews from the B2N research data bank. I decided to include two of them as part of the empirical data due to their practicality and interconnectedness to the area of research. Altogether, the empirical data of this study consists of six semi-structured interviews and seven different interviewees.

The interviews were recorded with the permission of each interviewee. I conducted one of the interviews on a telephone due to convenience and other three on face to face on the premises of the interviewees. All of the interviews were in Finnish as that was the native language for everyone.

Table 3 Summary of the interviews

Date of the interview	Length of the interview	Transcribed pages	Background of the interviewee	Label of the interviewee	Interviewers
10.07.2018	143 minutes	20 pages	Biologist, Researcher	I1	B2N research member
18.04.2019	101 minutes	18 pages	Landscaping architect, Horticulturist, Technology manager	I2	B2N research member and the author
			Project manager, Consultant	I3	
30.04.2019	34 minutes	6 pages	Researcher, Horticulturist	I4	The author
03.05.2019	48 minutes	10 pages	Consultant, Entrepreneur	I5	The author
03.05.2019	48 minutes	9 pages	Business professional, Engineer	I6	The author
29.03.2019	44 minutes	8 pages	Ecologist, Consultant	I7	B2N research member
Total	418 minutes	71 pages	-	-	-

The length of the interviews used in this study ranged between 34 minutes to 143 minutes, making it a total of 418 minutes of recorded interviews. After the data had been recorded it was transcribed into a written format by a third-party company specialised in transcription. The length of the transcribed pages ranged between 6 pages and 20 pages, making it total of 71 pages of transcribed data. Interviewees were labelled to maintain anonymity, and later used for referencing in the description of the findings. The interviews are summarised in the table 3 above.

3.2 Analysis of the data

Elo and Kyngäs (2008) suggest that inductive analysis consist of three main phases: preparation, organization and reporting (Elo & Kyngäs, 2008). I started the preparation phase by getting familiar with the transcribed raw data. The written format of the raw data allowed me to read the interviews several times and get in-depth knowledge of the

content. Whilst reading the raw data, I wrote notes, codes and headings in the margins to make sense of the content as a whole. Figure 4 illustrates the inductive analysis process in this study and is explained more in detail in the following section.

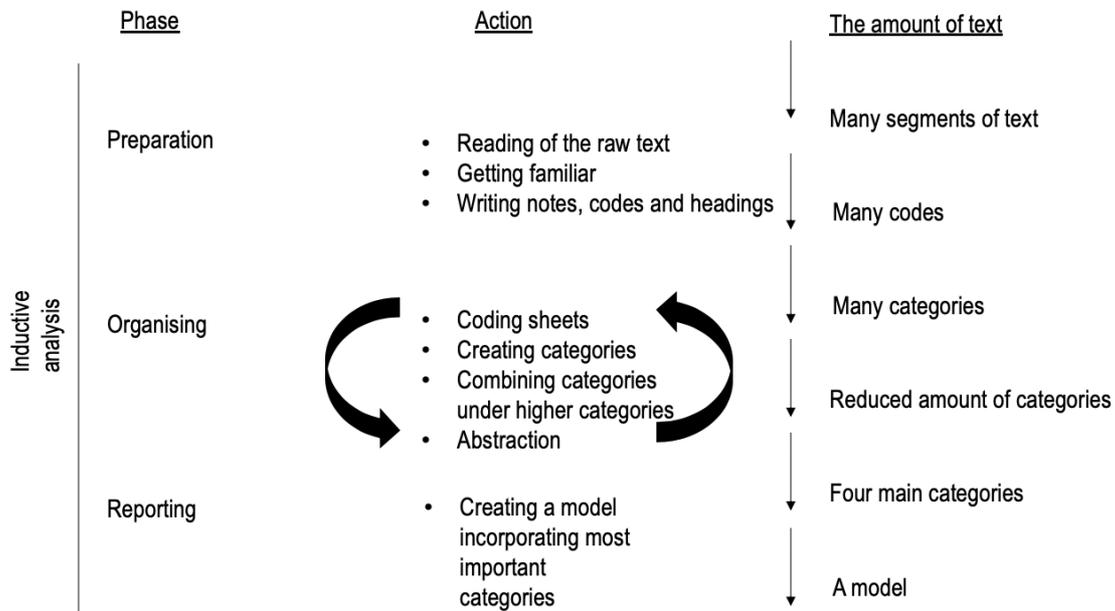


Figure 4 An illustration of the inductive analysis process

The *preparation* phase involved coding which aimed to take the raw data to a conceptual level (Corbin & Strauss, 2008) through interpretation. Issues and their importance addressed by the stakeholders in relation to the process of constructing green roofs was used as the unit of analysis. The unit of analysis provided focus on what to include in the analysis and what to leave out when conducting the analysis. Also, I outlined the following questions for the empirical data which are related to the overall research questions.

- 1) What is the process of constructing a green roof? Which factors influence the process of constructing and how?
- 2) Who are the stakeholders? How are different stakeholders involved? How are stakeholders engaged? Are there conflicts between different stakeholder groups?

The raw data was read through several times, keeping in mind the unit of analysis and the questions for the empirical data until saturation was reached and no new codes were

identified. Coding was not only writing notes and headings in the margins but also involved me interacting with the data by asking questions about the data and comparing the data (Corbin & Strauss, 2008, 65).

The process of *organising* qualitative data included coding sheets, creating categories, combining categories under higher categories and abstraction. During the organising phase, I collected the codes onto coding sheets in Microsoft Excel including a quote and a simplified expression from the original text. By doing this, I aimed to stay close to the original text without rushing to interpretation. In addition, I tried to understand the subjects in his or her own perspective at every stage of the analysis in order to understand their meanings as accurately as possible. Only the manifest content was analysed leaving out latent content, such as silence, laughter or posture (Elo & Kyngäs, 2008).

After free generation of codes on the coding sheets, I grouped codes under categories according to their properties and dimensions. In figure 4 the arrows illustrate the cyclical nature of the organising phase. The categories were created by asking “who, what, where, when” questions (Elo & Kyngäs, 2008). I decided which things to put in the same category and which things to leave out from the category through interpretation. Categories were developed after in terms of their dimensions and linked to each other based on their commonalities in meanings between categories or their assumed causal relationships. As illustrated in table 4 below, explaining the coding and creating categories under higher categories, and finally a main category.

Table 4 Example of the coding process

Quote from the original text	Simplified expression	Code	Subcategory	Category	Main category
"Green roofs are often demanding projects and designers do not necessarily have the experience yet" (I2),	Difficult projects, no experience	Challenging projects	Lack of expertise	Lack of expertise and professionals	Obstacle
"We have only a few designers in Finland who have dedicated to green roofs." (I6)	No dedication to green roofs	Missing professionals	The lack of the number of professionals		
"Different types of green roofs are causing confusion amongst professionals as well." (I2)	Confusion among professionals	Confusion phase	Lack of references	Lack of accustomed practices	
"We are a developing country." (I3)	Finland as a developing country	No routines	Lack of routines		

A model or a framework embedding category system represents an end point of the inductive analysis (Thomas, 2006, 240). I interpreted the data according to my subjective perspective by creating a model combining the main categories which are represented in the next chapter, 'empirical findings.' The category systems include a causal network which was not set prior to the analysis. I also left out some categories, without embedding them in the model. Thus, the findings arise from the empirical data, not from specific hypothesis, models or theory as in a deductive approach.

4 EMPIRICAL FINDINGS

4.1 The process of constructing green roofs in Finland

4.1.1 Stakeholders in the process of constructing green roofs

Six stakeholder categories are identified and a variety of stakeholder groups under them in the process of constructing green roofs in Finland. The categories are: 1) stakeholders regulating the construction industry; 2) stakeholders designing green roofs and their support functions; 3) stakeholders producing structures, growing mediums and plants; 4) stakeholders installing green roofs; 5) stakeholders using green roofs; and 6) stakeholders maintaining green roofs. Table 5 below displays the stakeholder categories and provides examples of stakeholder groups under each category.

Table 5 Stakeholder categories and stakeholder groups

STAKEHOLDERS REGULATING the construction industry	STAKEHOLDERS DESIGNING green roofs and their support functions
<ul style="list-style-type: none"> - Political actors - City planners - Cities and municipalities 	<ul style="list-style-type: none"> - Green designers - Stormwater designers - Structural engineers - Ecologists and biologists when roof certified - Architects and landscaping architects
STAKEHOLDERS PRODUCING structures, growing mediums and plants	STAKEHOLDERS INSTALLING green roofs
<ul style="list-style-type: none"> - Manufacturers - Building services engineering - Companies providing green roof structures - Companies providing growing medium and plants 	<ul style="list-style-type: none"> - Companies providing installation - Contractors - Developers - Project managers
STAKEHOLDERS USING green roofs	STAKEHOLDERS MAINTAINING green roofs
<ul style="list-style-type: none"> - City dwellers - Residents 	<ul style="list-style-type: none"> - Owners of buildings - Building maintenance

The process of constructing green roofs consists of three main phases: designing, installing and maintaining of green roofs. Different stakeholders are required in the

different phases as illustrated in figure 5. Thus, depending on the type of green roof and then the complexity of the process of constructing it, a variety of different stakeholders are needed in designing, installing and maintaining a green roof. This leads to the different stakeholder groups sometimes overlapping.

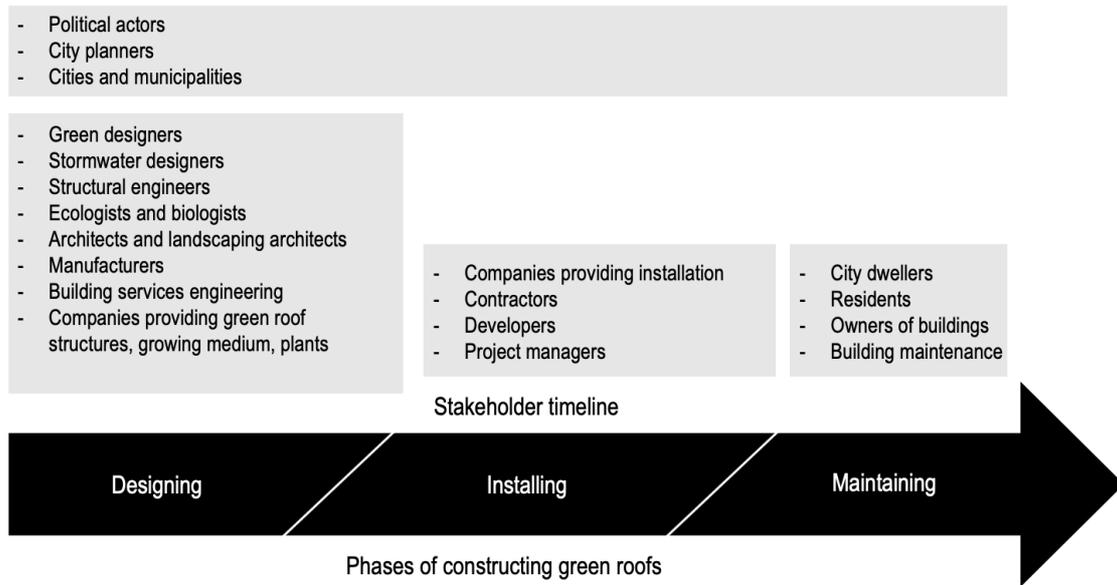


Figure 5 Stakeholder participation timeline

City planners are needed especially in the designing phase of the process of constructing green roofs, providing the permission in the city plan for the installation of a green roof. However, the participation of city planners, along with that of political actors, cities and municipalities, can also be seen as related to other phases of constructing green roofs, since they are regulating the whole construction industry.

In the designing phase, different stakeholders designing the green roof have to agree on the structures of the green roof, plant types, possible stormwater management features and possible ecological or biological features if desired to be a BREEAM¹ certified green roof. However, the participation of ecologists or biologists is not required in every green roof project. Manufacturers produce structures for the construction industry which structural engineers need to take into account when calculating weight capacity and green

¹ BREEAM stands for Building Research Establishment Environmental Assessment Method. It is used for assessing, rating, and certifying the sustainability of buildings. (BREEAM, 2020.)

designers when designing green roof features. Other companies provide the needed structures for the green roof itself including growth medium and plants.

This is followed by stakeholders installing green roofs. The installation phase can be done by a contractor or a developer depending on the project. Sometimes the company that has produced the structures for the green roof vegetation does the installation as well. Thus, different green roof stakeholders are interconnected in different ways.

The process of constructing green roofs also requires maintenance, the level of depends on the type of the green roof, plant selection, and the local weather conditions. Also, the stakeholders using the green roof depends on the type and access to, of the green roof. Some green roofs cannot be accessed by the public while some are especially constructed for that purpose. Thus, it is worth noting that stakeholders' participation can vary depending on the type, size and features of the green roof.

In addition, it is worth noting that different stakeholders hold different responsibilities in the process of constructing green roofs. For example, stakeholders designing the looks and plant types do not hold responsibility for calculating the weight structures of the green roofs. Moreover, the project manager holds responsibility during the process of installing the green roof. However, after the installation process has been completed, stakeholders maintaining the green roof continue to be responsible for the green roof of the building.

4.1.2 Regulation in the process of constructing green roofs

According to the empirical findings political actors are regulating the construction industry in Finland, and thus affecting the process of constructing green roofs. The most powerful political instrument for the point of view of the process of constructing green roofs point of view was recognised as city planning. Thus, city planners were seen to have the biggest power to say 'yes' or 'no' to the process of constructing green roofs.

The empirical findings presented cases where the city plan acted both for and against the process of constructing green roofs. One case in favour of constructing green roofs was where a building permission would have been denied without a green roof on the building, as the green roof was seen as a requirement for the permission to build in the city plan.

On the contrary, there were cases where city planning did not mandate a green roof on the building, and it would have been almost impossible to install there afterwards. The power of city planning was emphasised:

‘On a Finnish scale the guidance of city planning is a very important element, if it is not there in the building permit through a city plan or somewhere else, it might be the case that it (green roof) will not happen at all.’ (I6)

‘If there is a green roof in the city plan then there has to be a green roof. So, the city plan is gospel when installing a green roof.’ (I3)

Even though this study did not examine the level of the political willingness to construct green roofs, it recognised that political actors, especially city planners who decide on the city plan, hold a major role in the process of constructing green roofs in Finland. However, it was also noted that it is not enough that green roofs are a mandatory part of the city plan. It would be important that different stakeholders would come together at an early stage. For example, stakeholders designing green roofs would have to be involved when the city plan is being prepared and set so that they could have a word in the process of constructing the green roofs and thus influence the design and the functions of the green roofs.

Another important factor affecting especially the stakeholders designing green roofs, and thus the process of constructing them, in Finland was recognised to be building information, or so-called RT², cards. The RT cards were established for green roofs in 2016 and designed to set guidelines for green roofs with regard to spatial planning, structures and plant selections in Finland. Hence, they aim to guide different stakeholder groups in the process of designing, installing and maintaining green roofs.

Even though this study did not aim to examine the in-depth contents of the RT cards, their importance for different stakeholder groups, especially the ones designing and installing green roofs, were seen as vast. Before the RT cards were being introduced for green roofs,

² RT is an abbreviation from the Finnish word 'Rakennustietokortti'. It is an extensive information service in the construction industry, designed with the industry stakeholders for the needs of professionals (Rakennustieto, 2020).

a green roof could be a bitumen roof painted a green colour. The situation before RT cards was described as follows:

‘When we started doing these things, when there were no specific regulations on what a green roof is, someone put green colour on a bitumen roof.’ (I4)

These cases where the roof had been painted a green colour show that RT cards have helped to establish a conceptualisation of ‘what green roofs are’ among different stakeholder groups and also conceptualised them in the city planning. It was clearly stated that the role of the RT cards was highlighted in the interviews as a ‘designer’s bible’, affecting the process of constructing green roofs in the phases of designing, installation and maintenance:

‘I have been told that RT cards are like a designer’s bible.’ (I1)

To conclude, this study did not aim to examine the possible political agendas of different stakeholders regulating the construction industry in Finland. However, the empirical findings show that the political actors, especially city planners, have the ultimate power to decide in favour of or against the process of constructing green roofs. Therefore, the city planners can be considered as a crucial stakeholder group in the process of constructing green roofs. In addition, it is worth noting that RT cards have helped to conceptualise and develop the process of constructing green roofs, as well as to guide stakeholders designing, installing and maintaining green roofs. Thus, it was considered as an important tool for these stakeholder groups.

4.1.3 Obstacles in the process of constructing green roofs

Empirical examination recognised six main obstacles in the process of constructing green roofs in Finland. The identified obstacles were 1) lack of accustomed practices; 2) lack of expertise and professionals; 3) technology as a barrier; 4) lack of research and fact-based knowledge; 5) stakeholder conflicts; and 6) existing prejudices and fears. These identified obstacles indicate different stakeholder relations and aspects which are either slowing down the process of constructing green roofs or preventing them from happening at all. In the following sections these categorised obstacles are opened up in detail

examining stakeholder relations in them. Table 6 below sums up the identified obstacles in the process of constructing green roofs in Finland.

Table 6 Obstacles in the process of constructing green roofs

CATEGORY	SUBCATEGORY	Definition
Lack of accustomed practices	Lack of references	Not enough positive references to support the process of constructing green roofs
	Lack of routines	Not enough accustomed practices supporting the process of constructing green roofs
Lack of expertise and professionals	Lack of expertise	Stakeholders lacking skills needed in the process of constructing green roofs
	Lack of number of professionals	Professionals lacking in number in the process of constructing green roofs
Technology as a barrier	Technical challenges	Existing technical challenges with weight capacity, building restrictions and safety features
	Technical building solutions	Existing solutions made in the building including ventilation pipes and channels on the roof
Lack of research and fact-based knowledge	Lack of measuring	Not knowing the local benefits of different roof types, conditions and plant selections
	Unknown costs and benefits	Existing ambiguity about costs of the process of constructing green roof versus its benefits
	Unsureness about maintenance	Not knowing the right level of maintenance
Stakeholder conflicts	Stakeholders with different interest	Multiple stakeholders involved with different interests in mind for the process of constructing a green roof
	Stakeholders with different responsibilities	Stakeholders having different responsibilities in the process of constructing green roofs and not guaranteeing the work of other stakeholders
Existing prejudices and fears	Existing prejudices	Existing prejudices related to the weight capacity and green roofs' durability
	Existing fears	Existing fears related to indoor air problems, water leaking and extra costs

Lack of accustomed practices

Lack of accustomed practices refers to the factors and practices that are established among different green roof stakeholders but do not support the process of constructing green roofs per se. The empirical findings show that daily routines are lacking in the area of green roofs as well as finding a lack of positive references promoting green roofs. Especially one stakeholder group, contractors, seemed to have a lack of accustomed practices in the process of constructing green roofs. Interviewees described green roofs in Finland as very marginal in number and Finland as a developing country as regards the process of constructing green roofs:

‘Comparing to Sweden and Denmark, green roofs in Finland are very marginal.’
(I2)

‘We are a developing country.’ (I3)

Lack of references refers to the amount of existing positive references in Finland which does not seem to be enough to support the process of constructing green roofs. Positive references would be needed among stakeholders for finding arguments in favour of green roofs. References would be also needed to overcome other identified obstacles, such as existing prejudices and fears, since the lack of references were seen to have a causal relationship causing and maintaining prejudices and fears.

In addition to missing positive references, it seemed that some stakeholder groups still consider green roofs as a new thing and conceptualisation of different roof types is lacking. This causes confusion among stakeholders:

‘Different types of green roofs are causing confusion amongst professionals as well.’ (I2)

Altogether, the lack of accustomed practices can be considered as an obstacle slowing down the process of constructing green roofs or preventing it from happening at all. Different stakeholder groups are needed in the process, and with positive references it would be easier to convince some stakeholder groups such as contractors, and slowly establish familiar practices among them in favour of the process of constructing green roofs.

Lack of expertise and professionals

Lack of expertise and professional’s category refers to a lack of expertise and the small amount of green roof professionals in Finland and is closely linked to the previous category ‘lack of accustomed practices’. The process of constructing green roofs itself often requires professionalism in multiple fields, yet there are only a few designers in Finland specialising in designing green roofs. Also, as already recognised in the previous obstacle, green roofs are considered a somewhat new thing in Finland, and thus lack of familiarised practices. Especially contractors seemed to resist green roofs. Different

stakeholder groups designing and installing green roofs, for example green designers, structural engineers and contractors, do not necessarily have the experience yet. Also, green roof designers are lacking in numbers in Finland:

‘Green roofs are often demanding projects and designers do not necessarily have the experience yet.’ (I2)

‘We have only a few designers in Finland who are dedicated to green roofs.’ (I6)

In addition to the lack of professionals, the findings indicate that taking into account the environment and the overall sustainability within the process of constructing green roofs is increasing fast. Thus, some green roof stakeholders do not necessarily know about these new practices:

‘Sustainable development and considering the environment are progressing so fast that there is a lack of know-how and professionalism.’ (I3)

Thus, the process of constructing green roofs as challenging projects, would require both specific and versatile know-how:

‘It is not enough that you have green field expertise. You also need to know other fields for example, heat-water-air systems, municipal technology, structural design of green roof principles and how different vegetation acts and what kind of vegetation can be used.’ (I2)

Therefore, the lack of expertise and professionals can also make the process of constructing green roofs more time-consuming. It can also lead to mistakes since people are learning new and they might lack the skills needed. This might cause and maintain some prejudices and fears which are also recognised as one of the obstacles in the process of constructing green roofs and described in more detail in the following.

Technology as a barrier

Empirical findings indicate that technical barriers exist in today's construction industry since different manufacturers are providing structures which do not favour the process of constructing green roofs. This also connects with the 'lack of accustomed practices' obstacle as the process of constructing green roofs is not familiarized among every stakeholder group.

Today, new buildings' roofs are usually filled with air ventilation channels and pipes. The installation of a green roof becomes challenging or impossible in these cases where there is no space for a green roof to be installed. Also, the roof's weight capacity and safety features need to be taken into account when considering a green roof installation. Weight capacity and building restrictions seemed to be an issue especially with old building roofs. Also, new technical solutions are needed in the industry to support the process of constructing green roofs:

'Construction companies see it (installation of green roofs) too difficult... Building service engineering is producing structures which cannot be evaluated in the beginning of the designing phase. This leads to situations where green roofs cannot be installed because of the technical solutions made in the building.' (I2)

'So, the technical parts and components need to be improved. Instead of thinking about solving the issue with technology we could think about functionality and biology first. And technology would come to help, so that we could create a good environment and technology would help us, not the other way around, as it has been.' (I2)

In order to overcome technical barriers, the stakeholders in the construction industry need to understand the technical aspects required by the process of constructing green roofs requires in order to be able to produce these needed structures. In addition, the technical solutions of a building, for example ventilations channels and pipes on the roof, need to be combined with the architecture of the building and the design of the green roof at an early stage. Thus, the right timing among stakeholders designing and stakeholders installing green roofs becomes crucial. Architects and stakeholders designing green roofs need to come together at early stage so that the building's technology can be designed to

support the process of constructing green roofs and vice versa. For example, if green roofs want to be designed to be a part of a stormwater management system, the right stakeholders such as stormwater management planners, green roof designers and city planners need to cooperate at the early stages of the process of constructing green roofs.

Lack of research and fact-based knowledge

Empirical findings indicate that lack of research and fact-based knowledge is an obstacle, since there does not seem to be enough local information available to promote the process of constructing green roofs in Finland. The lack of research and fact-based knowledge category was formed from three subcategories: lack of measuring, unknown costs and benefits and unsureness about maintenance. The costs and issues related to maintenance seemed to be the biggest stakeholder concerns. This category was also closely linked to the previous categories of 'lack of accustomed practices' and 'lack of expertise and professionals'.

Lack of measuring indicates that there is not enough local information available to support the process of constructing green roofs in Finland. Monitors would be needed for measuring the different benefits of green roofs:

‘Monitors are needed for providing data of CO₂ emissions and water recycling and other good things done by the green roof.’ (I3)

In addition, green roofs are considered rather expensive investments comparing to traditional types of roofs, such as bitumen. Thus, finding arguments in favour of the costs of the process of constructing green roofs was seen as a crucial factor:

‘The greatest barrier to promoting green roofs is costs. A better image is needed on what it costs.’ (I2)

By measuring different elements, fact-based arguments supporting the investment could be found for different stakeholder groups. The importance of finding arguments in favour of the environment and for different stakeholders using the green roof was highlighted:

‘Cost and the investment itself are something that you have to find the arguments for... That why invest in a green roof, what are the benefits for the environment, for the microclimate, how can you utilise the space, how can the residents utilise it, how can businesses utilise it... So, we have to find the evidence that if we invest two euros what will that generate for us.’ (I3)

Thus, the process of constructing green roofs is seen only as a costly investment without a clear understanding of the different benefits and return on investment. Especially, the costs of green roofs were seen as too high for those stakeholder groups, such as project managers and building owners, who are responsible for the project or the building itself. The uncertainty about costs and other benefits for both humans and the natural environment, which would be needed in order to support and facilitate the process of constructing green roofs, was emphasised:

‘We have to be able to show the costs and benefits in euros... The investment (the green roof) costs more when installing it but these are the benefits for you, and these are the benefits for the environment. This why we need different measuring systems so we can report what benefits the green roof has created.’ (I3)

‘I would like to have tools for how I could support and facilitate the process of constructing green roofs. Information is needed about real expenses, and also water damages, and maintenance... A number is needed for everything and how much it (green roof) would cost more, so that we could make realistic decisions... We would need an estimate that this would be the cost, and these would be the other benefits of a green roof.’ (I7)

In addition to measuring the costs versus the benefits of green roofs, the unsureness about the right level of maintenance depending on the plant types was seen as an obstacle among stakeholders. Hence, not only the costs and benefits need to be known before considering the installation of green roofs, but also the right level of maintenance post-installation, so the whole life cycle of the process of constructing green roofs needs to be taken into account.

Thus, the empirical findings indicate that research can be a tool to increase understanding and knowledge about different conditions for installing green roofs, different green roof and plant types, the right level of maintenance and especially the benefits of the process of constructing green roofs in relation to the costs and to the environment. Stakeholders feel that there is no accurate local information available in Finland about the benefits of constructing green roofs. Without the necessary local information, it is harder to justify the investment, and thus harder to sell when seen only as a costly investment. Thus, the lack of research and fact-based knowledge was recognised to both slow down the process of constructing green roofs as well as prevent them from being constructed at all in some cases.

Stakeholder conflicts

As already stated before, the process of constructing green roofs requires the involvement of multiple different stakeholder groups. The empirical findings show that in the process of constructing green roofs exist stakeholder conflicts. These stakeholder conflicts hinder the different phases in the process of constructing green roofs. The stakeholder conflicts category was formed from two subcategories: stakeholders with different interests and stakeholders with different responsibilities.

There seem to be multiple stakeholder groups with different interests in mind in regard to for what purposes a green roof should be constructed. Especially, stakeholders' background was recognised as an important factor influencing the different interests for the purpose of which green roofs should be constructed for. For example, if the stakeholder's background was an ecologist, their main interest was to construct green roofs for ecological purposes, such as the hydrological cycle of the cities. Instead, if the stakeholder's background was a biologist, their main interest seemed to lie in supporting biodiversity and the use of native endangered plants on the green roofs. And then again, if the stakeholder's background was an entrepreneur installing green roofs and providing structures and plant selection for green roofs, their main interest seemed to lie in making the business better by innovating new green roof structures and elements and creating profit by doing that. Hence, the interests of different stakeholder as regards of the purpose of the process of constructing green roofs were seen as somewhat conflicting:

‘The sedum roof... it has been commercialised in Germany and then they (some green roof companies) would happily sell it here (in Finland), the same German sedum roof.’ (I1)

In this case the stakeholder conflict comes from the different viewpoints which different stakeholder have according to their backgrounds. When stakeholder groups installing a green roof, such as contractors, see the use of well conceptualised German sedum green roofs as easy and beneficial in Finland, other stakeholder groups, such as ecologists or biologists, see it conflicting. The conflict comes from the notion that the German made sedum roofs might create risks with invasive species or that the sedum roofs do not necessarily offer benefits from an ecological or biological point of view.

In addition to different roof types, stakeholder conflicts were recognised among different end-users of the green roofs. For example, residents could have been ready to pay for greener views in the city however, the construction companies did not seem ready to build them:

‘Stormwater management is one thing when considering green roofs, another thing is that tenants and property owners could be ready to pay for greener views, but construction companies are not ready to build greener views.’ (I2)

Thus, these conflicts are closely linked to other identified obstacles such as ‘lack of accustomed practices’ and ‘lack of expertise and professionals’ due to their interconnectedness with the whole process of constructing green roofs.

The empirical findings also indicate that stakeholder conflicts arise from the great number of stakeholder groups and the unknown responsibilities among these stakeholder groups in the process of constructing green roofs:

‘There are multiple different stakeholders involved... Multiple developers and builders, private sector and public sector... It is a difficult place, how do you take everything into account? It creates a myriad of challenges.’ (I3)

‘It is the same case if you do the water proofing of a bathroom, so no water proofing installer will guarantee the work of someone else layering the tiles.’ (I6)

This indicates that stakeholders are lacking information about their responsibilities which can cause misconceptions and a lack of trust. Different stakeholders’ interests were also seen to be related to the other obstacles and the background of the stakeholder. If the stakeholder was from the business sector their goal was more likely related to selling green roofs instead of supporting the ecological or biological side. If, instead, if the stakeholder’s background was from the ecological side, their goals were more likely to be related to the ecological side of the green roofs rather than the business side. However, more research is needed on the motives behind different stakeholder interests and goals in the context of the process of constructing green roofs.

Existing prejudices and fears

According to the empirical findings, there are existing prejudices and fears related to the process of constructing green roofs among different stakeholder groups. Especially the stakeholders who hold responsibility during the process of constructing green roofs seemed to have more prejudices and fears. The identified prejudices and fears were related to possible water damages in the building and mistakes affecting the end result and leading to a bad reputation, acting as a slowing factor or preventing the process of constructing green roofs from happening at all. Existing prejudices and fears among different stakeholders were described as follows:

‘Property owners, developers and builders are afraid that green roofs will let water in and ruin the building.’ (I3)

‘There are prejudices and fears against the process of constructing green roofs, probably even more fears... Finns fear indoor air problems and this is a big slowing factor.’ (I7)

‘In Finland one of the biggest issues against the process of constructing green roofs is prejudice... This is my own personal opinion, but prejudice is a big thing. We have challenging conditions, snow weight and they (green roofs) are functional only during the growing season.’ (I1)

These prejudices and fears seemed to be closely linked to those stakeholder groups who either own the building or have the responsibility for the construction work of the building, such as developers or contractors. The findings indicate that prejudices and fears have a causal relationships with the other identified obstacles, since existing prejudices and fears might be caused by the other identified obstacles. Especially, ‘the lack of expertise and professionals’ obstacle was considered to cause mistakes and therefore maintain the existing prejudices and fears related to the process of constructing green roofs. Thus, due to a lack of professionals, a lack of research and successful references and other stakeholder conflicts, prejudices and fears can flourish among different stakeholder groups slowing down the process of constructing green roofs or preventing them from happening at all.

4.1.4 Drivers in the process of constructing green roofs

Empirical examination recognised three main drivers affecting the process of constructing green roofs in Finland: 1) sustainability orientation and innovations for sustainability; 2) a trend for caring about the environment; and 3) considering the roof as a resource. These identified drivers indicate factors which are enabling the process of constructing green roofs whilst contributing to sustainability. In the following sections these categorised drivers are opened up more in detail examining stakeholder relations in them. Table 7 below sums up the identified drivers in the process of constructing green roofs in Finland.

Table 7 Drivers in the process of constructing green roofs

Category	Subcategory	Definition
Sustainability orientation and innovations for sustainability	Sustainability orientation	Individuals with an entrepreneurial mindset driving for sustainable development in the process of constructing green roofs by their own values and goals
	Innovations for sustainability	Emphasising sustainable solutions, combining product development with research, innovations using recycled materials, making use of everything, and acquisitions towards sustainability in the process of constructing green roofs
Trend for caring about the environment	Need for green space	Urbanization making cities denser increasing the need for green space
	Sustainability expected	Stakeholders and public opinion expecting sustainability in the process of constructing green roofs
	Solutions serving the environment	Change in stakeholder values to consider solutions serving the environment rather than destroying it
Considering the roof as a resource	Social dimension	The process of constructing green roofs as a social space, recreational area, aesthetic and therapeutic views, safe area, learning environment and urban farming
	Environmental dimension	The process of constructing green roofs for the microclimate, biodiversity potential, compensating for lost areas, carbon absorption, endangered species, urban filters
	Economical dimension	The process of constructing green roofs for stormwater management, protecting the roof, cost savings in the long term, savings in cooling and heating

Sustainability orientation and innovations for sustainability

This category was formed from two subcategories: sustainability orientation and innovations for sustainability. The category represents an individual’s sustainability orientation in the process of constructing green roofs and their innovative actions taken towards emphasising innovations for sustainability during that process.

Sustainability orientation describes individuals with an entrepreneurial mindset pushing for sustainable development in the process of constructing green roofs. These individuals were driven by their own sustainability related values and goals. They also seemed to share a mutual interest in promoting the process of constructing green roofs from sustainability perspective. Sustainability orientation was seen as an important factor for promoting the process of constructing green roofs, as previous references are missing and

processes of constructing green roofs are still seen as somewhat of a new thing embedded with prejudices and fears.

The innovations for sustainability describe the stakeholders' interest to find more environmentally friendly solutions through product development and making the business more sustainable in the long-term. Innovations for sustainability emphasised combining product development with research, innovations of using recycled materials, making use of everything, and acquisitions towards sustainability. Relations towards sustainability were described as follows:

‘Sustainable solutions can be found in product development, for example common reeds as a part of stormwater management, absorbs more water than some other plant types.’ (I2)

‘Bringing more environmentally friendly solutions has been a key element for a while.’ (I3)

‘It is a conscious choice that we make these kinds of acquisitions to find ecological and environmentally friendly solutions.’ (I6)

Hence, stakeholder interests were seen as closely related to sustainable development and innovations for sustainability in the process of constructing green roofs.

Trend for caring about the environment

This category represents the effects of urbanization, stakeholders and public opinion expecting sustainability in the process of constructing green roofs, and the change in stakeholders' values to consider solutions serving the environment rather than destroying it. Altogether, this category represents the switch in stakeholders' values and in common public opinion to care about the environment.

It was recognised, that especially the different stakeholder groups using the green roofs, such as city dwellers and residents, would like to have greener views in cities. However, increased urbanization has not been able to offer those views. Also, change in stakeholders' values was recognised. The sustainability mindset is cross cutting the

construction industry, and stakeholders want solutions which are serving the environment rather than destroying it. The change in values considering the environment was clear:

‘Nobody values the asphalt jungle in the city.’ (I5)

‘If you follow articles or media or the conversation in social media. All environmental questions have become more common in the past few years... Solutions that serve the environment are favoured. This is the trend, and it has increased the demand of green roofs.’ (I6)

‘Considering the environment is a key stone and sustainability is cross-cutting the whole industry.’ (I3)

Thus, this change in stakeholders’ values towards consideration of the environment was emphasised as a driver in the process of constructing green roofs, since green roofs can be a solution to increase the green in dense urban areas where space is limited.

Considering roofs as a resource

According to the empirical findings, considering roofs as a currently unused resource will enable potential in three different dimensions: social, environmental and economic. Together these dimensions offer the driving potential for the process of constructing green roofs as roofs are not considered a resource at the moment. Consideration of the roofs as a resource was being emphasised:

‘Cities are becoming denser and denser. So, it is a matter of fact that the roof area has to have a functional use. That we would see them as a resource of what they actually are.’ (I7)

Thus, in urban areas where construction is dense, the use of every space becomes crucial. Considering roof as a resource consist of identifying values from the social, environmental and economic dimensions. Values from the social dimension included possible utilisation of the roof as a green roof as a social space, learning environment or communal urban garden. A case where the green roof of an apartment building resulted in less antisocial behaviour and changing the whole culture in the building to a more

inclusive one was described. The green roof seemed to be a connecting factor between different stakeholders:

‘People are enjoying themselves, they know their neighbours, because Finnish people have this issues that it is hard to go to talk to the neighbour, so there (--) they have their own Facebook page, internet page and they have parties on the green roof. It connects people. The residents invite people there and they have had graduations and other parties on the green roof. This is the best thing that you can achieve with plants and vegetation.’ (I4)

According to the empirical findings, stakeholders seemed to also value green views, such as aesthetic, imago, and therapeutic factors and marketing appeal. Stakeholders considered green roofs as prettier than traditional rooftops and also valued greener views:

‘Green roofs are prettier than concrete roofs or bitumen roofs.’ (I4)

‘They wanted eye catching elements when you look outside of the hospital and green pathways and benches.’ (I5)

Green roofs were also considered to have the possibility to offer a safe and tranquil place for different stakeholders using green roofs. For example, for children as a learning environment to combat alienation from nature, for office workers as a lunch area or as an urban garden for a restaurant bringing these stakeholders together or for other city dwellers as a recreational area:

‘A green roof would also be a learning environment. Children in cities are alienated from the environment. One example is when my mum asked a group of children what vegetable this is, it was a beetroot, and the children argued that it is not, they argued that beetroots are slices... so just basic stuff... we are alienated from plants and animals.’ (I2)

‘There could be offices at the restaurant at the bottom and offices in the middle. The restaurant could use the green roof for urban farming and office people could

use it for meetings and as a lunch spot. A green roof would bring everybody together.’ (I3)

‘Urban hustle and bustle and also insecurity is increasing, so green roofs have a sanctuary function as a closed and tranquil green place.’ (I7)

Environmental dimension for considering roofs as a resource included green roofs as a possible driver for changing the microclimate, biodiversity potential, as a possible compensator for lost areas, potential for filtering air and water and ability for carbon absorption. All these environmental aspects of green roofs were considered to benefit urban nature and support the process of constructing green roofs in them:

‘Green roofs are like a filter in the urban environment for water and air, and carbon storage... I see green roofs as a part of the hydrological cycle, part of photosynthesis, carbon sequestration, thermoregulation, part of the ecological cycle in urban environment.’ (I7)

‘For some endangered species the roof is an excellent, suitable habitat.’ (I4)

The economic dimension for considering roofs as a resource included, for example, stormwater management, the green roof’s ability to protect the roof from wear and tear resulting in cost savings in the long-term and savings in cooling and/or heating depending on the climate. It was noted that these values from the economic dimension were easier to measure in money when comparing with the social or environmental aspects. However, it was also noted that the economic potential of green roofs, such as constructing them for stormwater management purposes, has not been marketed in Finland.

Hence, considering the roof as a resource which is currently unused, could enable potential for the process of constructing green roofs, benefiting different stakeholders from the social, environmental and economic aspects. However, this resource-based view of roofs is not currently established within the minds of the different stakeholders, and conflicts exist as described in previous chapters.

4.2 Stakeholder engagement in the process of constructing green roofs

4.2.1 Stakeholder engagement activities

Different stakeholder engagement activities were recognised from the empirical data. These engagement activities included emphasising overall stakeholder cooperation and communication. Cooperation included activities such as consulting other stakeholders, seeking guidance, learning from other stakeholders and working together. Communication emphasised activities such as informing, information sharing, understanding and listening and open dialogue. Altogether, these activities were recognised as contributing to integrating stakeholders. These identified stakeholder engagement activities are summarised in figure 6 below and described in more detail in the following section.

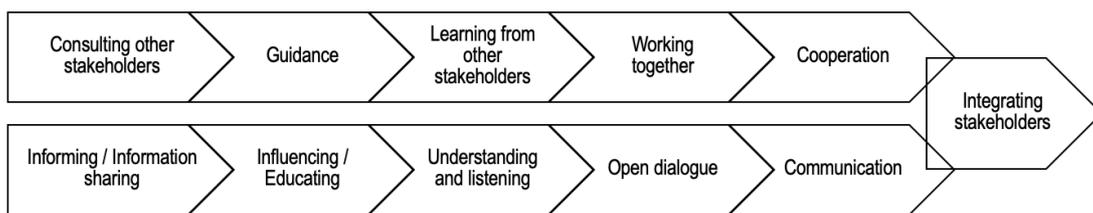


Figure 6 Stakeholder engagement activities

It was noted that the high risk and complex processes of constructing green roofs need the compounding of different stakeholders' skills. With the help of other stakeholders, they can benefit and speed up the process. The importance of getting help from other stakeholders, especially with difficult projects, was highlighted:

‘When we have a difficult project, we can ask help and advice from them... They offer designing help if I cannot solve the issue. I can send it (the project) to them and get help. It is a big benefit and has speed up our processes. It’s nice.’ (I5)

Empirical findings also highlighted the importance of cooperation which is beneficial for all stakeholders. Thus, this would require that stakeholders also share a mutual agenda.

The importance of creating cooperation which would serve the whole process of constructing green roofs and its stakeholders was emphasised:

‘We have to create good cooperation that it is profitable for both participants and serves the whole thing.’ (I6)

With an active dialogue, stakeholders can share information, educate each other and communicate during different phases of the process of constructing green roofs. Communication with stakeholders was recognised to increase trust between stakeholders and to create value. Communicating with stakeholders increases the chances for stakeholders to share their agendas and responsibilities. Without the understanding of different responsibilities in the different stages of the process of constructing green roofs, it can create and maintain uncertainty issues and lack of trust, as presented previously in the chapter 4.1.3. In other words, when one stakeholder group communicates its knowledge in an open dialogue between other stakeholders, it helps all stakeholders to do their work better:

‘We try to inform architects, landscaping architects, city councils, students about green roofs and their benefits.’ (I5)

‘There are so many different options for the structures of green roofs... It requires communication, someone to guide you like “this is where you can start” and so on.’ (I6)

Thus, the empirical findings indicate that the success of one stakeholder group helps the other stakeholders to flourish as well and to create value. It was also noted that the innovations of one stakeholder group helps the whole construction industry to evolve which would create value at a larger scale.

Integrating stakeholders was identified as the most important part of the stakeholder engagement activities since it does not only help to overcome the issues related to the process of constructing green roofs, but it may help to develop a mutual agenda between stakeholders, such as the ultimate goal of answering the question of why green roofs

should be constructed. Thus, the findings indicate that having stakeholder interest linked may help to create a mutual agenda and thus, value.

4.2.2 Stakeholder engagement in contributing to obstacles, drivers and regulation

Figure 7 below summarises the interconnected relations between the stakeholder engagement in relation to the identified obstacles, drivers and regulation affecting the process of constructing green roofs in Finland. Stakeholder engagement could increase the impact of the identified drivers or decrease the impact of the identified obstacles. The outcome depends on the type of the engagement.

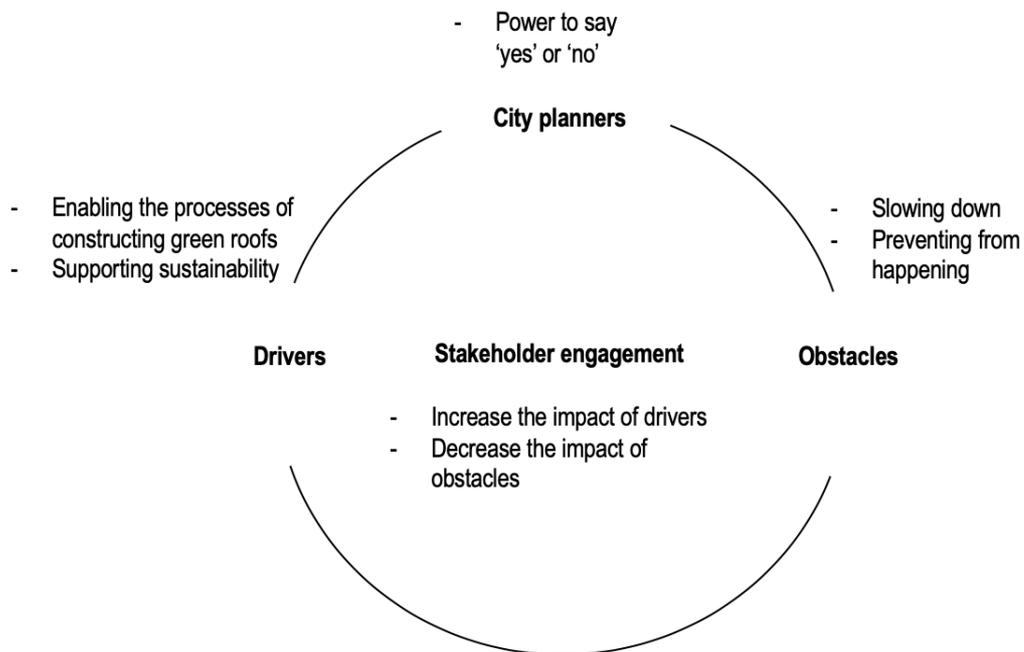


Figure 7 Interconnectedness of stakeholder engagement

In other words, if stakeholders are integrated in close cooperation and keep up active dialogue, they are more likely to develop a mutual interest which could help them to overcome the different obstacles identified in this study. In addition, stakeholder engagement itself could also increase itself the enabling power of the identified drivers by helping other stakeholders to flourish which could help the whole construction industry to evolve creating value for multiple stakeholders including the environment. Thus, increasing the impact of identified drivers in stakeholder engagement could contribute to sustainability in the process of constructing green roofs.

As explained in the previous chapters, some of the potential of green roofs is unutilised due to the lack of stakeholder cooperation, wrong timing and lack of trust. If architects and designers of green roofs come together at early stage of the design phase, they have a higher possibility to affect the technical structures in the building, enabling the process of constructing green roofs. For example, if the green roof is desired to be designed as part of the stormwater management system, it is crucial that right stakeholders, city planners, designers of stormwater management and designers of green roofs, come together before the stormwater management systems and decisions regarding them have been locked-in in the city plan.

Thus, stakeholder engagement can also influence the stakeholders regulating the construction industry such as city planners. However, it is worth noting that not only demanding green roofs as a mandatory part of the city plan will make them successful. In order to make the process of constructing green roofs successful, integrating multiple different stakeholders at the right time in the process is required. With closer stakeholder cooperation and communication, right timing for different stakeholder participation in the process could be easier to manage. Thus, green roofs could be better designed, installed and maintained.

However, despite noting that stakeholder engagement can enhance the process of constructing green roofs, the empirical findings also highlighted that there are not established ways to engage stakeholders in the different phases of the process, and that engaging different stakeholders is challenging in practice. For example, residents can be the daily users of a green roof and ideally could be engaged to maintain the roof. However, the challenge comes that residents do not necessarily have the experience and needed knowledge about maintaining the green roof. Another issue is that the residents need to be committed to maintain the roof regularly. Active dialogue, education, and having maintenance agreements with the residents could increase their engagement. However, more practical research is needed to support stakeholder engagement especially in relation to the identified obstacles in the process of constructing green roofs.

4.3 Summary of the empirical findings

The process of constructing green roofs requires the involvement of multiple stakeholder groups. The most powerful instrument regulating and guiding the process of constructing green roofs in cities and municipalities was identified to be city planning. City planners set the guidelines and have the ultimate power to say ‘yes’ or ‘no’ to the process of constructing green roofs in urban areas. Hence, city planning has a great steering force for the process of constructing green roofs.

The empirical findings also identified obstacles and drivers affecting the process of constructing green roofs. The obstacles indicate different stakeholder relations and aspects which are either slowing down the process of constructing green roofs or preventing them from happening at all. The identified obstacles were: 1) lack of accustomed practices; 2) lack of expertise and professionals; 3) technology as a barrier 4) lack of research and fact-based knowledge; 5) stakeholder conflicts; and 6) existing prejudices and fears.

The identified drivers indicate factors which are enabling the process of constructing green roofs whilst contributing to sustainability. The identified drivers were: 1) sustainability orientation and innovations for sustainability; 2) trend for caring about the environment; and 3) considering the roof as a resource.

The empirical findings also identified different stakeholder engagement activities. These activities were highlighted as fostering cooperation and communication between stakeholders contributing to integrating stakeholders. Thus, it was noted that if green roofs are constructed with active stakeholder engagement, it can both increase the number of processes of constructing green roofs, as well as to overcome stakeholder conflicts related to the complexity of the process of constructing green roofs.

Stakeholder engagement also ensures that the benefits of green roofs are better understood among stakeholders and taken into account in different stages of the process of constructing green roofs. In other words, if green roof stakeholders are actively engaging with each other by having open and active dialogue and cooperating, they can increase the effects of the identified drivers and lower the impact of the identified obstacles.

Even though it seems that the simplest way of supporting the process of constructing green roofs would be requiring them in the city plan as a mandatory thing, it is worth noting that only a notation in the city plan does not make the process successful. In other words, if green roofs are mandated in the city plan, it may lead to designing, installing and maintaining only the cheapest, lightest, sedum type of green roofs with minimum positive outcomes for the urban environment and the end-users of green roofs. In some possibly even creating issues with invasive species, instead of solving them.

However, with integrative stakeholder engagement these benefits of different types of green roofs can be better communicated between different stakeholders, such as city planners, designers of stormwater management, biologists, ecologists and city dwellers. Hence, if different stakeholders would be better integrated and engaged, the process of constructing green roofs could be created to support the social, environmental and economic aspects, contributing to sustainable development in urban areas.

However, the empirical findings also noted that there is not an established way to engage stakeholders in the process of constructing green roofs, and that engaging different stakeholders is challenging in practice. Thus, more practical research is needed to support stakeholder engagement especially in relation to the identified obstacles.

5 DISCUSSION

5.1 Theoretical contribution

The aim of this study was to examine how the process of constructing green roofs can be enhanced through stakeholder engagement. The process was defined as designing, installing and maintaining green roofs and requires the participation of multiple different stakeholders. The stakeholder engagement perspective focused on the stakeholders and their relations in this process. Sustainability was emphasised as green roofs were examined as a solution to contributing to the economic, environmental and social aspects of sustainability in urban areas and stakeholder engagement is closely linked to sustainability.

The research question of this study was stated as:

- 1) How can the process of constructing green roofs be enhanced through stakeholder engagement?

To be able to answer the research question combining previous literature with empirical observations was required. The theoretical part of this study utilised previous literature on sustainability, stakeholder engagement and green roofs. It focused on drawing a synthesis between green roofs and sustainability and stakeholder engagement and sustainability, since green roofs were examined as a solution to contributing to urban sustainability. The empirical research was conducted on the characteristics of the process of constructing green roofs in Finland, examining stakeholder relations and stakeholder engagement in that process.

Thus, I will answer the research question by combining the synthesis of previous literature and the empirical observations of this study using four propositions derived from the main empirical findings.

Proposition 1. Conflicting stakeholder relations and lack of mutual stakeholder interest hinder the process of constructing green roofs.

The empirical findings indicated that multiple obstacles exist in the process of constructing green roofs. Conflicting stakeholder relations and differing points of interest can lead to either slowing down or preventing the process of constructing green roofs. These obstacles related to stakeholder relations and interest include lack of accustomed practices, lack of expertise and professionals, technology as a barrier, lack of research and fact-based knowledge, stakeholder conflicts and existing prejudices and fears.

These empirical findings share some similarities with the constraints of the process of constructing green roofs addressed by Vijayaraghavan (2016, 747–748) about the right level of maintenance, non-existent local research, runoff quality, aesthetic issues, structural damage and roof leakage. However, this study noted that stakeholder conflicts are a crucial obstacle in the process of constructing green roofs. Especially the lack of mutual stakeholder interest on why green roofs should be constructed was recognised as a significant obstacle. It is worth noting that there is not much previous research on this topic. Thus, this study provides new knowledge on this area of research.

Proposition 2. The outcome of the process of constructing green roofs is dependent on the type of the stakeholder engagement.

It is worth noting that there is not much previous research on this topic. The empirical findings of this study noted that if the green roofs are constructed with stakeholder engagement, it could increase the number of constructed green roofs. In addition, stakeholder engagement can help with overcoming conflicts, which slow down or prevent the process of constructing green roofs. The empirical findings also noted that stakeholder engagement can help to create mutual interest between stakeholders. Thus, this study provides new knowledge on this area of research.

Having stakeholders' interests linked together may contribute to company success comparing to a situation where those interests are conflicting (Stubbs & Cocklin, 2008; Freeman et al., 2010). The empirical findings also noted that stakeholder engagement ensures that the benefits of green roofs are better understood among stakeholders and

taken into account in different stages of the process of constructing green roofs. Hörisch et al. (2014) also emphasise the importance of stakeholder cooperation for creating mutual interests and a common foundation for value creation. It is crucial for business to find a purpose that creates mutuality between key stakeholders in order to accomplish this task (Freeman et al. 2010, 28). Maak (2007) highlights engaging stakeholders in coalition through a common purpose. If green roof stakeholders are actively engaging with each other by having open and active dialogue and cooperating together, they can increase the effects of the identified drivers and lower the impact of the identified obstacles. Thus, this study shares similarities with previous literature and contributes to new outcomes on the stakeholder engagement in the context of the process of constructing green roofs.

As the empirical findings reveal, there are no established ways of engaging stakeholders and stakeholder engagement is challenging in practice in the process of constructing green roofs. However, engaging with stakeholders may lead to an increased number of completed processes of constructing green roofs. Yet, more practical research would be needed overcome stakeholder conflicts and to create mutual interest among the stakeholders.

Proposition 3. Considering roofs as resource could contribute to sustainable development in the cities in the long-term.

Green roofs' potential for contributing to sustainable development (Eggermont et al., 2015; European Commission, 2015; Raymond et al. 2017) benefiting both human (Alexandri and Jones, 2008; Snodgrass & McIntyre, 2010; Eggermont et al. 2015; Maes & Jacobs 2015) and non-human stakeholders (Miller, 2008; Francis & Lorimer, 2011; Boiras & Saizarbitroria, 2017) is addressed in multiple studies. As urbanization increases, the surface area of roofs will increase as well. In contrast, the available space for green areas such as parks or other recreational areas will decline in cities. This does not only pose challenges for the environment and urban biodiversity but creates socio-economic challenges as well, such as putting healthy living in cities at risk, as noted in previous studies (see e.g. Martinez-Bravo et al., 2019).

However, green roofs could compensate for the decline in green spaces in urban areas and serve as a resource which contributes to sustainability. Thus, turning empty roof space into green roofs could benefit both human and non-human stakeholders (Laine, 2010) by providing safe recreational areas and supporting biodiversity in cities contributing to sustainable development, as proposed in the empirical findings. Since previous literature has not examined green roofs from this perspective this finding adds valuable contribution into existing literature and practical research.

Proposition 4. Establishing engagement between different stakeholders can enhance the process of constructing green roofs and lead to sustainable outcomes.

As noted in this study, it is important to include a variety of stakeholders in the process, as stakeholder engagement can enhance the process of constructing green roofs both in number and also their various benefits. In the case of the process of constructing green roofs, connecting previously unconnected stakeholders such as city planners with stormwater designers and green roof designers may create benefits for all three aspects of sustainability.

Miller (2008) argues that the biggest potential of green roofs lies in stormwater management by providing an alternative and cost-effective way for their management in the long-term. The empirical findings also noted that stormwater management offers the potential for economic and environmental aspects. However, it was also noted that the potential of green roofs that include stormwater management systems has not been marketed in Finland among stakeholders. Maak (2007) emphasises the importance of engaging with the previously unconnected stakeholders. Thus, findings indicate that some stakeholders have been left out of the process of constructing green roofs. However, their engagement could benefit the processes leading to sustainable outcomes. Since previous literature on green roofs has not examined establishing engagement between different green roof stakeholders in the process of constructing them, this study adds valuable knowledge to existing research.

5.2 Managerial implications

This study targeted to increase the understanding among managers and policy makers about the process of constructing green roofs and their ability to contribute to sustainability and stakeholder engagement in the process. Regulation is a powerful tool and can be used to demand more green roofs in the city plan. Without political desire and incentives, it is highly likely that the number of green roofs is not going to increase dramatically. Thus, stakeholders regulating the constructing industry, such as city planners, should understand the process of constructing green roofs in urban areas as a way to manage stormwaters, increase biodiversity and create safe recreational areas for city dwellers.

However, as noted by Eggermont et al. (2015) the process of constructing green roofs is complex and surrounded by uncertainty issues which different parties such as policy makers or stakeholders have to take into consideration. As seen in the empirical findings, promoting the process of constructing green roofs in the city plan alone is not enough alone from a biodiversity perspective. Thus, managers and policy makers need to understand stakeholder relations and to engage them in sustainability efforts in order to overcome biodiversity issues and succeed in the long-term (Stubbs & Cocklin, 2008; Freeman et al., 2010; Boiral & Heras-Saizarbitoria, 2017). In addition, a sustainability mindset has to be ensured throughout the organization and within the minds of all stakeholders in order to create long-term sustainability (Freeman et al., 2010; Hörisch et al., 2014).

According to Hörisch et al. (2014) by educating stakeholders, not only are sustainable mindsets strengthened but stakeholders are empowered to act as intermediaries for the natural environment. Regulators have to encourage stakeholders to collaborate to increase sustainability, whilst governments should facilitate value creation. Value creation consists of both monetary value and the improvements of quality of life for each stakeholder. (Hörisch et al., 2014.)

Bansal and DesJardine (2014) state that time is an important factor in relation to sustainability. If managers and policy makers want to contribute to sustainable development, they should consider business success from the three aspects of

sustainability in long-term, looking beyond only short-term profits. The time relation is an important factor also when considering the process of constructing green roofs. Green roofs can be a costly investment if only considered in the short-term. However, if the green roofs are considered as a longer-term investment their potential in all three aspects of sustainability can be better taken into account. However, managers need to engage their stakeholders in order to get a better idea of the local costs versus the local benefits of the green roofs, as stated in the empirical findings.

Even though it seems that the simplest way of promoting the process of constructing green roofs would be targeting city planners to mandate green roofs in the city, it is worth noting that only a notation in the city plan does not necessarily make green roofs successful. In other words, if green roofs are mandatory on the city plan it may lead to constructing only the cheapest, lightest sedum type of green roofs with minimal positive outcomes, and in some cases even creating issues with invasive species, energy use and the use of materials such as plastics.

However, with integrative stakeholder engagement the benefits of different types of green roofs can be better communicated between different stakeholders such as city planners, stormwater designers, green designers, developers, biologists and ecologists. Thus, if different stakeholders are better integrated and engaged, different factors creating benefits for social, environmental and economical purposes contributing to sustainable development could be better taken into account when designing, installing and maintaining green roofs.

However, we can question who is responsible for the stakeholder engagement in the process of constructing green roofs when multiple stakeholder groups are affecting the process. Freeman (1984) puts the manager in the centre of attention for analysing stakeholder relations, communication and collaboration. In addition, Maak (2007) highlights the leader's responsibility in constructing and supporting trustful relationships between different stakeholders. However, Roloff (2008) suggest shifting the focus from the focal organization to the focal issue in these kinds of multi-stakeholder networks, which the process of constructing green roof is. Roloff (2008) also argues that managers are not always the best to manage their stakeholder relations in multi-stakeholder

networks and companies can be participants, without having a full control over the process.

This means, the focal issue in multi-stakeholder network, where civil society, businesses and governmental institutions come together (Roloff, 2008), could build up urban resilience by constructing green roofs in urban areas. This would put not only managers but also policy makers and other stakeholder groups in civil society in the centre of attention, creating a common purpose contributing to creating healthy, urban living habitats for human-and non-human stakeholders alike.

5.3 Evaluation of the study and suggestions for future research

Evaluation of scientific rigour is as fundamental in qualitative research as in any type of research (Slevin & Sines, 2000; Koskinen et al., 2005; Stige, Malterud & Midtgarden, 2009; Tuomi & Sarajärvi, 2009; Gelling, 2015). The evaluation may be done using various criteria for qualitative research emphasising ways how readers can have confidence in the qualitative research (Gelling, 2015).

In this study, the description of the research process is rich in detail in order to increase the credibility, which is seen as an important element for evaluating qualitative research (Koskinen et al., 2005). The detailed description also provides a chance for the readers to follow the research process and see how the research conclusions were formed which increases the trustworthiness of this study (Gelling, 2015).

Objectivity is considered an important component for evaluating qualitative research (Tuomi & Sarajärvi, 2009). The researcher, being a master's student, did not have considerable prior expectations or assumptions of the research phenomenon, nor did she know the interviewees beforehand, both of which could have affected the objectivity of the research.

Evaluation of a research process requires both self-criticism and social critique (Stige, Malterud & Midtgarden, 2009). This study is done with the best possible information and knowledge available according to the researcher's experience and resources. As a self-criticism, as being a master's student, the researcher does not have a background as an

experienced researcher. However, the researcher has had guidance and critique throughout the research process from the Business to Nature research group members including the supervisors of this Master's thesis. The guidance and the critique have helped the researcher in the process of selecting, weighing and evaluating the methods and the data. Expert involvement is seen a way to increase the overall credibility and consistency of the qualitative research (Slevin & Sines, 2000).

This study is qualitative in nature and may be judged because of that. The empirical data consists of six semi-structured interviews of seven green roof stakeholders. In addition, it is worth noting that not all green roof stakeholders were interviewed. However, in qualitative research the size of the data does not have to be large numerically, but rather high-quality in terms of the content (Tuomi & Sarajärvi, 2009). Interviewing different stakeholders or a wider range of stakeholders could have had an impact on the results represented in this study. However, to minimise possible biases and maximise the credibility, background information from the interviewees is provided for the reader in the methodological section. Also, the interviewed green roof stakeholders were seen to participate in the process of constructing green roofs in all of the three phases: designing, installing and maintaining of green roofs. Thus, they represent every phase of the process which increases the credibility of the findings.

Evaluation of transferability is also an important element for evaluating qualitative research (Slevin & Sines, 2000). The topic of this thesis can be considered quite fresh. It contributes to increasing understanding of sustainability and stakeholder engagement in the process of constructing green roofs. Since previous literature on green roofs has not examined the process of constructing green roofs from the stakeholder engagement perspective, this study adds valuable knowledge to existing literature and practical research. This can help to examine the research phenomenon in the future, increasing the transferability of this research (Slevin & Sines, 2000).

It is also worth noting that the empirical data is collected from Finland, so the findings reflect the phenomenon in Finland. This can question the transferability of the findings. The findings could have varied if the data had been collected with a broader geographical reach since the process of constructing green roofs is also affected by local conditions, such as the climate. Also, different countries have different regulations which can affect

the process of constructing green roofs. However, these geographical factors have been reported for the readers of this study. In addition, qualitative content analysis was used to analyse the empirical data due to its systematic nature (Schreier, 2013; Elo & Kyngäs, 2008). Using a systematic approach increases the transferability of the research (Slevin & Sines, 2000).

Also, the semi-structured interviews of this study were conducted in Finnish, that being the native language of all participants. Thus, it allowed reaching an in-depth understanding of the matter without having issues related to the possible language barriers. However, it is worth noting that the researcher translated the quotes represented in the findings as well as conducted the analysis itself in English, as that was the language of this study. To prevent misunderstandings caused by the possible language barrier, a proof-reader has gone through this study to correct errors which could have affected the reliability of this study.

In addition, one aim of this study, as in research in general, was to recognise fruitful future research possibilities. This study examined stakeholder engagement in the process of constructing green roofs. In the findings it was noted that engaging stakeholders is challenging in practice, and that there is not an established way to engage stakeholders in the process of constructing green roofs. However, stakeholder engagement was seen to enhance the process of constructing green roofs and contributing to sustainability. Thus, future research could focus especially on assessing stakeholder engagement on a practical level in relation to the identified stakeholder conflicts presented in this study. This kind of research could be conducted using an intensive or extensive case study to provide detailed insights on stakeholder engagement.

REFERENCES

- Alexandri, E. & Jones, P. (2008). Temperature decreases in an urban canyon due to green walls and green roofs in diverse climates. *Building and Environment*, 43, 480–493.
- Arias-Maldonado, M. (2013). Rethinking Sustainability in the Anthropocene. *Environmental Politics*, 22(3), 428–446.
- Baier, K. (1966). What is Value? An Analysis of the Concept, in Baier, K. & Rescher, N. (eds.), *Values and Future: The Impact of Technological Change on American Values*. The Free Press, New York, 33–67.
- Bansal, P. & DesJardine, M. R. (2014). Business sustainability: It is about time. *Strategic Organization*, 12(1), 70–78.
- Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, 65, 42–56.
- Boiral, O. & Heras-Saizarbitoria, I. (2017). Managing biodiversity through stakeholder involvement: why, who, and for what initiatives? *Journal of Business Ethics*, 140(3), 403–421.
- Bowman, C. & Ambrosini, V. (2010). How value is created, captured and destroyed. *European Business Review*, 22(5), 479–495.
- BREEAM. (2020). Referenced 15.4.2020. Retrieved from <https://www.breeam.com>
- Burchell, J. & Cook, J. (2006). It's good to talk? Examining attitudes towards corporate social responsibility dialogue and engagement processes. *Business Ethics: A European Review*, 15(2), 154–170.
- Burchell, J. & Cook, J. (2008). Stakeholder dialogue and organisational learning: changing relationships between companies and NGOs. *Business Ethics: A European Review*, 17(1), 35–46.
- Business2Nature. (2020). Referenced 15.4.2020. Retrieved from <https://www.b2n.fi>.
- Clarkson, M. B. E. (1995). A Stakeholder Framework for Analysing and Evaluating Corporate Social Performance. *Academy of Management Review*. 20(1), 92–117.
- Corbin, J. & Straus, A. (2008). Strategies for qualitative data analysis. In Corbin, J., & Strauss, A. *Basics of qualitative research (3rd ed.): Techniques and procedures for developing grounded theory*, 65–86. *Thousand Oaks, CA: SAGE*.
- Dillard, J., Dujon, V. & King, M., C. (2008). In Dillard, J., Dujon, V. & King, M., C. (eds.), *Understanding the Social Dimension of Sustainability*, 1–14. *Routledge Taylor & Francis Group*.

- Dimitriyev, S., Freeman, R. E., Kujala, J. & Sachs, S. (2017). A Pragmatist Perspective on Management Scholarship and on Stakeholder Engagement in Particular. In Freeman, R. E., Kujala, J., & Sachs, S. (eds.), *Stakeholder Engagement: Clinical Research Cases*. Retrieved from <https://ebookcentral.proquest.com>
- Dixon, T. & Wilkinson, S. (2016). In Wilkinson, S., & Dixon, T. (eds.), *Green Roof Retrofit: Building Urban Resilience*. West Sussex, England: Wiley Blackwell. Retrieved from <https://ebookcentral.proquest.com>.
- Driscoll, C. & Starik, M. (2004). The Primordial Stakeholder: Advancing the Conceptual Consideration of Stakeholder Status for the Natural Environment. *Journal of Business Ethics*, 49, 55–73.
- Eggermont, H., Balian, E., Azevedo, J., M., N., Beumer, V., Brodin, T., Claudet, J., ... & Le Roux, X. (2015). Nature-based Solutions: New Influence for Environmental Management and Research in Europe. *GAIA - Ecological Perspectives for Science and Society*, 24(4), 243–248.
- Elo, S. & Kyngäs, H. (2007). The qualitative content analysis process. *Journal of Advanced Nursing*, 62(1), 107–115.
- European Commission. (2015). *Towards an EU research and innovation policy agenda for nature-based solutions and re-naturing cities*. Final Report of the Horizon 2020 expert group on “Nature- Based Solutions and Re-Naturing Cities.” European Commission, Brussels, Belgium.
- Francis, R.A. & Lorimer, J. (2011). Urban reconciliation ecology: The potential of living roofs and walls. *Journal of Environmental Management*, 92, 1429–1437.
- Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Boston, MA: Pitman.
- Freeman, R. E., Harrison, H., S., Wicks, A., C., Parmar, B. & de Colle, S. (2010). Stakeholder theory: The State of the Art. Cambridge: Cambridge University Press, 3–29.
- Freeman, R. E., Kujala, J., Sachs, S. & Stutz, C. (2017). Stakeholder Engagement: Practising the Ideas of Stakeholder Theory. In Freeman R. E. et al. (eds.), *Stakeholder Engagement: Clinical Research Cases*. Retrieved from <https://ebookcentral.proquest.com>.
- Gelling, L. (2015). Qualitative research. *Nursing Standard*, 29(30), 43.
- Greenwood, M. (2008). Stakeholder Engagement: Beyond the Myth of Corporate Responsibility. *Journal of Business Ethics*, 74, 315–327.
- Guibert, L. & Roloff, J. (2017). Stakeholder dialogue: strategic tool or wasted words? *Journal of Business Strategy*, 38(5), 3–11.
- Haksever, C., Chaganti, R. & Cook, R. G. (2004). A Model of Value Creation: Strategic View. *Journal of Business Ethics*, 49, 291–305.

- Harrison, J. S. & Wicks, A. C. (2013). Stakeholder Theory, Value and Firm Performance. *Business Ethics Quarterly*, 23(1), 97–124.
- Holton, I., Glass, J., & Price, A. D. (2010). Managing for sustainability: Findings from four company case studies in the UK precast concrete industry. *Journal of Cleaner Production*, 18(2), 152–160.
- Hörisch, J., Freeman, R. E., & Schaltegger, S. (2014). Applying stakeholder theory in sustainability management: Links, similarities, dissimilarities, and a conceptual framework. *Organization & Environment*, 27(4), 328–346.
- Kujala, J., Lehtimäki, H. & Myllykangas, P. (2017). Value Co-creation in Stakeholder Relationships: A Case Study. In Freeman R. E. et al. (eds.), *Stakeholder Engagement: Clinical Research Cases*. Retrieved from <https://ebookcentral.proquest.com>.
- Kujala, J. & Sachs, S. (2019). The Practice of Stakeholder Engagement. In Harrison. J. S., Barney. B. J., Freeman. R. E. & Phillips. R. A. (eds.), *The Cambridge Handbook of Stakeholder Theory*, 227–241. Cambridge University Press.
- Laine, M. (2010). The nature of nature as a stakeholder. *Journal of Business Ethics*, 96(1), 73-78.
- Lauri, S., & Kyngäs, H. (2005). Hoitotieteen teorian kehittäminen. Porvoo: WSOY.
- Laurila, S., Jyrkänkallio-Mikkola, J., Mesimäki, M., Kallio, P., Kuoppamäki, K., Nieminen, H., & Lehvävirta, S. (2014). Normeja viherkatoille - perusteita kehittämiseen. Helsingin yliopisto, koulutus- ja kehittämiskeskus Palmenia. Helsinki: Euroopan unioni. Euroopan aluekehitysrahasto.
- Lorr, M. J. (2012). Defining Urban Sustainability in the Context of North American Cities. *Nature & Culture*, 7(1), 16–30.
- Maak, T. (2007). Responsible Leadership, Stakeholder Engagement, and the Emergence of Social Capital. *Journal of Business Ethics*, 74, 329–343.
- Marans, R. (2015). Quality of urban life & environmental sustainability studies: Future linkage opportunities. *Habitat International*, 45(1), 47–52.
- Martínez-Bravo, M., Martínez-Del-Río, J., & Antolín-López, R. (2019). Trade-offs among urban sustainability, pollution and liability in European cities. *Journal of Cleaner Production*, 224, 651–660.
- Mathur, V. N., Price, A. D. F. & Austin, S. (2008). Conceptualizing stakeholder engagement in the context of sustainability and its assessment. *Construction Management and Economics*, 26, 601–609.
- Mcdonald, R. C. (2012). Sustainable Buildings: A Necessary Component of a Sustainable Communities. In Robinson, P., Dale, A. & Dushenko W. T. (eds.), *Urban Sustainability: Reconnecting Space and Place*. University of Toronto Press, Scholarly Publishing Division.

- Meadowcraft, J. (2000). Sustainable Development: a New(ish) Idea for a New Century? *Political Studies*, 48, 370–387.
- Miller C. (2008). Blue-green Practices: Why They Work and Why Have They Been So Difficult to Implement Through Public Policy. In Birch, E. L., & Wachter, S. M. (eds.), *Growing greener cities: Urban sustainability in the twenty-first century*. Retrieved from <https://ebookcentral.proquest.com>.
- Mylykangas, P., Kujala, J. & Lehtimäki, H. (2010). Analyzing the Essence of Stakeholder Relationships: What do we Need in Addition to Power, Legitimacy, and Urgency? *Journal of Business Ethics*, 96, 65–72.
- Portney, K., E. (2015). *Sustainability*. Cambridge, Massachusetts: The MIT Press. Retrieved from <https://ebookcentral.proquest.com/lib/tampere/detail.action?docID=4397950>.
- Raymond, C. M., Frantzeskaki, N., Kabisch, N., Berry, P., Breil, M., Nita, M. R., Calfapietra, C. (2017). A framework for assessing and implementing the co-benefits of nature-based solutions in urban areas. *Environmental Science and Policy*, 77, 15–24.
- Roloff, J. (2007). Learning from Multi-Stakeholder Networks: Issue-Focused Stakeholder Management. *Journal of Business Ethics*, 82, 233–250.
- Jenks, M., & Jones, C. (2010). In: Jenks M., Jones C. (eds.), *Dimensions of the Sustainable City*. Future City, 1–19. Springer, Dordrecht.
- Kabisch, N., Frantzeskaki, N., Pauleit, S., Naumann, S., Davis, M., Artmann, M. & Bonn, A. (2016). Nature based solutions to climate change mitigation and adaptation in urban areas: perspectives on indicators, knowledge gaps, barriers, and opportunities for action. Nature-based solutions to climate change mitigation and adaptation in urban areas: perspectives on indicators, knowledge gaps, barriers, and opportunities for action. *Ecology and Society*, 21(2), 39.
- Kaptein, M., & Van Tulder, R. (2003). Toward effective stakeholder dialogue. *Business and Society Review*, 108(2), 203–224.
- Koskinen, I., Alasuutari, P. & Peltonen T. (2005). Laadulliset menetelmät kauppatieteissä. Tampere: Vastapaino.
- Maes, J., & Jacobs, S. (2015). Nature-Based solutions for Europe’s sustainable development. *Conservation Letters*, 10(1), 121–124.
- Mitchell, R. K., Agle, B. R. & Wood, D. J. (1997). Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and what really Counts. *Academy of Management Review*, 22(4), 853–886.
- Phillips, R., Freeman, R., & Wicks, A. (2003). What Stakeholder Theory is Not. *Business Ethics Quarterly*, 13(4), 479–502.
- Rakennustieto. (2020). Referenced 15.4.2020. Retrieved from <https://www.rakennustieto.fi/index/tuotteet/rt/sisalto.html>.

- Schaltegger, S. & Burritt, R. (2018). Business Cases and Corporate Engagement with Sustainability: Differentiating Ethical Motivations. *Journal of Business Ethics*, 147(2), 241–259.
- Schaltegger, S., Hörisch, J. & Freeman, E. (2017). Business Cases for Sustainability: A Stakeholder Theory Perspective. *Organization & Environment*, 32(3), 191–212. Sage Publications.
- Schreier, M. (2013). Qualitative Content Analysis. Flick, U (eds.), *In The SAGE Handbook of Qualitative Data Analysis*, 170–183. Retrieved from <http://methods.sagepub.com.libproxy.tuni.fi/book/the-sage-handbook-of-qualitative-data-analysis>.
- Slevin, E., & Sines, D. (2000). Enhancing the truthfulness, consistency and transferability of a qualitative study: Utilising a manifold of approaches. *Nurse Researcher*, 7(2), 79. Retrieved from <https://libproxy.tuni.fi/login?url=https://search-proquest-com.libproxy.tuni.fi/docview/200819635?accountid=14242>.
- Snowgrass, E. C. & McIntyre, L. (2010). *The Green Roof Manual. A Professional Guide to Design, Installation and Maintenance*. Timber Press.
- Starik, M., & Kanashiro, P. (2013). Toward a Theory of Sustainability Management: Uncovering and Integrating the Nearly Obvious. *Organization & Environment*, 26(1), 7–30.
- Stige, B., Malterud, K., & Midtgarden, T. (2009). Toward an Agenda for Evaluation of Qualitative Research. *Qualitative Health Research*, 19(10), 1504–1516.
- Stubbs, W., & Cocklin, C. (2008). Conceptualizing a “sustainability business model”. *Organization & Environment*, 21(2), 103–127.
- The Green Roof Organisation. (2014). *The GRO Green Roof Code. Green Roof Code of Best Practice for the UK*. Groundwork Sheffield. Retrieved from <https://livingroofs.org/wp-content/uploads/2016/03/grocode2014.pdf>.
- Thomas, R. (2006). A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American Journal for Evaluation*, 27(2), 237–246.
- Tilastokeskus, (2018). Retrieved from https://www.stat.fi/til/vaerak/2018/01/vaerak_2018_01_2019-11-22_tie_001_fi.html.
- Tuomi, J., & Sarajärvi, A. (2009). *Laadullinen tutkimus ja sisällönanalyysi (5., uud. laitos.)*. Helsinki: Tammi.
- United Nations. (1992). *Convention on Biological diversity*. Retrieved from <https://www.cbd.int/doc/legal/cbd-en.pdf>.
- United Nations. (1987). *Report of the World Commission on Environment and Development. Our Common Future*. Downloaded from https://www.are.admin.ch/are/en/home/sustainable-development/international-cooperation/2030agenda/un-_milestones-in-sustainable-development/1987--brundtland-report.html.

- United Nations. (2018). Department of Economic and Social Affairs, Population Division. *The World's Cities in 2018—Data Booklet* (ST/ESA/ SER.A/417). Retrieved from https://www.un.org/en/events/citiesday/assets/pdf/the_worlds_cities_in_2018_data_booklet.pdf.
- United Nations Environment Programme. (2010). What is biodiversity? Retrieved from https://www.unesco.pl/fileadmin/user_upload/pdf/BIODIVERSITY_FACTSHEET.pdf.
- Vijayaraghavan, K. (2016). Green roofs: A critical review on the role of components, benefits, limitations and trends. *Renewable and Sustainable Energy Reviews*, 57, 740–752.
- WWF. (2018). Living Planet Report - 2018: Aiming Higher. Grooten, M. and Almond, R.E.A.(Eds). WWF, Gland, Switzerland. Retrieved from https://www.wwf.org.uk/sites/default/files/2018-10/LPR2018_Full%20Report.pdf.

APPENDIX

APPENDIX 1: Interview guide translated from Finnish

Practicalities

- Research topic
- Themes of the interview
- Confidentiality aspects
- Referring to the interviewee
- Recording the interview in accordance with good research ethics

Background information: the role of the interviewee in the company / project

- What is your background?
- What is your role in the company / project?
- Why are you involved; what is your interest?
- How long have you been working with the processes of constructing green roofs?

Business practices

- How are you involved in the processes of constructing green roofs; what is your role in them? Which phases do the constructing processes of green roofs have; which phases are you involved in, how?
- How long have you been working on green roofs? Where did it start?
- Why have you started constructing green roofs?
- Where do the orders come from; who does them?
- How has the business for green roofs developed? How much has been invested in it?
- Are there any certificates or have you considered applying for one? Can you get some recognition from stakeholders (from some “green” organization) that you can use to improve your own image?

Green Roofs

- What kind of green roof projects have there been (naming projects if possible)?
- Would you tell about the phases of the process of constructing green roofs?

Stakeholders

- Would you tell which actors / stakeholders are involved in the process of constructing green roofs? (competitors, city, residents, etc.)
- Who are the main stakeholders and why?
- What kind of discussion is there between these stakeholders?
- What kind of things do stakeholders value in green roofs? Are there any differences between the values; if so, how are they resolved?
- What kind of decision-making power do stakeholders have? Who has it and who does not?

End questions

- What has been the best or worst thing in the process of constructing green roofs?
- The future of green roofs?
- Your dream project; where should a green roof be installed and why? What would it be like?