MASTER

Corporate real estate sustainability management
a strategic management framework for implementing a sustainable corporate real estate strategy

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A strategic management framework for implementing a sustainable corporate real estate strategy

Author
G.T.D. (Gerben) Sinke
ID-No: 0871222
gerben.sinke@gmail.com

Master
Architecture, Building and Planning
Real Estate Management and Development
Department of the Built Environment

Graduation Comity
1st Academic supervisor
dr. ir. H.A.J.A. (Rianne) Appel-Meulenbroek
Chair of Real Estate Management and Development
Eindhoven University of Technology

2nd Academic supervisor
prof. dr. T.A. (Theo) Arentze
Chair of Real Estate Management and Development
Eindhoven University of Technology

Company supervisor
mr. M.C.M. (Marc) van Rooijen MRE
Senior manager Real Estate
Deloitte Financial Advisory Services B.V.

University
Eindhoven University of Technology
Den Dolech 2
5600 MB Eindhoven

Company
Deloitte Nederland
Gustav Mahlerlaan 2970
1040 HC Amsterdam

This thesis is original, unpublished, independent work by the author, G.T.D. Sinke.
Preface

This thesis represents the final product of my graduation project of the master track Real Estate Management and Development at the Eindhoven University of Technology. This graduation project was executed during my half-year internship period at Deloitte Real Estate Transactions.

During my master Architecture, Design and Planning, I developed a growing interest for the main subject, corporate real estate management. The way in which the built environment is used by organizations to perform their businesses and how people use all kind of buildings every workday triggered my interest for this specific topic. Especially in what way organizations can use their property strategically to contribute to the business performance, which is a relatively unknown and undervalued resource. Ultimately, from all known strategies to achieve this, adding value by implementing sustainability within the real estate portfolio and the way professionals assume that sustainability supports corporate strategy mostly triggered my interest, resulting in the thesis as presented before you.

I wish to express my gratitude to both my academic supervisors from the Eindhoven University of Technology, Rianne Appel-Meulenbroek and Theo Arentze. I am grateful for their supervision during this nine-month process and their professional expertise within the field of corporate real estate and decision-making theories. Moreover, I had the great opportunity to conduct my thesis at Deloitte Real Estate Transactions under the supervision of Marc van Rooijen, who gave me more insights in this topic and provided valuable contacts within his network, making it possible to conduct interviews among professionals in this specific sector. I would like to give my special thanks to Deloitte Real Estate Transactions for making this possible. Furthermore, I would like to highlight my gratefulness to all participants of the interviews who provided me with the input needed to come to the insights as presented in this thesis. As a last notion, I like to express my love and thanks to my family, girlfriend and friends who provided me with their welcome distraction, unconditional support and motivational words when needed.

Gerben Sinke
May 2016
Summary

This research explored the added value of sustainability decisions for the performance of the real estate portfolio and for the organization as a whole. Chapter 1 introduced and discussed the main objective of this thesis. General literature regarding corporate strategy and corporate real estate management, corporate real estate sustainability management, performance management and strategic decision-making is discussed in respectively chapter 2, 3, 4 and 5. In chapter 6, a research plan is drafted based on the literature. This resulted in conducting several semi-structured interviews based on laddering methodology to collect the required data. Chapter 7 provides an overview of the results. Chapter 8 combined the results from the theoretical framework and the semi-structured interviews to provide the conclusion to this research, reflect on the results and provide recommendations.

Introduction

Over the past decade, corporate real estate management has changed its focus from an operational view solely based on cost reduction, to a strategic management discipline. An increasingly important real estate strategy to add value to the overall organization is the support of organizational sustainability. However, this strategy is added relatively recent as an additional strategy due to an increasing societal interest in social responsibility and sustainability within the built environment in recent years. Despite this growing recognition of sustainable real estate among corporations, corporate real estate strategies are rarely aligned with corporate sustainability goals. However, several studies found evidence that real estate sustainability might positively affect both economic aspects, such as occupancy costs and real estate value and building-use related aspects, such as employee satisfaction, work engagement and employee productivity. Contradictory, there is little to no focus on research aimed at how to implement a successful sustainable corporate real estate strategy.

To prove the added value of strategic corporate real estate management on business performance, corporate real estate performance should be measured and monitored. Although several academic contributions within the field of corporate real estate management have been provided, there is a need for more evidence of the added value of strategic corporate real estate management on organizational performance. In addition, scientific based evidence and best practices on how to positively affect real estate performance by implementing a sustainable real estate strategy are lacking. To obtain this evidence, new theoretical frameworks are needed to connect corporate real estate sustainability to different types of added value and areas of performance. The main objective of this research is therefore defined as:

To develop a real estate performance management framework that gives insight in the added value of strategic corporate real estate sustainability management decisions for organizational performance.

To achieve this objective, the main research question of this research is:

What is the potential added value of sustainability decisions for the performance of the real estate portfolio and for the organization as a whole?

Review of literature

In this research, corporate real estate management is defined as “the management of a corporation's real estate portfolio by aligning the portfolio and services to the needs of the core business (processes), in order to obtain maximum added value for the businesses and to contribute optimally to the overall performance of corporations”. In order to add value to the organization with the strategic management of corporate real estate, the real estate strategy has to be aligned with the overall business strategy as described in the strategy statement on all levels of strategy and with both the internal and external environment. To achieve strategic alignment, the corporate real estate management targets are derived from the strategy statement's mission and
objectives. Moreover, these targets must be in conjunction with the other four business resources: human resources, technology, information and communication technology, and capital. The real estate targets determine the direction set for the real estate strategy and are leading for assessing strategic real estate decisions.

Combining theories concerning corporate real estate performance management and sustainability results in corporate real estate sustainability management, which is in this thesis defined as "the integrated management of all economic, environmental and social aspects of an organization’s property (real estate) activities and associated investment decision-making. It involves all relevant strategies, processes and organizational structures that support corporate governance and sustainable business and product development". Real estate sustainability performance can be measured during building usage, but maximum potential can only be estimated when all relevant physical real estate characteristics are known. Thus, these physical real estate characteristics affect real estate sustainability performance. Besides the physical, building-related factors, real estate sustainability performance is influenced by non-physical factors as well. However, physical real estate characteristics have an even greater impact on real estate sustainability performance and are substantially easier to influence by the corporate real estate manager. Thus, in order to strategically implement sustainability within the real estate portfolio, the corporate real estate manager must align operational decisions concerning physical real estate characteristics with the real estate sustainability strategy based on the corporate sustainability strategy statement.

An adequate performance management framework is needed to make deliberate strategic real estate decisions that are aligned with the long-term organizational goals and objectives of the organization. Moreover, it provides guidelines and the ability to measure performance, manage the real estate strategy based on strategy performance, benchmark performance and communicate results internally and externally. In order to fulfill basic requirements, a business performance management should include all relevant aspects of the organization, be multidimensional, represent performance concisely and straightforward, integrate the various levels of strategy and measure both results and their drivers. Analyzing various studies on real estate performance management and organizational performance management resulted in the conceptual corporate real estate performance management framework as illustrated in figure 4.6.

Being able to understand and control the real estate decision-making process might affect organizational performance positively. A rational perspective can be helpful to make proper real estate decisions. In order to do so, the chosen real estate strategy should reflect the corporate strategy and act as a guideline for the decision-making process. Moreover, the decision-making process must provide criteria based on the real estate strategy that form the input for the real estate performance management framework. Fourteen critical distinct real estate operating decisions are distinguished, which are location, quantity, tenancy duration, identity/signage, building size/character, building amenities, exterior quality, company space, mechanical systems, communications systems, ownership rights, financing, control and risk management. Based on the strategy statement and alignment with other supporting functions, these operating decisions provide a variety of alternatives that should be considered when making real estate decisions.

**Methodology**

It is expected that organizations implement sustainability within their real estate portfolio for a variety of reasons, such as cost reduction, marketing and sales and employee satisfaction, and not merely for the sake of a sustainable future. Hence, this research is qualitative with an exploratory and descriptive character. Semi-structured interviews were performed to gather the required data. The whole interview protocol consisted of four steps. First, seven corporate real estate managers that were involved with implementing a corporate real estate sustainability strategy and three real estate advisors specialized in sustainable corporate real estate were selected by means of sampling. Second, a document review was performed to obtain information regarding the organizations and corresponding corporate real estate departments. Third, semi-structured interviews were conducted among the participating managers and advisors. To uncover the
sustainability drivers subject to organizational sustainability goals and to gain more insight into the decision-making process, a laddering methodology was used for the semi-structured interviews to provide a graphical representation of the drivers of decision-making. Fourth, the results of the semi-structured interviews were analyzed by means of a cross-case analysis. Comparing outcomes of the interviews gave new insights in the way operational decisions are used to support organizational sustainability goals and how sustainable corporate real estate affect overall organizational performance.

**Findings**

During the interviews, the participants mentioned four distinct operational real estate decisions that are subject to organizational sustainability goals. The means-end-chains that represents the causal relations as subtracted from the participants’ mental representations for each distinct operational real estate decisions are included in figure 1 till figure 4 (p. VII). First, relation is found between the properties mechanical systems and real estate sustainability performance. The main reasons given why mechanical systems should be subject to sustainability goals are energy, pollution, water and health and wellbeing. Some participants also mentioned materials. Taking these sustainability aspects into account, mechanical systems is related to the majority of the real estate performance areas except for collaboration and controlling risks. Second, a relation between between the quantity of a corporation's real estate and real estate sustainability performance is found. The main reason given why quantity is considered important is that using less real estate and thus less square meters results in a reduction of energy use and carbon emissions. Moreover, it is considered important because it results in changing requirements for the health and wellbeing of the building users, being more efficient in material use and a possible reduction of water usage. By doing so, quantity seems to have a direct or indirect influence on the majority of the real estate performance areas except for collaboration and therefore affects all areas of organizational performance. Third, a relation is found between the location of corporate real estate and real estate sustainability performance. Location is considered important because of transport. Transport is considered mostly important because of employee satisfaction. Other reasons mentioned are employee productivity, flexibility, cost reduction and marketing and sales. These real estate performance areas together were related to productivity, competitive advantage and profitability. Fourth, a relation is found between company space and real estate sustainability performance. Company space is considered important because of materials, waste and health and wellbeing. These sustainability categories together might affect the majority of real estate performance areas except for collaboration.

Based on the views of the participants, it can be concluded that the various sustainability areas together are mostly mentioned in relation to cost reduction, which corresponds with their leading real estate strategies and drivers for sustainability. However, it is also notable that employee satisfaction seems to receive considerable attention given the high ranking of health and wellbeing. Leading comprehensive real estate strategy statements that combine various real estate strategies, such as new ways of working and the war on talent, seems to anticipate mostly on cost reduction and employee satisfaction, whereby sustainability is implemented as a matter of course as much as possible. Other frequently mentioned real estate performance areas that are relatively often related to are marketing and sales and value of assets. From all real estate performance areas based on the real estate strategies, only employee satisfaction, employee productivity, flexibility and innovation are mentioned in relation to all aspects of organizational performance. Cost reduction, marketing and sales and controlling risks are mentioned to both profitability and competitive advantage. Collaboration and culture are mentioned in relation to competitive advantage and productivity. Value of assets is mentioned only in relation to profitability.
Figure 1: Means-end-chain of quantity

Figure 2: Means-end-chain of mechanical systems

Figure 3: Means-end-chain of location

Figure 4: Means-end-chain of company space
The performance indicators used by the participants to measure their real estate performance cover various categories of performance, although basic indicators such as costs, area and number of employees are most frequently used. Five out of seven participants have an insight into basic real estate sustainability performance indicators by benchmarking their CO2 footprint and energy costs. Waste, water and energy usage and energy labels are also mentioned by the majority of participants, as well as health and wellbeing oriented indicators such as indoor quality and qualitative employee satisfaction surveys.

**Conclusion, reflection and recommendations**

Figure 5 illustrates the corporate real estate performance management framework that includes all fundamental elements that should be taken into account when managing the sustainability performance of the corporate real estate portfolio. Combining this framework with the means-end-chains that represents the causal relations between real estate sustainability decisions and the various areas of performance provides insight into the missing relations between the operational real estate decisions in the output box and the various areas of performance in the outcome box.

**Figure 5: Corporate real estate sustainability performance management framework**
To add value, the corporate real estate sustainability management targets must be derived from the strategy statement’s mission and objectives. By doing so, a real estate strategy can be drafted that is fully aligned with the corporate strategy statement and therefore provides optimal added value to an organization. In relation to sustainability, this means that the strategy statement must contain a specific corporate sustainability strategy statement that is leading for the real estate sustainability strategy statement. Based on the drafted strategy statement, each source of competitive advantage composes its input that affects real estate and sets the real estate sustainability targets. These targets are the main input for the corporate real estate management organization. The input is processed in collaboration with the other four sources of competitive advantage on all strategy levels of corporate real estate management to generate a certain output. The output provides guidance for aligning the operational real estate decisions with the corporate sustainability goals. The most frequently mentioned operational decisions, which are quantity, mechanical systems, location and company space, are included in the output box. The outcome is determined by these operational decisions. The relations between output and all included variables of performance is illustrated by the means-end-chains as discussed above. Analyzing the differences between real estate sustainability performance and real estate performance requirements for all selected performance variables and corresponding performance indicators and report sustainability results provide valuable information for the stakeholders. Providing a double loop feedback that communicates between stakeholders, corporate management and the corporate real estate management department that takes both the internal and external corporate environment into account generates a controlling system and continuous input for both corporate and corporate real estate strategy. The outcomes on both real estate performance and organizational performance provide an ongoing input for the stakeholders to benchmark and communicate results, manage and adjust strategy when needed and to make rational and deliberate real estate sustainability decisions that might lead to an improved corporate real estate performance.

In relation to the five characteristics that a business performance framework should meet, the proposed framework meets all five characteristics to a large extent. First, by considering both exchange value and use value strategies, it contains both financial and non-financial measures. In addition, it contains internal and external measures by taking both corporate and real estate strategy into account. Second, the framework involves input from all corporate resources, making it multidimensional. Third, the framework represents real estate performance fairly simple and is open for interpretation and adjustment based on the specific characteristics of each organization. Fourth, the framework integrates the various levels of strategy and various functions. Fifth, it takes also the drivers into account by involving both corporate and real estate strategy.

This research provided the academic field of corporate real estate research with scientific based evidence and best practices on how to positively affect real estate performance by implementing a real estate sustainability strategy, based on both tacit knowledge of mature corporate real estate departments and an extensive amount of existing literature. Hence, this research established various relations between real estate sustainability, corporate real estate performance and organizational performance. By doing so, it determines the relations between various areas of organizational real estate performance management that were undefined in the provided existing management frameworks. In addition, this research provided the academic field of corporate real estate research with a new research method that has proved to be valuable to capture the explicit knowledge of corporate real estate managers and therefore brings academic research and daily practice closer together. Regarding daily practice, there is a strong need to determine objectively what impact certain corporate real estate strategies have on the organization itself. This research provides corporate real estate managers with characteristic examples that provide guidelines to successfully implement and manage a real estate sustainability strategy. It provides guidance to select and prioritize specific areas of real estate performance and corresponding performance indicators. Hence, it provides a solid foundation to develop a tailor-made quantitative framework that meets the requirements to manage all areas of sustainability performance as determined in the corporate sustainability strategy statement. Moreover, it can be used to make deliberate and
strategic decisions by providing a framework to define decision problems, identify and allocate weight to decision criteria and to develop and evaluate alternatives to actually make rational strategic real estate decisions.

Several recommendations for corporate real estate management can be made. First, the corporate strategy statement must involve corporate sustainability in such a way that real estate sustainability targets can be derived from the strategy statement. Second, when real estate sustainability targets are set, a tailor-made real estate performance management framework can be established that at least should contain processes to inventory, select and design measures, gather data, provide information management, evaluate performance and review outcomes. The proposed real estate sustainability performance management framework can be used to capture most of the relevant aspects needed towards successfully implementation of sustainability within the real estate portfolio. However, because the real estate performance management framework should contain all important aspects of the strategy statement that distinguish the organization from its competition, the explicit details of the management framework differ for each organization.

Seven distinctive recommendations for further research can be made. First, the various relations between real estate sustainability performance, real estate performance and organizational performance should be further examined to provide quantitative frameworks that can be implemented in daily practice without significant modifications. Second, this research shows that laddering methods are useful for capturing tacit knowledge and the underlying motives of corporate real estate managers. Therefore, it is recommended to further explore the possibilities of laddering methods to capture valuable tacit knowledge and motives. Third, theory into how to optimally affect non-physical real estate characteristics is lacking and should be further examined in future research. Fourth, it seemed that the criteria with the highest weighs receive more attention from the corporate real estate managers than less weighted criteria. However, it is unclear if these variables actually add more value to the variables and the added value of these variables should therefore be further explored. Fifth, it might be valuable to perform a more in-depth research with less variables to obtain more detail. Sixth, it might be possible that certain relations differ for certain sectors or across regions, resulting in different conclusions and recommendations for specific sectors and regions. Seventh, it is recommended to perform quantitative research regarding the causal relation between real estate performance and organizational and to make this framework more quantitative.
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<td>BN</td>
<td>Bayesian Network</td>
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<tr>
<td>BPM</td>
<td>Business Performance Measurement</td>
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<td>BSC</td>
<td>Balanced Scorecard</td>
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<tr>
<td>CNET</td>
<td>Causal Network Elicitation Technique</td>
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<tr>
<td>CRE</td>
<td>Corporate Real Estate</td>
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<tr>
<td>CREM</td>
<td>Corporate Real Estate Management</td>
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<td>CRESM</td>
<td>Corporate Real Estate Sustainability Management</td>
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<td>CSF</td>
<td>Critical Success Factor</td>
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<td>CSR</td>
<td>Corporate Social Responsibility</td>
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<td>DN</td>
<td>Decision Network</td>
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<td>HVM</td>
<td>Hierarchical Value Map</td>
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<td>KPI</td>
<td>Key Performance Indicator</td>
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<td>MCDA</td>
<td>Multi-criteria Decision Analysis</td>
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<td>MEC</td>
<td>Means-End-Chain</td>
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<tr>
<td>MR</td>
<td>Mental Representation</td>
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<tr>
<td>PBPD</td>
<td>Preference Based Portfolio Design</td>
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<tr>
<td>PM</td>
<td>Performance Measurement</td>
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<tr>
<td>ROCE</td>
<td>Return on Capital Employed</td>
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<tr>
<td>ROI</td>
<td>Return on Investment</td>
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<tr>
<td>SBU</td>
<td>Strategic Business Unit</td>
</tr>
<tr>
<td>SMART</td>
<td>Strategic Measurement Analysis and Reporting Techniques</td>
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1. Introduction

“In an environment where consumers, employees and other stakeholders are asking what role businesses are playing in the sustainability crisis, it is in the business interests of companies to invest in being part of the solution regarding climate change.”

— Al Gore

This chapter introduces and discusses the main objective of this thesis. The first paragraph provides an introduction and clarification of the context (§1.1), which serves as the motivation for this research. The subsequent paragraphs give the problem definition (§1.2), research questions (§1.3), main objective (§1.4), scope (§1.5.), and relevance of this thesis (§1.6). The last paragraph gives an overview of the research approach (§1.7).
1.1 Context

The development of real estate built for the mere purpose of accommodating business activities, also known as corporate real estate (CRE), started approximately since the beginning of the industrial revolution in the mid-1700s (Krumm, 2001). CRE can be defined as "corporate property—industrial, office and retail space—used for business purposes, as an input into the production process by companies not primarily in the real estate business" (Nappi-Choulet, Missonier-Piera, & Cancel, 2009, p. 80). Activities regarding CRE as a separate discipline within corporations have been around since the beginning of the twentieth century (Krumm, 2001). According to Krumm, Dewulf & de Jonge (2000, p. 32), the primary aim of corporate real estate management (CREM) is "the management of a corporation's real estate portfolio by aligning the portfolio and services to the needs of the core business (processes), in order to obtain maximum added value for the businesses and to contribute optimally to the overall performance of the corporation". These definitions indicate that CRE and CREM are interrelated with the core business activities and overall performance of corporations and that CRE activities should be aligned to the overall business strategy in order to add value to a corporation.

CRE makes up for a significant amount on the balance sheet as well as a significant amount of the operation expenses of corporations and forms one of the largest asset classes in the world (Krumm & Linneman, 2001; Roulac, 2001; and Brounen & Eichholtz, 2005; and Stadlhofer, 2010). However, for a long time, CRE has been seen as a “factor of production, providing space for production and delivery of goods and services” (Hiang-Low & Nappi-Choulet, 2008, p. 55). Real estate decisions were made without proper alignment with the corporate business goals. The recognition of CRE as an asset for corporations and the discussion about the significance of CRE started only in 1983, when Zeckhauser and Silverman published their study 'Rediscover your company's real estate'. Since approximately the mid-1990s, more and more corporations recognize CRE as a source of competitive advantage, next to capital, human resources, technology, and communication (Roulac, 2001; Gibler, Black & Moon, 2002; Scheffer, Singer & van Meerwijk, 2006; Stadlhofer, 2010; and Haynes, 2012). Over the years, this growing international recognition of the importance of CREM resulted in CREM seen as a professional discipline contributing to corporate business success (Haynes, 2012; Shiem-Shin, Teng-Hee, Rogerio, Sentovito & Jensen, 2014).

Until the 1990s, the focus of CREM has solely been on cost reduction (Krumm, 2001; and Roulac, 2001). However, since the mid-1990s, the focus of CREM has gradually changed from a focus on cost reduction to a focus on alignment of CRE strategies with the overall business strategies to add value to the corporation (Appel-Meul enbroek, Brown & Ramakers, 2010; Jensen, van der Voordt, Coenen & Sarasoja, 2014; Gerritte, Bergsma & Groen, 2014; Gibler & Lindholm, 2011; Jensen et al., 2012; Lindholm, 2008; and Stadlhofer, 2010). In order to provide added value to the corporation, existing literature provides a number of frameworks for aligning the CRE strategy with the overall business strategy, including Nourse & Roulac (1993), Roulac (2001), Acoba & Foster (2003), Krumm & de Vries (2003), Osgood (2004), Scheffer, Singer & van Meerwijk (2006), Lindholm, Gibler & Levaïnen (2006), Singer, Bossink & van de Putte (2007) and den Heijer (2011). These studies give a number of CRE strategies that can be implemented to align the CRE strategy with the overall business strategy to add value to the organization as a whole.

From these CRE strategies, support of organizational sustainability goals as a real estate strategy is relatively the most recently added strategy (Gibler & Lindholm, 2008). This is attributed to an increasing societal interest in social responsibility and sustainability within the built environment over the past decade (Jensen et al., 2014; Langford & Haynes, 2015; Stibbe & Voigtländer, 2014; and van der Voordt, 2015). Despite this growing recognition of sustainable real estate among corporations, Ventovuori et al. (2012) found that the CRE strategies of corporations in North Europe are rarely aligned with corporate sustainability goals. However, several studies found evidence that real estate sustainability might positively affect both economic aspects, such as occupancy costs and real estate value (Eichholtz, Kok & Quigley, 2016; Gibler & Lindholm, 2011; and Nappi-Choulet & Dé camps, 2013) and building-use related aspects, such as employee
satisfaction, marketing and sales, work engagement and employee productivity (Feige, Wallbaum, Janser & Windlinger, 2013; and Smith & Pitt, 2011). Contradictory, there is little to no focus on research aimed at how to implement a successful sustainable CRE strategy.

Moreover, CRE performance should be measured and monitored to prove the added value of strategic CREM on business performance. Business performance indicators such as metrics, benchmarks, key performance indicators (KPI) and costs should be obtained from surveys, workplace, human resources and technology (Langford & Haynes, 2015). Several studies on CRE performance management that include many CRE measurements such as building, workplace, cost and environment have been performed among others by Varcoe (2010), Haynes & Nunnington (2010), Lindholm & Leviainen (2006), Jordan, McCarty & Velo. (2009), Stadlhofer (2010), den Heijer (2011), Riratanaphong, van der Voordt & Sarasoa (2012) and Riratanaphong (2014). Each of these studies tries to give an objective framework on how to manage and measure CRE performance. However, business-oriented measures are lacking. According to Riratanaphong (2014), performance management should cover all the aspects regarding the organization and states that due to changing business environments, traditional tools that focus solely on cost reduction are insufficient. New performance measures such as shareholder value, economic profit, customer satisfaction, internal operation performance, intellectual capital and intangible assets should be taken into account as well (Neely and Bourne, 2000, in Riratanaphong, 2014). Jordan et al. (2009) state that the focus of real estate measures is mainly on real estate performance rather than real estate contribution to organizational performance, which is confirmed by Stadlhofer (2010). So although there are many CRE measures, they mainly focus on the physical aspects rather than the business-oriented performance (Jensen et al., 2014; and Langford & Haynes, 2015). In addition, Hinks and Varcoe (2012) state that there is still no objective way to prove the added value that strategic CREM brings to corporations, to which Jensen et al. (2014) agree. It is clear that the academic field of CREM made major progress in the past decades by providing conceptual frameworks for CRE alignment with the overall business strategy and a few first steps towards CRE measurement on the operational level. However, to provide evidence of the added value of CREM there is a need for CRE performance management on the corporate strategy level.

1.2 Problem definition

Although several academic contributions in the field of CREM have been provided, it seems that the frameworks for CRE alignment with the corporate strategy are not ready to be implemented into daily practice. There is a need for more evidence of the added value of strategic CREM for organizational performance (Hinks et al. 2012; Jensen et al., 2014; Kampf-Dern & Pführ, 2014, and Van der Voordt & Jensen, 2014). In addition, implementing sustainability within the CRE strategy might positively affect both economic and building-user related real estate aspects. This insinuates that real estate sustainability might improve the performance of other real estate strategies. However, scientific based evidence and best practices on how to affect real estate performance positively by implementing a sustainable real estate strategy are lacking (Jensen et al., 2014). Moreover, it seems that existing literature is mainly based on explicit knowledge (information), while combining explicit knowledge with the tacit knowledge (experiences and skills) of CRE managers might provide the new insight needed to acquire this evidence and best practices (Hinks et al., 2012). Hence, new theoretical frameworks based on both tacit and explicit knowledge are needed to understand how CRE sustainability is connected to different types of performance and how sustainability add value to the organization (Jensen et al, 2014; and Jensen & Van der Voordt, 2015). To draft such a framework and obtain more insight in the added value of sustainability on the performance of CRE strategies and organizational performance, a clear understanding of the relation between sustainability, CRE performance and organizational performance is needed to connect these fields on the corporate strategy level.
1.3 Research objective

The problem definition explains that existing CREM literature provides a number of frameworks on how to align a corporation's real estate strategy with the overall business strategy, but that these frameworks lack methods for implementing and managing sustainability within the real estate portfolio. Moreover, these frameworks lack a clear connection with other areas of real estate performance and organizational performance. Existing frameworks for daily practice are not sufficient to implement a deliberate CRE sustainability strategy and making strategic decisions on the corporate level. Therefore, this thesis provides daily practice with a new theoretical framework to implement and manage real estate sustainability performance. Moreover, it provides relations between strategic CRE sustainability decisions, real estate strategy performance and organizational performance to make deliberate, rational strategic sustainability real estate decisions. The main objective of this research is:

To develop a real estate performance management framework that gives insight in the added value of strategic corporate real estate sustainability management decisions for organizational performance.

1.4 Research questions

To gain more insight into CRE sustainability performance management and how to align CRE sustainability with CRE performance management and organizational performance management to make strategic CRE decisions, the following main research question is drafted:

What is the potential added value of sustainability decisions for the performance of the real estate portfolio and for the organization as a whole?

The main research question given illustrates the research issue that brings the fields of real estate sustainability management, real estate performance management and corporate performance management together. In order to gain more insight into those fields, the following sub-questions are drafted:

I. What are the key elements of (corporate) strategy and how can strategic management of corporate real estate add value to an organization?
II. How can sustainability be incorporated strategically within the real estate portfolio?
III. How can the performance of corporate real estate be managed to optimally align corporate real estate decisions to the overall corporate strategy?
IV. How does the corporate real estate sustainability decision-making process take place?
V. Which operational corporate real estate management decisions are subject to strategic sustainability goals and how do these decisions affect real estate performance?
VI. How is sustainable real estate performance connected with organizational performance and which performance indicators are used to measure the impact of strategic real estate decisions?

1.5 Scope

The CRE portfolio characteristics of organizations such as type and size might differ and is highly dependent of the organization’s characteristics. However, organizations that participate in this research must have implemented some significant form of sustainability that is also addressed in the real estate strategy. Based on the study by Ventovuori et al. (2012), it is expected that this reduces the number of potential participating organizations considerably. To find the right amount of eligible participants, this research is not limited to a particular type of organization. However, to be able to analyze and compare the outcomes at the same level, this research is limited to the office real estate market. With regard to the participating organizations, these are
selected based on their annual turnover and must be considered large national or multinational organizations with a mature CRE department.

### 1.6 Relevance

The practical relevance of this thesis is to provide daily practice with a framework that provides insight in the potential implications of sustainability real estate decisions. By doing so, it establishes the relation between CRE sustainability, CRE performance and organizational performance and provides further indications to demonstrate the added value of implementing sustainability within the CRE portfolio. This provides a starting point for making deliberate and strategic sustainable real estate decisions. Moreover, the results might be useful to improve CRE performance in general and CRE sustainability performance in particular. On the other hand, legislation related to the sustainability performance of real estate became stricter over the past few years and it is expected that this trend will continue. As a consequence, organizations are forced more and more to take their own sustainability measures or to set higher requirements for the real estate owner. The results of this research will provide starting points to deal with this constantly changing corporate and built environment.

With regard to scientific relevance, previous research mainly focused on methods to align CRE with the overall business strategy. This resulted in several contributions that distinguish various CRE strategies for alignment with the overall business strategy. However, there is little to no focus on research aimed at how to specifically implement a successful sustainable CRE strategy. Some research has been performed regarding single sustainability practices and how this might influence CRE performance. Research that combines all aspects of CRE sustainability and attempts to establish the relation with the whole range of real estate performance and organizational performance is not yet performed and might establish new insights in possible relations between sustainability and CREM. This might be valuable for further research and provide the research field of CREM with scientific based evidence and best practices on how to positively affect real estate performance by implementing a sustainable real estate strategy.

In addition, existing frameworks for CRE alignment with the corporate strategy focus on explicit data. Methodologies for implementing those frameworks in order to simulate strategic, deliberate CRE decisions are lacking. Arentze, Dellaert and Timmermans (2008), developed a method to model and measure mental representations of decision problems used to simulate reasoning and decision making processes in order to capture tacit knowledge. However, this model is never implemented in this field of research to obtain scientific based evidence and best practices to provide strategic decision alternatives.

### 1.7 Research layout

This research aims to translate CRE performance management theory into a framework that connects the CRE sustainability performance management with organizational performance management. The research layout will give an overview of the framework that describes the research process. Figure 1.1 gives an overview of the different steps that will be conducted in order to resolve the research question.

**Step 1: Background**

The first chapter provides background information about the research subject. It discusses the context and problem definition to conduct the research object. It also provides the research questions, scope, theoretical and practical relevance and the research layout.
Step 2: Theoretical framework

The second chapter discusses the literature and theories concerning corporate strategy and CREM. It gives a brief overview of the different levels of strategy and an overview of the developments, background, purpose and understanding of CREM. Moreover, it gives an overview of the position of CREM within a corporation, the different corporate real estate alignment frameworks that can be distinguished from the literature, which CRE strategies can be extracted from those frameworks and an overview of CREM activities. Sub-question I; “What are the key elements of (corporate) strategy and how can strategic management of corporate real estate add value to an organization?” will be answered in this chapter.

Chapter three will give a brief overview of the history of sustainability and growing recognition of its importance. It will answer sub-question II; “How can sustainability be incorporated strategically within the real estate portfolio?” It will discuss the field of corporate real estate sustainability management and the various aspects of sustainability within CRE. Moreover, it gives an overview of the drivers for real estate sustainability and an overview of assessment and reporting methods of real estate sustainability.

In chapter four, performance management is discussed. Based on existing literature in this research area, it will provide an answer of sub-question III; “How can the performance of corporate real estate be managed to optimally align corporate real estate decisions to the overall corporate strategy?” It gives an overview of performance measurement, underlying theoretical frameworks and how these frameworks are used in the field of CREM. Moreover, it gives an overview of performance measures by extracting KPI’s and metrics from existing literature. Based on scientific studies, it provides a list of existing KPI’s that are used in the field of organizational performance.
management and CRE performance management. Last, it provides a theoretical real estate sustainability performance management framework based on the literature.

The fifth chapter introduces strategic decision-making and discusses existing decisions frameworks in the field of CREM. Sub-question IV; "How does the corporate real estate sustainability decision-making process take place?" will be answered in this chapter. It also discusses mental representations of decision problems and the manner in which these can be used to create a means-end-chain that represents the tacit knowledge of CRE managers.

**Step 3: Empirical research**

Chapter six assembles existing theory concerning CRE strategy, sustainability, performance measurement and strategic decision-making as discussed in the preceding chapters and provides the research plan. This chapter discusses how the findings of the theoretic framework can be used to gather new insights into CRE sustainability management, assumed relations between real estate sustainability decisions, real estate performance and organizational performance and how to capture tacit knowledge concerning these relations.

Within chapter seven, conducting multiple interviews among CRE managers and real estate advisors provide insight within the assumed cause-effect relations between the variables used in the decision-making process when implementing a sustainable real estate strategy. By comparison of the results from these interviews, sub-question V; "Which organizational corporate real estate management decisions are subject to strategic sustainability goals and how do these decisions affect real estate performance?" will be answered in this chapter. Analysis of the results by means of a cross-case analysis will provide information that will answer sub-question VI; "How is sustainable real estate performance connected with organizational performance and which performance indicators are used to measure the impact of strategic real estate decisions?"

**Step 4: Conclusion and recommendations**

The last part, chapter nine, summarizes the findings and conclusions from the sub-questions to deal with the main research question; "What is the potential added value of sustainability decisions for the performance of the real estate portfolio and for the organization as a whole?" and reflects on the methodology and literature. Last, this chapter gives recommendations for use in daily practice and further research.
2. Corporate real estate strategy

"Strategy is not the consequence of planning, but the opposite: its starting point."
— Henry Mintzberg

This chapter introduces and discusses the literature concerning corporate strategy and the field of CREM. It gives a brief overview of the different levels of strategy and an overview of the developments, background, purpose and understanding of CREM. Moreover, it gives an overview of the position of CREM within a corporation, the different corporate real estate alignment models that can be distinguished from existing literature and which CRE strategies can be extracted from those models. In addition, it gives an overview of the activities performed by CREM departments. Sub-question 1; “What are the key elements of (corporate) strategy and how can strategic management of corporate real estate add value to an organization?” will be answered in this chapter. The first paragraph provides an introduction and clarification of corporate strategy (§2.1). The subsequent paragraphs explore strategic management (§2.2), provide an introduction of CREM related to strategic management (§2.3), discuss the position of CREM in the corporate environment to provide added value (§2.4) and give an overview of CREM activities (§2.5). The last paragraph concludes this chapter and will answer sub-question 1 (§2.6).
2.1. Defining strategy

The presumed added value of strategic CREM on organizational performance can be achieved when CRE strategy is aligned with the overall corporate strategy (Appel-Meulenbroek, Brown & Ramakers, 2010; Gerritse, Bergsma & Groen, 2014; Jensen et al., 2014; and Lindholm, 2008). However, the term strategy is known as an umbrella term with a wide spread definition. In order to define strategy related to both corporate strategy and CRE strategy, an understanding of strategy is needed. The actual strategy is part of the corporate strategy statement that includes the corporate mission and vision, corresponding objectives and the actual strategy (Johnson, Whittington, Scholes, Angina & Regnér, 2014). Figure 2.1 shows the components of the strategy statement that is used to gain competitive advantage in the corporation’s scope.

Figure 2.1: Components of the strategy statement. Amalgamation of Johnson et al. (2014) and Hoendervanger, van der Voordt & Wijnja (2012)

Competitive advantage can be described as added value that a business unit creates, which is greater than the costs of supplying the added value and superior to the competitive position of rival organizations (Johnson et al., 2014). Thus, to be competitive, an organization has to create value in a manner that clients are prepared to pay more than the costs made to establish that value. According to Tangen (2005), competitive advantage is part of organizational performance, which can be seen as a compound variable including competitive advantage, profitability and productivity. Organizational performance and its components will be further examined in chapter 4.

The corporate mission involves the goals and decisive purpose of the corporation. The vision also involves the goals and refers to the desired future state of the corporation. The objectives are more quantifiable statements of the corporations its goals and the desired position over a period of time. According to Chandler (1962, p. 13), one of the first researchers in the field of strategy, the definition of strategy is:

"The determination of the long-run goals and objectives of an enterprise and the adoption of courses of action and the allocation of resource necessary for carrying out these goals."

This definition states that strategy is the long-term direction of a corporation. Strategy is typically measured over years, which defines long-term. According to Johnson et al. (2014), corporations should define three horizons in term of years to implement a successful strategy. The first horizon are business activities that concern extending and defending the core business. The second horizon are emerging business activities that provide new sources of profit on the short term. The third horizon are emerging business activities that create viable options on the long term and are typically riskier research and development projects. In order to set the strategic direction, corporations should compose long-term objectives.
According to Johnson et al. (2014), strategy can exist at three different levels. In addition, Thomson and Strickland (2003) state that when a corporation is operating in multiple businesses, different strategies may occur for each business and added the business level strategy. However, corporate and business strategy can be considered the same, depending on the scope and businesses of the corporation. Figure 2.2 gives an overview of the different levels of strategy.

Corporate or business-level strategy is concerned with the overall scope of an organization and the way in which value is added to the constituent businesses of the organizational whole (Johnson et al., 2014). Tactical or functional strategy is about how the individual businesses should compete in their particular markets. Operational strategy is concerned with how the components of an organization effectively deliver the corporate- and business-level strategies in terms of resources, processes and people.

To provide an overall business strategy, the corporation, business and operational levels should be aligned with each other. However, to create a successful corporate strategy, it must be favorably aligned with its external environment as well (Nundakumar, Ghobidian & O’Regan, 2010). So in order to implement a successful strategy, the match between strategy, structure of the corporation and the corporate environment has to be aligned. However, according to Mintzberg, Ahlstrand and Lampal (1998) there is a huge bias towards the definition of strategy in the existing management literature. Therefore, Mintzberg et al. defined ten ‘schools of thought’ towards strategy that occurred during the past decades, which can be divided in the descriptive, prescriptive and integrative Schools. The prescriptive schools concern the manner in which strategies should be formulated rather than how they should be executed. The descriptive schools consider specific aspects of the strategy formulation and prescribe strategic behavior rather than how strategies should be made. The integrative schools see strategy in relation to a specific context and combine aspects from both descriptive and prescriptive schools. Mintzberg et al. state that each school has its positive and negative elements and to achieve the best strategic management, a synthesis of these schools should be applied. To get an understanding of strategy and the way in which strategy is formulated, the three prescriptive schools of thought are described in box 1. These are the most commonly used schools of thought in both corporate practice as within the research field of business strategy and form the fundamentals for strategic thinking (Schelle & Baltussen, 2013).

The industries wherein organizations compete vary widely in terms of attractiveness (Johnson et al., 2014). Porter (1985) states that the competitive environment consists of five forces, which can be seen as the determinants of competitiveness and profitability. Four of these forces are the bargaining power of suppliers, the bargaining power of buyers, the threat of new entrants, and the threat of substitutes that affect the last force, which is the rivalry within the industry. The influence of these forces determines the intensity of competitiveness in each industry. Analyzing each competitive force gives insight in the organizations strengths and weaknesses in order to
determine the strategy. A competitive strategy involves how an organization achieves competitive advantage in the industry wherein it competes (Johnson et al, 2014). In addition, Tregoe and Zimmerman (1980, in Appel-Meulenbroek et al., 2014) argue that nine different driving forces for developing corporate strategies can be distinguished:

I. Products offered;
II. Market needs;
III. Technology;
IV. Production capacity;
V. Method of sale;
VI. Method of distribution;
VII. Natural resource;
VIII. Size/growth;
IX. Return/profit.

These driving forces form the start of the strategy formulation and set the directional strategy, from which the corporate strategy can be derived. Only one driving force is leading. Porter (1985) suggests four generic strategies for achieving competitive advantage that make a distinction between the market (segmentation or total market approach) and the distinctive character (low cost or differentiation in products). Figure 2.3 (p. 12) shows these generic strategies by Porter.

As discussed above, the corporate environment is constantly subject to change due to a variety of causes. One of these causes is ecological and social trends. This is attributed to an increasing interest towards corporate sustainability (Baumgartner, 2014). Due to a relatively large impact on the internal and external corporate environment, corporate sustainability decisions should be integrated in the corporate strategy, vision and culture. Thus, these decisions are made on the strategic level and are part of the corporate strategy statement (Engert, Rauter & Baumgartner, 2016). However, corporate sustainability management is a broad concept that is for the most part beyond the scope of this research. The concept of sustainability and its relation with the built environment is discussed in chapter 3.
2.2. Strategic management

Being capable of strategic management is necessary for the strategy implementation. Both planning and thinking are distinct thought processes of strategic management (Steptoe-Warren, Howat & Hume, 2011). Mintzberg (1994) states that strategic thinking involves synthesis, which encourages an intuitive, innovative, divergent and creative thought process. Strategic planning involves analysis, which concerns a programmatic, analytical thought process for determination of features and their relations to establish and formalize systems and procedures. Strategy implementation focuses on how corporations understand the environment and takes strategic decisions in this highly complex, ambiguous and competitive environment (Steptoe-Warren et al., 2010). This indicates that strategy emerges over time rather than being planned and that it should focus on continuous adaption and improvement.

In order to achieve this, the schools of thought should be integrated. The descriptive schools should be applied for achieving synthesis and provides an emergent approach for implementing strategic thinking. On the other hand, the prescriptive schools can be used for implementing analysis and provides a rational approach for strategic planning. Strategic momentum is the final stage of strategic management, where the strategy implementation is evaluated to learn more about successes and to incorporate new strategic thinking (Ramakers, 2008). Figure 2.4 gives an overview of the different stages of strategic management.

Figure 2.3: Porters’ (1985) generic strategies

Figure 2.4: Strategic management (Ramakers, 2008)
The emerging process of strategic management starts with the strategic thinking phase. The purpose of strategic thinking is "to discover novel, imaginative strategies which can re-write the rules of competitive game; and to envision potential futures significantly different from the present" (Heracleous, 1998, p485). Strategic thinking involves orientation of the corporate position in the external environment, analyzing available data, question the assumptions made to determine the position and generate new ideas to strengthen the competitive advantage. Thus, it concerns the fundamental intellectual activity to develop a corporate strategy (Ramakers, 2008).

The second phase of strategic management is strategic planning. The purpose of strategic planning is "to operationalize the strategies developed through strategic thinking, and to support the strategic thinking process" (Heracleous, 1998, p485). Strategic planning consists of three components. Situational analysis involves determination of the corporate position by analyzing external opportunities and threats, internal strengths and weaknesses and analyzing the strategic direction to enhance the competitive advantage. Strategy formulation deals with the actual documentation of the chosen strategy in terms of directional, adaptive, market entry and competitive strategies. Planning the implementation involves writing an action plan for implementing the chosen strategy and determination of the service delivery and support strategies (Ramakers, 2008). Strategic momentum is the management of the chosen strategy when it is incorporated. It involves managerial action to comply the chosen direction, evaluation of the strategy by measuring and analyzing data, emergent learning and re-initiate strategic thinking to determine a new strategy when needed and to restart the strategic management cycle.

Thus, in order to implement the corporate strategy, managers must be capable of strategic thinking, analyzing the external environment and obtaining the required internal information. Once a strategy is implemented, managers must benchmark relevant data to determine the strategy performance, analyze the results and eventually set a new strategy based on those results.

### 2.3. Corporate real estate management

To get an understanding of CREM and related CRE strategies, a clear definition of CRE is needed. According to Zeckhauser and Silverman (1983), CRE regards "the land and buildings owned by companies not primarily in the real estate business". Over the past decades, there has been a discussion whether CRE regards only real estate that is used for business purpose or that CRE also concerns real estate that is used as a capital investment (Schelle & Baltussen, 2013). However, the scope of this thesis is to connect corporate real estate used for business purposes with the overall business performance. Therefore, the maintained definition for CRE in this thesis is:

"Corporate property – industrial, office and retail space– used for business purposes, as an input into the production process by companies not primarily in the real estate business" (Nappi-Choulet, Missonier-Piera, & Cancel, 2009, p. 80).

The introduction of CRE as an academic discipline in 1983 started the discussion about the significance of CRE. This resulted in the recognition of CRE as an asset for corporations and since approximately the mid-1990s, more and more corporations recognize CRE as a source of competitive advantage, next to capital, human resources, technology, and communication (Gibler, Black & Moon, 2002; Haynes, 2012; Roulac, 2001; Scheffer, Singer & van Meerwijk, 2006; and Stadlhofer, 2010). Maintaining these CRE portfolios requires thorough knowledge and specialized management skills, which resulted in separate CREM departments within corporations. The maintained definition for CREM in this thesis is:

"The management of a corporation's real estate portfolio by aligning the portfolio and services to the needs of the core business (processes), in order to obtain maximum added value for the businesses and to contribute optimally to the overall performance of corporations" (Krumm, Dewulf & de Jonge, 2000, p. 32).
Over the years, this growing international recognition of the importance of CREM resulted in CREM seen as a professional discipline contributing to corporate business success (Haynes, 2012; Shiem-Shin, Teng-Hee, Rogerio, Sentovito & Jensen, 2014). Joroff et al. (1993) state that this transformation can be described in five evolutionary stages, from taskmaster, controller, dealmaker, and entrepreneur to business strategist. To achieve the level of business strategist, CRE managers must change their real estate perspective from the operational-level thinking, through business-level thinking to corporate-level thinking. Krumm, Dewulf and de Jonge (2000, in Appel-Meulenbroek, 2014) state that this model is additive. Hence, to achieve strategic thinking on the corporate-level, all tasks concerning the previous level have to be performed as well. To be a business strategist, CREM must be technical, analytical, problem solving, business planning and strategic at the same time. This can also be seen in the CRE management model of de Jonge (1996), whereby the field of CREM exists of four different managing elements: general management, facility management, asset management and project management (figure 2.5). This figure also illustrates how Den Heijer (2011) linked the CRE domains to various stakeholder goals.

Thus, to master all these different managing elements, a CRE manager has to be able to approach the CRE portfolio from both an operational and strategic focus and both business and real estate perspective. Several CRE managers might have long evolved into a business strategist, but recent surveys show that the majority still has a traditional focus (Bouri, Acoba and Wu, 2008; and McDonagh and Nichols, 2009). From this traditional perspective, the focus of CRE managers has mainly been operational, concerning facility management and cost control. So in order to be a business strategist and anticipate on the corporate-level, the focus also has to be strategic.

To achieve this focus, the real estate perspective has to be aligned with the business perspective. This can also be deduced from the CREM definition: in order to obtain maximum added value for the business and to contribute optimally to the overall performance of corporation, the management of the CRE portfolio has to be aligned with the services and needs of the core business. According to van Driel (2010), the CRE strategy alignment with the overall business strategy can only be achieved when the different levels of CREM are aligned and communicate with each other and with the overall corporate management. For optimal alignment with the business perspective, strategic CREM takes place on the three levels of strategy as discussed in paragraph 2.1 (van Driel, 2010). Portfolio management is the strategic management of CRE on the business-level of strategy. The core business of portfolio management is periodically producing a strategic CRE policy by obtaining management information from asset management, property management and the overall corporate management. Asset management is the strategic management of CRE on the functional or tactical level. The core business of asset management is identifying and analyzing the real estate portfolio per object. It uses performance measurement to determine the extent to which existing objects meet the criteria established in the strategic CREM.
policy. Property management is the strategic management of CRE on the operational level. The core business of property management is an efficient, structured and customer-focused attention on the daily activities involving administrative, technical and commercial activities to create a highly efficient work environment.

2.4. Corporate real estate management in the corporate environment

To get a better understanding of CREM related to corporate strategy, the position of CREM in the external corporate environment is further examined in this paragraph. Existing literature covers respective issues of the corporate environment, but only a few studies combine multiple aspects in order to determine the position of CREM in its environment. Kämpf-Dern et al. (2012) developed the CREM map by analyzing existing literature and combine their findings with broadly accepted structures of general management frameworks to place CREM in the internal and external environment of interaction. Kämpf-Dern and Pfnür (2014) state that targets are derived from the corporate objectives as well as the corporate mission and vision. Therefore, they guide management processes and thus lead to corporate action. According to Steinmann and Schreyögg (2005, in Kämpf-Dern & Pfnür, 2014) the major management processes are strategy development, organization and steering/controlling. Figure 2.6 shows the CREM map, which contain the domains (spheres of activity) CREM targets, CREM strategies, CREM organization and CREM controlling systems derived from the major management processes.

CREM-context

The CREM context involves the corporate environment in which CREM takes place. The corporate environment can be divided into the external and internal corporate environment. According to Jensen (2010), the influence of stakeholders such as customers, investors/shareholders, suppliers, municipalities and the users are part of both the external and internal corporate environment. The external environment contains the industry in which the corporation is operating along with its regulation, growth and competition (Hartmann, 2011). The internal corporate environment parameters are derived from the strategy statement such as company targets, strategies and the business model as well as the size and internationality of the corporation and its portfolio structure. Kämpf-Dern and Pfnür (2014) add the mandate/role that has been given to the CREM department by the corporations’ management.

Figure 2.6: CREM map as framework of CREM institutionalization parameters (Kämpf-Dern & Pfnür, 2014)
**CREM-targets**

The CREM targets are derived from the strategy statement’s mission and objectives, incorporating targets from the external environment. Lindholm (2008) states that CREM performance should be measured and monitored at certain points of time to achieve the highest cohesion between the corporate objectives and CRE performance. Therefore, CREM targets can best be described as:

"Measurable and desirable achievements at a certain point of time" (Kämpf-Dern & Pfnür, 2014, p. 104).

Together with corporate objectives and strategies, CREM-targets form the basis for developing CREM strategies and designing the CREM organization. Besides that, CREM-targets are the benchmarks for CREM controlling. CREM targets should take the perspective of all relevant stakeholders into account. Therefore, they must approach CRE from all relevant perspectives, which are the business, financial and capital market perspective (Liow & Nappi-Choulet, 2006). However, perspectives from different stakeholders might differ. To manage these differences, CREM departments should set priorities that form the CREM mandate and position CREM in its environment (Kämpf-Dern & Pfnür, 2014). Corporate performance measurement and CRE performance measurement will be further examined in chapter 4.

**CREM-strategies**

The presumed added value of real estate on organizational performance, which can be both positively and negatively, is the basis of strategic CREM (Den Heijer, 2011). In order to provide added value to the corporation, existing literature provides a number of models for aligning the CRE strategy with the overall business strategy that give a number of CRE strategies. According to Kämpf-Dern & Pfnür (2014), the definition of CREM strategies is:

"The medium and long-term policies and plans that are developed to reach the CREM targets and to support building corporate competitive advantage" (Kämpf-Dern & Pfnür, 2014, p. 104).

Previous studies show that the most dominant value in practice is cost reduction (De Vries, De Jonge and Van der Voordt, 2008; Gibler & Lindholm, 2011; and Van der Voordt & Jensen, 2014). However, recent literature has shown a shift from added value of strategic CREM linked to cost related strategies, such as shareholder value, productivity growth and revenue growth, to a broader perspective connected to the external corporate environment such as building users, clients and the society as a whole (Kämpf-Dern & Pfnür, 2014; Riratanaphong, 2014; and van der Voordt, 2015). Multiple researchers in the field of CREM performed research regarding the added value of CREM and proposed various types of added value. Based on the work of Riratanaphong (2015), these proposed types of added value are analyzed as presented in table 2.1. The comprehensive analysis is included in appendix 1.

<table>
<thead>
<tr>
<th>Business perspective</th>
<th>Exchange value strategies</th>
<th>Use value strategies</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>Reduce costs</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Increase value of assets</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Internal business processes</td>
<td>Increase flexibility</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Controlling risk</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Support sustainability</td>
<td>Support sustainability</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>Supporting culture</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>Promote marketing and sales</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>Increase innovation</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>Increase collaboration</td>
<td>2</td>
</tr>
<tr>
<td>Customer</td>
<td>-</td>
<td>Increase employee satisfaction</td>
<td>7</td>
</tr>
<tr>
<td>Learning and growth</td>
<td>-</td>
<td>Increase productivity</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 2.1: CRE strategies, based on Riratanaphong (2014)
Support user activities and increase quality of space are not included as a distinctive CRE strategy in this research because these strategies are only mentioned once and can be seen as part of increase employee satisfaction. This results in eleven CRE strategies, which can be classified by financial, internal business processes, customer and learning and growth perspectives based on the work of Kaplan & Norton (1996). These eleven strategies have a lot in common with Tregoe and Zimmerman’s (1980) driving forces as discussed in paragraph 2.1. According to Ramakers (2008), this can be explained by the usage of the driving forces as underlying theory for defining the CRE strategies by various authors. In addition, a variety of terms are found in existing literature for the various types of added value. The CRE strategies as presented in this table will be applied throughout this research. A comprehensive definition of each corporate real estate strategy is included in appendix 2.

Appel-Meulenbroek (2014) states that the CRE strategies can be divided into exchange value and use value strategies. With exchange value strategies, the focus lies on the lowest cost strategy. Added exchange value can be retrieved by the CRE strategies reduce costs, increase value of assets, increase flexibility and controlling risk by increasing efficiency. According to Appel-Meulenbroek (2014), adding exchange value is in full control of the CRE manager because its focus on primarily real estate costs. With use value strategies, the focus lies on differentiation strategy. Added use value can be retrieved by increase innovation, increase employee satisfaction, increase collaboration, increase productivity, promote marketing and sales and supporting culture. Adding use value needs interaction with other business units such as capital, human resources, technology, communication or marketing and sales and CREM has thus an indirect impact on the output performance of use value strategies.

The CRE strategy support sustainability is additionally added to this list and therefore the most recent strategy. This is attributed to an increasing societal interest towards social responsibility and sustainability within the built environment over the past decade (Jensen et al., 2014). In addition, various studies found evidence that this real estate strategy has a positive effect on both exchange value and use value. This evidence suggest that it might affect the exchange value strategies cost reduction and increase value of assets (Eichholtz, Kok & Quigley, 2016; Gibler & Lindholm, 2011; and Nappi-Choulet & Décamps, 2013) and the use value strategies employee satisfaction, marketing and sales, culture and employee productivity (Feige, Wallbaum, Janser & Windlinger, 2013; and Smith & Pitt, 2011). Therefore, supporting sustainability is included as both exchange value and use value.

However, recent studies state that the content and purpose of CRE strategies are mainly on real estate performance rather than real estate contribution to organizational performance (Jensen et al., 2014; Jordan et al., 2009; Langford & Haynes, 2015; and Stadlhofer; 2010). CREM should rather recognize the strong interdependent relation between target, strategy and organization, which needs a deep understanding of the corporate strategy statement (Kämpf-Dern & Pfnür, 2014). Relevant determinants in a holistic approach that support a suitable framework are therefore; the degree in which CREM strategies and corporate strategies are aligned, the width and depth of the strategies and the form in which the strategies are available.

CREM-organization
CREM organization covers partly how a CREM organization is structured. De Jonge (1996) states that the basis management structure of CREM is comprised of general management, asset management, facility management and financial management. Facility management can be seen as the demand side and asset management as the supply side. Financial management forms the monitoring body for the general management. To achieve interdependency from the core business, the CREM-structure has to be parallel or at least iterative with strategy development (Kämpf-Dern & Pfnür, 2014). Therefore, the CREM organization must take the following parameters for institutionalizing into account; the organizational structure for CREM functions, centralization and decentralization of decision-making, CRE sourcing, CREM culture and CREM HR, and process management.
CREM-controlling

The CREM targets derived from the strategy statement should be measured and monitored (Lindholm, 2008). CREM-controlling systems measures monitor and support the performance of CREM. Therefore, CREM-controlling can best be described as:

“All systems that are meant to support the other domains by providing communication channels as well as information for steering and controlling core and management processes”. (Kämpf-Dern & Pfnür, 2014, p. 106).

CREM controlling systems are supportive to all functions and levels of CREM and should enable effective and efficient work. The CREM department is affected by multiple internal and external disciplines that assume different roles. Therefore, local information and communications requirements are intense. Parameters affecting institutionalizing are the level of transparency and standardization and integration of information, communication and the involved processes (Kämpf-Dern & Pfnür, 2014). Moreover, integration of processes, budgeting and reporting, transfer-pricing systems other systems for optimal allocation of resources and quality management systems are mentioned.

2.5. Corporate real estate management activities

To get an understanding of the internal CREM structure and CREM activities, a closer view on the CREM organization is needed. Bontekoning (2015) analyzed the CREM organization activities, whereby his theoretical model elaborates on the portfolio management model of Hartmann (2010), CREM activities model of Kämpf-Dern & Pfnür (2014) and the strategy levels of CREM discussed in paragraph 2.3.

CREM activities are not limited to the core portfolio management activities. Based on the management model of St. Gallen, CRE management tasks can be differentiated into core, support and management activities (Rüegg-Stürm, 2002; in Kämpf-Dern & Pfnür, 2014). An overview of the CRE management activities is presented in figure 2.7.

![Figure 2.7: CREM activities according to the St Gallen management model (Hartmann et al, 2010; and Kämpf-Dern & Pfnür, 2014)](image)

Management activities involve developing the organizations structure and its management to implement the corporate strategy. However, as discussed in paragraph 2.3, corporate real estate can be seen as a support function like finance, human resources, information technology and communication (Ribon et al., 2007). Therefore, CRE management activities involves...
implementing a CRE strategy aligned with both the corporate real estate core activities and support activities involving interaction with the corporate core business besides the support functions (Kämpf-Dern & Pfnür, 2014). The core activities of CREM are activities regarding the management of the real estate portfolio (Ploumen, 2014). Real estate activities concerning real estate portfolio management are listed along the real estate life cycle. Figure 2.8 illustrates that these activities can be separated in provision of space, operation and disposition. Provision of space involves all activities concerning the acquisition or lease of new CRE and can be divided into four main activities; space planning, acquisition, lease and lease administration and project development. Operation involves all activities necessary for occupying real estate and consists of three main activities. Technical facilities management involves all activities regarding building maintenance. Infrastructural facilities management concerns activities that facilitate workplace design and functional flexibility. Commercial facilities management involves activities regarding facilitating extra services and optimization of occupancy rates. Support activities involve enabling and facilitating the core activities through e.g. technology, human resources and procurement, but are not involved directly with generating the product or service. The portfolio management activities defined by Hartmann et al. (2010) are integrated in this model as CRE core activities. In addition, Bontekoning (2015) analyzed eight different studies concerning CREM skills and activities. This resulted in the identification of 31 unique core activities for the CREM organization as presented in figure 2.8.

Figure 2.8: CREM activities assigned to the strategy levels of CREM (Bontekoning, 2015)
The most prominent core activities are: facility management, real estate development, leasing and property lease administration, acquisition and disposition, strategic planning, IT, portfolio management and project management. Moreover, Bontekoning placed the core activities for the CREM organization into the three strategy levels of CREM. Combined with the management and support functions obtained from the CREM activities model of Kämpf-Dern and Pfnür (2014) this results into the internal real estate organization scheme as presented.

2.1. Conclusion

Sub-question I, which has to be answered in this chapter, is ambiguous. First, the answer of the first part "What is corporate strategy?" has to be answered. Strategy can be defined as "the determination of the long-run goals and objectives of an enterprise and the adoption of courses of action and the allocation of resource necessary for carrying out these goals". Corporate strategy is part of an organizations' strategy statement, which consists of the mission, vision, objectives and the actual strategy itself. Strategy can be implemented on corporate, business, functional and operational levels of an organization. However, in order to provide an overall business strategy, the strategy of these levels should be aligned with each other and with the external environment of the corporation. Thus, strategy concerning corporate sustainability should first be implemented at the corporate level within the strategy statement and then aligned with the lower levels of the organization to successfully implement it within the organization as a whole.

During the past decades, three different schools of thought concerning corporate strategy can be distracted from the literature. Strategic management involves strategic thinking, strategic planning and strategic momentum. Strategic thinking is mainly concerned with the prescriptive school, while strategic planning is mainly concerned with the descriptive school of thought. Strategic momentum involves the evaluation of the implemented strategy. Strategic management is a cycle. Therefore, strategic momentum also involves re-initiate strategic thinking when circumstances deem necessary.

Second, the answer of the second part "How can strategic management of corporate real estate add value to an organization?" has to be answered. The definition of corporate real estate management is "The management of a corporation's real estate portfolio by aligning the portfolio and services to the needs of the core business (processes), in order to obtain maximum added value for the businesses and to contribute optimally to the overall performance of corporations". Over the years, corporate real estate management has evolved from being seen as a mainly operational function to a strategic function. To evolve into be a business strategist, corporate real estate managers must be able to implement strategic thinking and implement corporate real estate strategies on all organizational levels of corporate real estate management. In order to add value to an organization, the corporate real estate strategy has to be aligned with the overall business strategy on the strategic, tactical and operational level and with both the internal and external environment of the organization. To achieve strategic alignment, the corporate real estate management targets must be derived from the strategy statement's mission and objectives. These targets form the basis for the corporate real estate strategies. In order to implement the strategies and to operate independent from the core business, the structure of the corporate real estate management organization has to be parallel or at least iterative with strategy development. The alignment procedure described above also applies for the implementation of a sustainable real estate strategy, and the strategy statement and corresponding targets has thus to be derived from the corporate sustainability strategy. Sustainability and its relation to corporate real estate are further examined in chapter 3. The core activities of the corporate real estate management organization involve provision of space, operation and disposition, which can be subdivided into strategic, tactical and operational activities. Moreover, the corporate real estate management targets, corporate real estate management strategies and corporate real estate management organization should be measured and monitored by a corporate real estate management controlling system to gain insight in the corporate real estate performance. Performance management and measurement is further examined in chapter 4.
3. Corporate real estate sustainability management

“Sustainable development is the pathway to the future we want for all. It offers a framework to generate economic growth, achieve social justice, exercise environmental stewardship and strengthen governance.”
— Ban Ki-moon

This chapter gives a brief overview of the history of sustainability and growing recognition of its importance. It discusses corporate real estate sustainability management and the various aspects of sustainability within CRE. Moreover, it gives an overview of the drivers for real estate sustainability and an overview of assessment and reporting methods of real estate sustainability. Sub-question II; “How can sustainability strategically be incorporated within the real estate portfolio?” will be answered in this chapter. The first paragraph introduces sustainability and its emergence as a key factor within political and corporate policies (§3.1). The subsequent paragraphs explore corporate real estate sustainability management (§3.2), provide the drivers for sustainability in real estate (§3.3) and discuss sustainability reporting (§3.4). The last paragraph concludes this chapter and will answer sub-question III (§3.5).
3.1. Sustainability

Sustainability is a relatively young concept. The scientific community published the first note of sustainability within worldwide politics in the report ‘the limits to growth’ in 1972. Establishing the relation between economic development and the environment, sustainability became part of the political agenda. The global oil crisis in 1973 raised the awareness of mankind’s dependency on fossil fuels resulting in a growing attention for energy conservation (IISD, 2011). However, it took until 1987 to receive worldwide attention, when the World Commission of Environment and Development released the report ‘Our Common Future’. This report gave new insights in social, economic and environmental aspects, linking economic growth, environmental issues and the difference in wealth levels on a large scale for the first time (VROM, 2010). The most common used definition of the term sustainable development is found in this report (United Nations, 1987, p. 16):

"Development which meets the needs of current generations without compromising the ability of future generations to meet their own needs."

So sustainability means to look at the current needs of humanity and how to develop these needs without affecting humanity, nature or welfare. Five general protection principles for sustainable development that are also applicable to real estate can be derived from this general concept of sustainability.

I. Protection and restoration of the natural environment / ecosystem;
II. Protection of natural resources;
III. Protection of human health and, wherever possible, improvement of well-being;
IV. Protection and promotion of social values and of public goods;
V. Protection of capital and material goods.

Based on the social, economic and environmental impacts, Elkington (1995) developed the triple bottom line theory (TBL) and introduced the three P’s: people, planet and profit. People refers to social dimensions within a specific region and involve aspects such as health and safety, but also aspect such as education, social capital and quality of life. Planet refers to the environment, involving usage of natural resources such as water quality, energy consumption, natural resources, waste and land use. Profit refers to economic aspects that focus on the flow of money involving income and expenditures, taxes, business climate, employment and revenue. According to Slaper and Hall (2011), sustainability as an organizational goal is growing among businesses, nonprofits and governments. For these organizations, the TBL can be used as an accounting framework for measuring sustainability, taking more than just financial measures into account by involving both social and environmental dimensions.

3.2. Corporate real estate sustainability management

Real estate and sustainability are highly intertwined and recognition of the importance of sustainable real estate has increased over the years (Eichholtz, Kok & Quigley, 2013). The built environment is responsible for an estimated 40% of the global energy use and sustainable strategies related to CRE are therefore growing in importance (Taylor, 2013; and Eichholtz et al., 2013). Within the Netherlands, the built environment takes 36% of the national CO2 emission into account (NOS, 2015). Although this emphasizes the importance of sustainable real estate, there is relatively little theory concerning the implementation of sustainability as a real estate strategy (Jensen et al., 2014). Implementing sustainability within the CRE portfolio is a relatively new real estate strategy that is only recently added to CRE theory by Gibler and Lindholm (2011). In addition, based on real estate alignment theory as discussed in chapter 2, Haynes (2012) identified ten components of CREM, which are planet, position, purpose, procurement, place, paradigm, processes, people, performance and productivity. Optimal alignment of the CRE strategy with the organizational strategy is achieved when all these elements are aligned with one another. Notable is that Haynes (2012) is one of the first that identified planet as one of the CREM
components and argues that the CRE portfolio should be aligned with issues relating to sustainability and CSR. Related to the component planet, Shen et al. (2012, in Haynes, 2012) proposed some major findings concerning the future trends in CRE sustainability, including:

I. Increased energy use and carbon footprint transparency;
II. CRE as an energy source besides being consumers of energy;
III. Reliable and renewable energy, potable water and waste distribution;
IV. Technology for monitoring and controlling the efficiency of CRE;
V. CRE as a tool to create sustainability awareness among building users.

Moreover, Kuijstermans (2012) states that various researches highlight benefits such as a “decrease of exploitation costs (energy use and maintenance), extended depreciation periods, higher rental level by decrease of exploitation costs, future proof design, increase let ability, decrease of risk of vacancy, increase of residual value, higher productivity, increase of health of employees, decrease of absence through illness, increase of satisfied employees, and a green image”. These findings are consistent with the theory regarding the CRE strategy support sustainability as discussed in chapter 2 and presume that a deliberate sustainable real estate strategy has a direct or indirect impact on the performance of almost all other real estate strategies. Implementing a sustainable real estate strategy is known as corporate real estate sustainability management (CRESM). According to the UNEP (2014, p19), CRESM is defined as:

“The integrated management of all economic, environmental and social aspects of an organization its property (real estate) activities and associated investment decision-making. It involves all relevant strategies, processes and organizational structures that support corporate governance and sustainable business and product development.”

This definition is in line with the findings concerning strategy and performance management theory as discussed in chapter 2. So in order to implement a deliberate and successful CRE sustainability strategy, the sustainability targets should be derived from the corporate sustainability targets as defined in the corporate strategy statement. Moreover, CRESM is a proactive process of measurement, analysis and response based on the real estate sustainability performance set against CRE performance requirements and organizational performance requirements. Performance measurement and its relation will be discussed.

Masalskyte, Andelin, Sarasoa and Ventouori (2014) found that various benefits might be achieved with CRESM for all three aspects of the TBL. An overview of the mentioned benefits is presented in table 3.1.

<table>
<thead>
<tr>
<th>Environmental benefits</th>
<th>Social benefits</th>
<th>Economic benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficient use of resources</td>
<td>Healthy and comfortable working environment</td>
<td></td>
</tr>
<tr>
<td>Lower life cycle impacts</td>
<td>Employee engagement</td>
<td>Increase real estate market value</td>
</tr>
<tr>
<td>Sustainable workplaces</td>
<td>Employee satisfaction</td>
<td>Cost reduction</td>
</tr>
<tr>
<td>Other issues related to physical building features</td>
<td>Employee productivity</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.1: Possible benefits of CRESM (Masalskyte et al., 2014)

According to the UNEP (2014), required information on the operational property management level that might support CRE sustainability decision-making consists of the performance characteristics and the physical property characteristics. The performance characteristics can be measured during the operating phase. The physical property characteristics are known from the planning phase of a project and consist of the technical and functional quality. The performance characteristics can be subdivided within three categories, based on the TBL, which are presented in figure 3.1.
Figure 3.1: Categories of real estate sustainability performance characteristics (UNEP, 2014)

This figure illustrates that both the technical and functional quality of CRE affect all three aspects of sustainability, which are translated into the environmental, social and economic quality. CRE sustainability performance consists of these quality categories together.

The physical characteristics are of interest when planning a sustainable renovation or developing a new corporate building. The physical real estate characteristics of a building determine the extent to which real estate can achieve a certain level of sustainability, while the actual real estate sustainability performance during operation is determined by the non-physical characteristics. This means that real estate sustainability performance can be measured during building usage, but maximum potential can only be estimated when all relevant physical real estate characteristics are known. An overview of the physical real estate characteristics that might affect real estate sustainability is given in figure 3.2 (p.26).
Figure 3.2: Physical building characteristics that may affect CRE sustainability performance (UNEP, 2014)

Besides the physical, building related factors, CRE sustainability performance is influenced by non-physical factors (UNEP, 2014). Non-physical factors that have an impact on real estate performance include site and location, climate and weather conditions, surroundings, construction processes, quality of sustainable facility management, ease of use, affordances provided to inhabitants and occupant, tenant and corporate behaviors. Especially occupant, tenant and corporate behaviors can have a substantial impact on natural resources by energy and water performance. Besides the physical factors, the CRE manager can influence these non-physical factors as well. However, physical real estate characteristics have an even greater impact on real estate sustainability performance and are substantially easier to influence by the CRE manager (UNEP, 2014).

To manage the CRE sustainability performance, Masalskyte et al. (2014) identified the most typical CRESM activities. An overview of these activities is presented in figure 3.3. It encompasses various core activities of CREM assigned to the levels of strategy as discussed in chapter 2. Monitoring and controlling and strategy should be implemented on all three levels of strategic
CREM. However, this list is not necessarily complete to actually manage CRE sustainability performance and must be seen as complementary to the various core activities of CREM. Hence, in order to take all necessary core activities into account to successfully manage CRE sustainability, both the CREM and CRESM core activities should be taken into account.

**Figure 3.3: CRESM core activities (Masalskyte et al., 2014)**

### 3.3. Drivers for real estate sustainability

The need for implementing sustainability within the real estate portfolio is determined by the stakeholders and their corresponding drivers for sustainability (Hoendervanger, van der Voordt & Wijnja, 2012). Falkenbach, Lindholm and Schleich (2010) identify three types of drivers for environmental sustainability within the built environment.

I. External drivers
II. Corporate level drivers
III. Property level drivers

Important external drivers are top-down market drivers such as building sustainability certifications, although only environmental legislation is a mandatory external requirement. Examples of international legislation are initiatives such as the Kyoto Protocol and the UN Principles of Responsible Investment. At the national level, most levels have legislations regarding carbon emissions, energy efficiency, water consumption and waste management that affect all mentioned stakeholder categories. In addition, external drivers may include incentives on green buildings and possibilities to obtain more appealing terms for financing. Due to increasing sustainability awareness among both business and community, sustainability may result in image benefits on the corporate level. On the property level, evidence is found that sustainability results in an increased rental level, decreased property costs, decreased risks and increased property values, although the amount of empirical evidence is still limited (Falkenbach et al., 2010).

Within the built environment, several stakeholders can be identified (Hoendervanger et al., 2012). Stakeholders operate from their own specific role and corresponding interests that cover often high stakes, due to the substantial financial and long lasting nature of real estate within the field of e.g. finance, health and well-being, image, culture, spatial planning and the environment. The number of various stakeholders and the diversity of interests are high. Hoendervanger et al. (2012) distinguish three categories in which stakeholder can be divided.

I. Building users
II. Corporate stakeholders
III. External stakeholders
These categories correspond with real estate as an operational, financial and physical asset, as discussed in chapter 2. The building users cover all people that structural or incidental makes use of a building and its amenities. Structural users include e.g. employees, subtenants and clients. Incidental users are e.g. customers that seek to receive a service or to obtain a product. The corporate stakeholders concern the financiers of the organization, which are the owners and/or shareholders of an organization, but also include the bank as financial provider. External stakeholders include persons and third parties without a financial or operational relation with the respective real estate that still wants to be able to have an influence, such as local residents, municipalities and other third parties that might encounter convenience of nuisance due to the respective real estate.

### 3.4. Sustainability reporting

The growing importance of sustainability led to more transparency in reporting corporate sustainability practices due to the urge of being responsible, to improve the corporate reputation or due to external influences by stakeholders. Within the built environment, several methods are available to assess the level of sustainability. These methods have been developed in line with the demand for more transparency within the built environment and the growing need for better sustainable real estate performance. Jansen (2015) performed a comparison of the most frequently used tools and rating standards to assess sustainable real estate performance, which is presented in table 3.2. Although each method has its own criteria and weights, it seems that the main focus of all methods is on energy. Materials and health and wellbeing seem to receive a considerable focus as well by the majority of methods. Contrary, water is weighted less heavily compared to the other criteria. Moreover, waste and sustainable sites are only included as a criterion in one assessment method, just like stakeholder engagement.

<table>
<thead>
<tr>
<th>Criteria (%)</th>
<th>BREEAM</th>
<th>LEED</th>
<th>GRESB</th>
<th>Green Star</th>
<th>GPR Building</th>
<th>Energy Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>12</td>
<td>8</td>
<td>31</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>8</td>
<td>25</td>
<td>44</td>
<td>20</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Energy</td>
<td>19</td>
<td></td>
<td></td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>6</td>
<td>5</td>
<td></td>
<td>12</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td>12,5</td>
<td>19</td>
<td></td>
<td>10</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Pollution</td>
<td>10</td>
<td>11</td>
<td></td>
<td>5</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Land use and ecology</td>
<td>10</td>
<td>5</td>
<td></td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste</td>
<td>7,5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable sites</td>
<td></td>
<td></td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and wellbeing</td>
<td>15</td>
<td>13</td>
<td></td>
<td>26</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Stakeholder engagement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2: Comparison of measurement tools (Jansen, 2015)

The first highlighted tool is the Building Research Establishment Environmental Assessment Methodology (BREEAM). BREEAM’s sustainability performance assessment involves eight categories: management, transport, energy, water, materials, pollution, land use and ecology, sustainable sites and health & wellbeing. In addition, to these categories, BREEAM is able to assess new buildings, buildings that are currently in use and area development projects. The second tool is the Leadership in Energy and Environmental Design (LEED). LEED involves five categories of sustainable performance: sustainable sites, energy and atmosphere, water efficiency, indoor environmental quality and materials & resources. LEED can be applied to new buildings, building operations & maintenance and area development projects. The third highlighted tool is the Global Real Estate Sustainability Benchmark (GRESB). GRESB assesses properties within seven categories: management, policy and disclosure, risks and opportunities, (environmental) monitoring systems, performance indications, building certifications, stakeholder engagement.
and new construction and major renovations. Other, less used tools, are Green Star, GPR building and Energy star.

It must be noted that BREEAM and LEED assess sustainable performance on a property level and that GRESB assesses sustainable performance on the portfolio level. Therefore, BREEAM and LEED are more suitable for CRE managers by facilitating assessment for each asset in the real estate portfolio. GRESB is more suitable for real estate investors by facilitating an overall sustainability score for the whole real estate portfolio. Due to the focus on CREM in this research, only the BREEAM and LEED categories and corresponding categories are analyzed to draft a list of sustainability performance variables. However, a combination of tools might provide the best solution for assessing sustainability in daily practice. The list as presented in table 3.3 provides an overview of all relevant categories and corresponding sub-categories from the two most used sustainability assessment tools in daily practice classified by the real estate sustainability performance categories as discussed in paragraph 4.2. However, it must be noted that three CRE sustainability performance variables have been excluded from this list for several reasons, which are management, sustainable sites and innovation. First, these variables are not consistent with the CRE sustainability performance areas as discussed in CRESM theory. Second, the variable management refers to the ongoing process of management and cannot be assigned to a specific CRE sustainability decision. Third, the variable sustainable sites is mainly related to real estate and area development, which is not within the scope of this research. Last, the variable innovation may relate to all possible innovations that are related to sustainability in any way whatsoever and is therefore not specific enough to be included as a distinct variable.

<table>
<thead>
<tr>
<th>Area</th>
<th>CRE Performance variable</th>
<th>CRE Performance sub-variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social</td>
<td>Health and Wellbeing</td>
<td>Visual comfort</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Indoor air quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Safe containment in laboratories</td>
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<tr>
<td></td>
<td></td>
<td>Thermal comfort</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acoustic performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Safety and security</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low-emitting materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controllability of systems</td>
</tr>
<tr>
<td>Transport</td>
<td>Public transport accessibility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alternative transportation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proximity to amenities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cyclist facilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum car parking capacity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Travel plan</td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>Energy</td>
<td>Reduction of energy use and carbon emissions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy monitoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>External lighting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low carbon design</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy efficient cold storage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy efficient transportation systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy efficient laboratory systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy efficient equipment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drying space</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On-site renewable energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green power</td>
</tr>
<tr>
<td>Water</td>
<td>Water consumption</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water monitoring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leak detection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water efficient equipment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Innovative wastewater technologies</td>
<td></td>
</tr>
</tbody>
</table>
Waste

- Construction waste management
- Recycled aggregates
- Operational waste
- Speculative floor and ceiling finishes
- Adaptation to climate change
- Functional adaptability

Land use and Ecology

- Site selection
- Ecological value of site and protection features
- Minimizing impact on existing site ecology
- Enhancing site ecology
- Long term impact on biodiversity

Pollution

- Impact of refrigerants
- NOx emissions
- Surface water run off
- Light Pollution Reduction
- Noise attenuation

Environmental & Economical Materials

- Life cycle impacts
- Hard landscaping and boundary protection
- Responsible sourcing of materials
- Insulation
- Designing for durability and resilience
- Material Efficiency

Table 3.3: Overview of sustainability variables and sub-variables (BREEAM, 2015; LEED, 2015; and UNEP, 2014)

3.5. Conclusion

This chapter covered corporate real estate sustainability management and in specific how physical and non-physical building characteristics might affect corporate real estate sustainability performance. An answer on Sub-question II; “How can sustainability strategically be incorporated within the real estate portfolio?” can be provided in this paragraph. Sustainability performance can be measured during building usage, but maximum potential can only be estimated when all physical real estate characteristics are established. These physical real estate characteristics affect corporate real estate sustainability performance, which involve the functional, technical, social, environmental and economical quality. Besides the physical, building related factors, corporate real estate sustainability performance is influenced by non-physical factors such as occupant, tenant and corporate behavior. However, physical real estate characteristics might even have a greater impact on real estate sustainability performance and are substantially easier to influence by the corporate real estate manager. Thus, in order to strategically implement sustainability within the real estate portfolio, the corporate real estate manager must align operational decisions concerning physical real estate characteristics with the corporate real estate sustainability strategy based on the corporate sustainability strategy statement.

The need for real estate sustainability is determined by various stakeholders and their corresponding drivers, which operate from their own specific roles and interests. The stakeholders within corporate real estate can be divided into building users, corporate stakeholders and external stakeholders. In addition, there are three types of drivers that might motivate stakeholders, which are external, corporate level and property level drivers.

Several frequently used rating standards to assess sustainable real estate performance have been identified along with corporate real estate sustainability variables. The most frequently used rating standards are BREEAM and LEED. By subtracting the various categories from each standard rating and combining those categories with corporate real estate sustainability management theory, eight sustainability variables and corresponding sub-variables are identified. These rating standards combined with how the physical real estate characteristics affect sustainability performance provide guidance for incorporating sustainability within the corporate real estate portfolio.

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4. Performance management

"If a measurement matters at all, it is because it must have some conceivable effect on decisions and behavior. If we can’t identify a decision that could be affected by a proposed measurement and how it could change those decisions, then the measurement simply has no value.”

— Douglas W. Houbart

This chapter introduces and discusses the literature concerning performance measurement and its CREM applications. It gives a brief overview of business performance measurement and an overview of the developments, background, purpose and understanding of CREM performance measurement. Sub-question III: “How can performance of corporate real estate be measured to align corporate real estate decisions to the overall corporate strategy?” will be answered in this chapter. The first paragraph provides an introduction and clarification of performance management (§4.1). The subsequent paragraphs explore business performance management, (§4.2), give an overview of common business performance management models (§4.3), clarify the position of business performance management in the CREM environment (§4.4), and explore the proposed performance measurement themes and performance measures (§4.5). Based on the discussed theory, a theoretical framework is presented in subsequent paragraph (§4.6). The last paragraph concludes this chapter and provides an answer on sub-question III (§4.7).
4.1. Performance management

According to de Vries, de Jonge & van der Voordt (2008), the desired output of an organization is produced with a certain input, which can both be measured in order to determine the performance of the organization. Performance measurement “reviews past and present functioning, derives strategies for future endeavors, compares performance within and among the facilities, assesses the performance toward the organization’s goals and provides needed direction to management for decision-making” (Lavy, Garcia and Dixit, 2014). Tangen (2005) performed an extensive literature review on organizational performance, wherein he argues that organizational performance concerns the success of a company and its activities and involves both overall economic and operational aspects. Organizational performance can be seen as a compound variable including competitive advantage, profitability and productivity (Riratanaphong, 2014). Figure 4.1 shows the triple P-model by Tangen (2005) to illustrate how these terms are related.

![Figure 4.1: Triple P-model (Tangen, 2005)](image)

Productivity and profitability are often seen as one issue (Tangen, 2005). Although they are interdependent, a clear distinction can be made: productivity is the relation between input and output quantity and profitability is the ratio between revenue and cost. Competitive advantage is described as the development in market share as a result of performance (de Vries et al., 2008). Tangen (2005, p. 41) defines effectiveness as “the ratio between actual output and expected output” and describes to what extend desired goals are reached. Efficiency is defined by Tangen (2005, p. 41) as “the ratio between resources expected to be consumed and actually consumed” in order to determine how the resources are used to accomplish the desired goals. The terms effectiveness and efficiency are related with the other three variables of performance and therefore cross functional.

According to Johnson et al. (2014), two basic approaches to performance can be distinguished; direct economic performance and overall organizational effectiveness. Smith & Goddard (2002) argue the most common criteria of performance measurement are financial. However, they state that from a traditional view, the definition of performance management (PM) is placed in a human resource management (HRM) point of view and places the individual employee at the focus of attention. In this context, performance is derived from the corporate strategy and the main interest is in the availability of appropriate tools to optimize performance. So PM emphasizes organizational control within a predetermined set of objectives. Therefore, PM can be defined as:
Thus, PM is a process of control and adjustment, involving the measurement and analysis of performance, and reaction to the outcome (Smith & Goddard, 2002). Figure 4.2 gives a schematic representation of the performance management process.

**Figure 4.2: Schematic representation of the performance management process (Smith & Goddard, 2002)**

The proposed proactive loop can be divided into an inner loop that represents the narrow view of PM and an outer loop that represents the broader view of PM. Within the narrow view, strategy, objectives, organizational structure and culture are taken as given. The purpose of PM is to control and adjust the organizational direction optimally within that context. The broader view of PM is dynamic, whereby the management recognizes that the external environment continually influences the context. This is taken for given in the narrow view. Circumstances may change in such a way that strategy adjustment is needed.

So in order to influence activity within the organization, four different categories of actions can be subtracted from the schematic representation that are highly related to the emerging process of strategic management as discussed in chapter 2. The first category is the formulation of strategy to determine what constitutes performance, corresponding to the strategic thinking phase. Second, performance measurement systems are needed to gather the required data of the determined measures. Third, analytic techniques have to be implemented to be capable of analyzing the gathered data. These two actions correspond to the strategic planning phase, where a situational analysis is required in order to formulate the corporate strategy. Fourth, instruments designed to encourage appropriate organizational responses to the obtained outcomes of the data analytics have to be applied, corresponding to the strategic momentum. The levels in which these four categories of actions are implemented within the organization determine whether PM can be successful. This schematic representation gives a clear overview of the most important components of PM, although PM is in reality much more complicated than a double loop representation as given in figure 4.2.

“A process that allows an organization to handle its performance in line with strategy and objectives... providing a proactive close loop control system where the corporate and functional strategies are deployed to all business processes, activities, tasks and personnel, and feedback is obtained through the performance measurement system to enable appropriate management decisions.” (Bititci, Carrie & McDevitt, 1997, p. 524)
4.2. Business performance management

Performance management has been a human activity as long as humanity itself (Manzoni & Islam, 2009). Accounting performance measurement is traced back to the thirteenth century, when Venetian monks invented the double-entry bookkeeping system (Neely, 2007). However, it includes not only finance, but also a diversity of disciplines such as organization theory, strategic management, operations management, human resource management, organizational behavior, marketing, management accounting, economics, operations research and information systems (Franco-Santos et al., 2007, Manzoni & Islam, 2009). In chapter 1, the corporate strategy was defined as a theory to successfully compete in the corporation’s scope and to gain competitive advantage. In order to gain competitive advantage, corporations have to outperform corporations that are competitive equal or have a competitive disadvantage (Barney, 2002). Therefore, business performance measurement (BPM) is an essential component of the corporate strategy. BPM can be defined as:

“The process of quantifying the efficiency and effectiveness of actions” (Neely et al., 1995, P. 80).

Moreover, a performance measure can be defined as “a metric to quantify the efficiency and/or effectiveness of an action” and a performance measurement system can be defined as “a set of metrics to quantify the efficiency and effectiveness of an action” (Neely et al., 1995, p. 80). However, the definition of BPM approaches performance measurement mainly from an operational perspective (Franco-Santos et al., 2007). BPM serves both external and internal stakeholders (Arnaboldi, Azzone & Giorgino, 2015). From a strategic perspective, BPM should also reflect the procedures used to determine the necessary performance metrics used to implement the corporate strategy and provide the corporation with information to determine the content and validity of the chosen strategy. From a management accounting point of view, BPM should be in conjunction with the corporate planning and available financial resources. According to Franco-Santos et al. (2007), BPM can be seen, from a more extensive point of view, as the core of six of the most important management disciplines, which are strategic planning, marketing, operations and production management, accounting and management control, HRM and information systems. BPM can be used to link those disciplines with each other. However, as discussed in chapter 2, in order to align strategic CREM with the overall business strategy, CREM must be implemented as professional management discipline contributing to corporate business success. Therefore, CREM is added as an import management discipline to illustrate that the CREM department should be linked to other management disciplines to fully exploit the potential of BPM.

The purpose of implementing BPM is to achieve the corporate goals. Although these goals are usually referred to as strategic goals, they can also be purely operational (Franco-Santos et al., 2007). A BPM system consists of only two necessary features, which are performance measures and a supporting infrastructure, although a large variety of measures can be extracted from existing literature (Franco-Santos et al., 2007). The supporting infrastructure can vary from a basic structure to highly sophisticated. Beside the infrastructure itself, the infrastructure consists of supporting procedures such as data acquisition, collecting data and data analysis, and the human recourses that are needed to perform these procedures. In addition, Neely et al. (1995) provide five different categories in which the role of BPM can be subdivided, which are measure performance, strategy management, learning and improvement, communication and influence behavior. However, they argue that the only necessary role of BPM is to measure performance. These five different categories in which BPM plays an important role illustrate the importance and interdisciplinary nature of BPM. BPM is not only essential in evaluating organizational performance, it can also be used to establish the corporates strategy statement as discussed in chapter 2 and therefore provide guidelines for the management to make important strategic decisions (Lavy, Garcia & Dixit, 2010). However, to implement BPM in a correct way, an appropriate BPM framework is needed.
4.3. Business performance measurement frameworks

Over the years, corporations, academics and consultants developed an abundance of BPM frameworks and methodologies (Neely, 2007). A performance management framework can be described as “using performance measures to determine whether performance improvements are made” (O’Neill, 2006). Early frameworks were implemented by organizations to define the most appropriate measures for their business. These early frameworks approached BPM mainly from a financial perspective, such as the pyramid of financial ratios developed by DuPont in the early 1900s. The pyramid of financial ratios can be seen as the single most used tool on financial management reporting (Neely, 2007). However, the focus lies purely on financial measurement and is overemphasizing historical financial performance, which might result to short-term thinking (Neely, 2007).

It took until the late 1980s until academics came up with the vast majority of research and new theories (Neely, 2005). Yadav, Sushil and Sagar (2013) performed a comprehensive literature review of performance measurement and management frameworks developed in the period 1991 until 2011 in which they conclude that the SMART model (Lynch & Cross, 1991), the European foundation for quality management business excellence model, the balanced scorecard (Kaplan & Norton, 1992) and the performance prism (Neely 2001) can be distinguished from existing literature as the four dominant BPM frameworks. Although paradigm shifts, such as from financial perspective to integrative perspective and from an operational perspective to a strategic perspective, took place during this period, these four frameworks can be seen as the underlying fundamentals of the vast majority of developed BPM frameworks until 2011. These four frameworks are designed to adopt non-financial performance measures in addition to existing financial performance measures (Neely, 2007).

Perhaps one of the most well-known BMP frameworks within the field of CREM is the balanced scorecard by Kaplan and Norton (1992). The balanced scorecard (BSC) distinguishes itself from the hierarchical models by considering the results from various horizontal aspects without aggregating the results (Tonchia & Quagini, 2010). Therefore, the BSC measures and analyses various classes of performance, without directly determining relationship between outcomes. Figure 4.3 shows the BSC with its original classes of performance.

```
<table>
<thead>
<tr>
<th>Customer perspective</th>
<th>Financial perspective</th>
<th>Innovation and learning perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do our customers see us?</td>
<td>How do we look to our shareholders?</td>
<td>Can we continue to improve and create value</td>
</tr>
<tr>
<td>Internal business perspective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What must we excel at?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

**Figure 4.3: The balanced scorecard (Kaplan & Norton, 1992)**

According to Kaplan and Norton (1992), economic value is affected by revenue (profitability) and productivity. The BSC accesses BPM from four different perspectives. The financial perspective involves the traditional measures from the accounting perspective. Kaplan and Norton (1992)
argue that the drivers of the financial perspective, customer perspective and the internal business perspective, and the innovation and learning perspective should be given equal attention. The BSC involves many essential aspects of other BPM frameworks, but exceed in linking the corporate strategy to performance management (Neely, 2007). To achieve alignment of BPM with the corporate strategy, goals and corresponding measures can be derived from the corporate strategy for each specific perspective by clearly identifying the drivers of performance (Riratanaphong, 2014). Although the BSC is widely used, critical points are the absence of a competitiveness dimension and the fact that it leaves out perspectives on HRM, employee satisfaction, supplier performance, product/service quality and environmental considerations (Neely, 2007).

Elaborating on their earlier findings concerning the BSC, Kaplan and Norton (2004) proposed the Strategy Map. The Strategy map is a visualization of the relation between the linked components of strategy from the four perspectives as presented in the BSC. It is used to determine the organizational performance indicators on the four perspectives that can be used as guidelines for individual departments to establish their performance indicators (Markiewicz, 2013). Moreover, it indicates the cause and effect relationships between the four perspectives from the BSC and related goals and therefore describes the process of improving performance.

Although each of the dominant frameworks has its advantages and shortcomings, several important characteristics can be subtracted from these frameworks (Neely, 2007). These characteristics are the basic requirements that a BPM framework must meet in order to be complete.

I. The BSC illustrates that a BPM framework should consider all relevant aspects of the organization, including financial and non-financial measures and internal and external measures. Moreover, alongside productivity, profitability and competitive advantage measures, efficiency and effectiveness measures should be taken into account as well.

II. Each framework illustrates that a BPM framework should be multidimensional. Hence, all important areas of performance that contribute to an organization’s success should be included. The EFQM model provides the best overview of performance dimensions, although no real consensus can be found between the frameworks.

III. A PBM framework should represent organizational performance concisely and rather straightforward in order to be widely adapted.

IV. The SMART pyramid emphasizes the need for integration between the various levels of strategy as discussed in chapter 2 and also between the various functions of the organization.

V. The results of performance are a consequence of its drivers. So in order to monitor past and future performance to make rational strategic decisions, both results and their drivers should be measured.

4.4. Corporate real estate performance management

According to Riratanaphong (2014), the purpose of real estate performance management can be described as:

“To comprehend the impact of management decision-making on the success and failure of the real estate portfolio and to suggest possible improvements” (Cable & Davis, 2004, in Riratanaphong, 2014, p.49).

Although the importance of performance management and performance measurement within the context of CREM is frequently mentioned, few real estate performance measurement frameworks of the added value of CREM can be subtracted from existing literature (Jensen et al., 2012). However, in an extensive literature review among published articles until 2012, Jensen et al. (2013) found four real estate performance measurement frameworks that can be derived from existing literature.
The dissertation of Den Heijer (2011) elaborates on the work of de Vries et al. (2008) by rephrasing and adding new added values and connecting them to specific parts of organizational performance. Moreover, CREM literature after 2012 provides the work of Riratanaphong (2014), where a conceptual framework of CREM performance management is proposed that elaborates on the work of de Vries (2007) and Jensen (2010).

Lindholm and Leväinen (2006) developed a theoretical framework that illustrates how real estate decisions support the corporate strategy statement and add value to the core business. The framework is based on Kaplan and Norton’s (1996) BSC methodology, defining economic value as the result of revenue growth and/or productivity. Each CRE strategy with its corresponding real estate decisions can be seen as an area of CRE performance and is linked to organizational performance via profitability and/or revenue. This framework identifies seven CRE strategies including corresponding real estate decisions. However, Sarasja (2007) has modified this model by including supporting environmental sustainability as a real estate strategy in addition to the original seven CRE strategies (Lindholm & Aaltonen, 2011). Comparison with the real estate strategies as used throughout this research shows that this model lacks the strategies controlling risk and supporting culture. The framework is descriptive. It provides cause and effect relations between CRE strategies and the compound variables of economic value, but does not provide insight in the relationship between CRE strategies or provide measurable quantitative values to be predictive. Moreover, it does not provide insight in how CRE strategies are integrated with the various levels of strategies and various functions within the organization. Neither does it take the context into account.

De Vries et al. (2008) developed a real estate performance measurement framework based on the triple P-model by Tangen (2005), in order to connect real estate interventions to organizational performance. This framework places CRE as the fifth resource next to HR, technology, ICT and capital as an input parameter for organizational performance. Five possible ways of real estate intervention are distinguished: maintenance, functional adjustment, reshuffling, (partial) renewal and new building. The output parameters consist of the products and/or services provided by the organization. Nine different types of real estate strategies subtracted from CREM literature might influence the output (de Vries, 2007). The change in performance can be measured by comparing input and output, which is determined by efficiency, profitability and competitive advantage. Comparison with the real estate strategies as used throughout this research shows that this model lacks the strategy support sustainability. The framework is also descriptive and not predictive due to providing only cause and effect relations between CRE interventions, CRE strategies and the compound variables of organizational performance.

In 2010, Jensen presented the FM Value Map, a conceptual framework that explains how facility management (FM) and CREM influence organizational performance based on the strategy map. The FM value map is a theoretical framework that explains how CREM can add value to organizational performance, based on Kaplan and Norton’s (2006) strategy map. The FM value map consists of two levels. The top level includes resources as an input to processes, which leads to provisions that have an impact on both surroundings and the core business. Therefore, CREM is seen as a process that requires certain input that has to be processed to obtain a certain output, which corresponds to the triple-p model and the schematic performance measurement process. It distinguishes itself from earlier work by focus on both the internal and external environment of organizations (Jensen, 2010). All parameters (or strategies) subtracted from the frameworks of Lindholm (2006) and de Vries et al. (2008) influencing organizational performance were grouped into the categories people, process and economy. The FM value map adds parameters that were grouped into the category surroundings, thus relating to sustainability and CSR. However, this framework does not take the CRE strategies increasing real estate value, supporting culture and stimulating innovation into account. This framework is also descriptive by providing the cause and effect relations without quantitative measures and mutual relations, although it adds certain resources and processes.
Den Heijer (2011) states that every CRE decision and/or intervention can be related to the different ways in which CRE can attribute to organizational performance. These CRE goals can all be directly or indirectly linked to profitability, productivity or competitive advantage. Figure 4.4 shows a more comprehensive framework elaborating on de Vries et al. (2008), where Den Heijer (2011) links the real estate strategies to the three compound variables of performance as discussed above. This framework not only illustrates cause and affect relations between CRE strategies and performance, but it also illustrates how the CRE strategies variables and performance variables are mutually related. This framework gives more insight into the effects of specific strategies on performance and is therefore more predictive, although quantitative measures are still lacking.

![Diagram](Figure_4.4.png)

**Figure 4.4: Framework for linking real estate interventions to performance (Den Heijer, 2011).**

Based on the edited framework of de Vries (2008), Den Heijer (2011) further explored in what manner CRE adds value to organizational performance. Based on the FM Value Map, a fourth variable sustainable development is added to performance, which involves the environment. The four real estate perspectives as discussed in chapter 2 are connected to real estate strategies and the four performance variables. The strategic perspective of the framework involves how real estate can contribute to the strategy statement by improving the quality and effectiveness of primary processes through the CRE strategies improving the quality of space, supporting image, supporting culture, stimulating innovation and stimulating collaboration. The financial perspective contributes to profitability goals by controlling risks, increasing real estate value and decreasing costs. The functional perspective aims at contributing to productivity. It focuses at the real estate goals supporting user activities, supporting user satisfaction and increasing flexibility. The real estate goals are assessed in terms of output versus input, according productivity definition (Tangen, 2005). The functional perspective can also contribute to competitive advantage and profitability, which are related to productivity. The physical perspective has a focus
on the more technical aspects in order to reduce the portfolio’s footprint and contribute to sustainable development (Den Heijer, 2011).

In addition to the frameworks of de Vries (2008) and Den Heijer (2011), several other authors tried to link the CRE strategies to productivity, profitability and competitive advantage, including van Schie (2013) and Koster and Arkesteijn (2015). Table 4.1 compares how the CRE strategies of these authors are directly linked to performance. This table illustrates that there is no consensus in the existing literature on how to link the CRE strategies directly to each variable of performance. However, Den Heijer (2011) suggests that both the CRE strategies and the performance variables are mutually related with each other.

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Productivity</strong></td>
<td>Increase employee satisfaction</td>
<td>Increase employee satisfaction</td>
<td>Increase employee satisfaction</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Increase flexibility</td>
<td>Increase innovation</td>
<td>Increase flexibility</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increase collaboration</td>
<td>Increase collaboration</td>
<td>2</td>
</tr>
<tr>
<td><strong>Profitability</strong></td>
<td>Controlling risk</td>
<td>Controlling risk</td>
<td>Controlling risk</td>
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<td>Reduce cost</td>
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<td>Reduce cost</td>
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<td>Increase flexibility</td>
<td>Increase flexibility</td>
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<td><strong>Competitive advantage</strong></td>
<td>Increase collaboration</td>
<td>Support culture</td>
<td>Supporting culture</td>
<td>3</td>
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<tr>
<td></td>
<td>Increase innovation</td>
<td>Promote marketing and sales</td>
<td>Promote marketing and sales</td>
<td>3</td>
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<td></td>
<td>Support culture</td>
<td>Increase productivity</td>
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</tr>
<tr>
<td></td>
<td>Promote marketing and sales</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Sustainable development</strong></td>
<td>Support sustainability</td>
<td></td>
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<td>1</td>
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</tbody>
</table>

Table 4.1: Analysis of various studies that links CREM to performance

Riratanaphong (2014) performed an extensive research on performance management in the context of CREM. Figure 4.5 (p. 40) shows the framework by Riratanaphong (2014) that elaborates on the frameworks of de Vries (2007) and the FM value map by Jensen (2010). In relation to the five characteristics that a business performance framework should meet as discussed in paragraph 4.3, this framework takes all different aspects of the CREM map into account and therefore and therefore all relevant aspects of the (CREM) organization. Furthermore, it approaches performance measurement from both the organizational as real estate performance perspective and involves the different processes of a BPM framework. It illustrates the possible impact of both organizational and CRE strategies on the organization, with consideration of the processes between input and output and the impact on both organizational and CRE performance. Moreover, it considers the context wherein it operates and the need for feedback by using the double loop representation of performance measurement by including both results and their drivers. However, it does not integrate the various levels of strategy as discussed in chapter two. Hence, this framework seems to meet four out of five requirements and can be used to approach performance measurement from both organizational and CRE real estate perspective. It illustrates how the organization and CRE performance measurement should be incorporated to align with the corporate and CRE strategies. However, this framework is also descriptive. It takes the relations between the different management aspects of CRE performance into account, but it does not illustrate the relation between the variables of organizational
performance, the possible effect of CRE strategies on organizational performance and quantitative measures.

![Figure 4.5: Framework for performance measurement related to CRE (Riratanaphong, 2014)](image)

### 4.5. Performance indicators in the context of CREM

Implementing performance measures can be an effective method to increase competitiveness and profitability of organizations (Tangen, 2003). Performance measurements are used to quantify the efficiency and/or effectiveness of certain actions (Tangen 2004). Key performance indicators (KPI’s) are measures for critical success factors (CSF) of organizations. A CSF is an action that an organization has to excel in to accomplish the goals that are derived from the strategy statement. A KPI can best be described as:

“A set of measures that focus on those aspects of organizational performance that are the most critical for the current and future success of the organization” (Parmenter, 2007; in Riratanaphong, 2014, p58).

Corresponding to the levels of strategy, three types of performance indicators can be distinguished (Tonchia & Quagini, 2010):

I. Economic-financial indicators at the corporate level;
II. Indicators related to the CSF’s at the business level;
III. Operating indicators, typically non-financial measures, at the operational level.

Moreover, within the field of performance management, performance indicators can be classified in four different categories (Neely et al, 2005). The first differentiation can be made between financial and non-financial performance indicators. During the past decades, the importance of non-financial performance drivers such as productivity, employee satisfaction and customer satisfaction have grown due to a shift towards value driven performance (Yadav, Sushil & Sagar, 2013). The second distinction is lagging and leading performance indicators. Lagging performance indicators measure past results and outcomes. Leading performance measures whether desired
results and outcomes will be achieved. Neely (2005) states that financial performance indicators are mainly lagging, while non-financial performance indicators are more leading. The third classification can be made between short-term and long-term performance indicators. Long-term performance indicators have a greater focus on the corporate strategy. Short-term performance indicators are more concerned with operational action and budget planning (Ahn, 2001). The fourth classification is internal and external performance indicators, thus indicators involving the external corporate environment and indicators concerning the internal corporate environment. Many authors (Kaplan & Norton, 2006; Neely, 2005; and Yadav, Sushil & Sagar, 2013) argue that a thorough BPM system should contain all types of performance measures mentioned above.

Both Folan and Brown (2005) and Yadav et al. (2013) performed an extensive literature review within the field of performance management and examined the dimensions of measurement included in different theories. They both concluded that there is no consensus in which dimensions covers all aspects of performance management. This results in no general categories for subdividing KPI’s can be subtracted from existing performance management literature. Therefore, the KPI’s will be directly classified into productivity, profitability and competitive advantage or indirectly through Kaplan and Norton’s (2006) classes of performance or the CRE strategies as discussed in paragraph 4.4.

Concerning the selection of KPI’s, many authors argue that the appropriate performance measures and KPI’s differ for each organization (Neely, 2008). However, according to Dutch legislation, all organizations have to provide an annual report that must contain specific performance measures. An overview of performance indicators used in the annual reports of commercial organizations arranged by profitability, competitive advantage and internal indicators is provided in table 4.2. The indicators are derived from the work of Klaassen (1994) who performed research into performance indicators that are used in annual reports. The operationalization of those performance indicators is derived from the work of Carton and Hofer (2006). Moreover, Klaassen (1994) added some internal performance indicators that are used for internal accountability. Not all indicators used are mandatory. This overview illustrates two main findings. First, it is remarkable that no common performance indicators for productivity can be derived from the annual report, although this might be explained by the fact that each organization is operating in its own specific market with its specific characteristics. Second, the vast majority of the more common performance indicators is still financial. A list of common non-financial performance indicators is rarely given due to the fact that each organization has its own specific characteristics.

<table>
<thead>
<tr>
<th>Performance</th>
<th>Indicator</th>
<th>Operationalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profitability</td>
<td>Return on equity (ROE)</td>
<td>Net income shareholders / common stockholder equity</td>
</tr>
<tr>
<td></td>
<td>Return on assets (ROA)</td>
<td>Net income / average total assets</td>
</tr>
<tr>
<td></td>
<td>Return on sales (ROS)</td>
<td>Net income / sales</td>
</tr>
<tr>
<td></td>
<td>Net income (NI)</td>
<td>Revenues - expenses</td>
</tr>
<tr>
<td></td>
<td>Return to shareholders (RTS)</td>
<td>(Share price (end-start) + dividends) / Share price start</td>
</tr>
<tr>
<td></td>
<td>Return on investment (ROI)</td>
<td>Net income / (long-term liabilities + equity)</td>
</tr>
<tr>
<td></td>
<td>Price / earnings ratio</td>
<td>Share price / earnings per share</td>
</tr>
<tr>
<td></td>
<td>Debt-to-equity ratio</td>
<td>Total Liabilities / Shareholders’ Equity</td>
</tr>
<tr>
<td></td>
<td>Value added per employee</td>
<td>Employee cost + interest + tax + net revenues / FTE</td>
</tr>
<tr>
<td></td>
<td>Sales growth rate</td>
<td>Percentage of sales growth</td>
</tr>
<tr>
<td></td>
<td>Employee growth</td>
<td>Percentage of employee growth</td>
</tr>
<tr>
<td></td>
<td>Total asset growth</td>
<td>Percentage of asset growth</td>
</tr>
<tr>
<td></td>
<td>Debt-to-equity ratio</td>
<td>Long-term debt / equity</td>
</tr>
<tr>
<td>Competitive advantage</td>
<td>Internal</td>
<td></td>
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<tr>
<td>-----------------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>Debt-to-total assets ratio</td>
<td>Total liabilities / total assets</td>
<td></td>
</tr>
<tr>
<td>Times interest earned</td>
<td>EBIT / interest payments</td>
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<tr>
<td>Working capital</td>
<td>Current assets - current liabilities</td>
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<tr>
<td>Current ratio</td>
<td>Current assets / current liabilities</td>
<td></td>
</tr>
<tr>
<td>Quick ratio</td>
<td>(Current assets - inventory) / current liabilities</td>
<td></td>
</tr>
<tr>
<td>Cash flow return on equity</td>
<td>Cash flow / equity</td>
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<tr>
<td>Cash flow return on assets</td>
<td>Cash flow / return on total assets</td>
<td></td>
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<tr>
<td>Temporary contracts</td>
<td>Number of temporary contracts</td>
<td></td>
</tr>
<tr>
<td>Training budgets</td>
<td>In € by employee or FTE</td>
<td></td>
</tr>
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<table>
<thead>
<tr>
<th>Fixed costs / total cost</th>
<th>Fixed costs / total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average cost of employees</td>
<td>Employee costs / number of employees</td>
</tr>
<tr>
<td>Leverage</td>
<td>Debt / total assets</td>
</tr>
<tr>
<td>Liquidity</td>
<td>Current assets / current liabilities</td>
</tr>
<tr>
<td>Quick ratio</td>
<td>Receivables + liquid assets / current liabilities</td>
</tr>
<tr>
<td>Acid test</td>
<td>Cash / current liabilities</td>
</tr>
</tbody>
</table>

Table 4.2: (Key) performance indicators derived from the annual report, based on Carton & Hofer, (2006) and Klaassen (1994)

Although there is thus no such thing as a list of common KPI’s that should apply for all organizations, especially concerning non-financial KPI’s, Parmenter (2007) provides a performance measures database involving non-financial performance measures from a customer satisfaction, employee satisfaction, environment, internal process and learning and growth perspective. However, it must be noted that this list is intended for orientation purposes only and although this list is quite extensive, it is not complete. So although this database gives an insight in the possibilities, it especially illustrates the variety of possible KPI’s that match the characteristics of each individual organization.

Cable and Davis (2004) argue that a BPM framework, with the right KPI’s, should focus on alignment with an organizations strategy statement and provide a guideline for strategic CREM decision-making. Although several authors have shown the importance of strategic CREM and measuring performance, a list of (key) performance indicators is rarely given (Jensen et al., 2012). An extensive literature review amongst articles until 2009 within the field of CREM found three exceptions: the frameworks of Lindholm (2006) and de Vries (2008) that have been discussed above and the work of Varcoe (2002). Later studies within the field of CREM that provide KPI’s are the frameworks of Den Heijer (2011) and Riratanaphong (2014), also discussed above. Within the field of FM, Lavy (2014) performed an extensive literature review to identify facility related KPI’s and provide a list of performance metrics, subdivided into four categories: financial, physical, functional and survey-based. Moreover, Lavy (2014) states that there is need for quantifiable and easy to measure KPI’s. The provided KPI’s from the literature mentioned above are analyzed (see appendix 3) by comparing the provided lists of KPI’s to generate a new list of CREM related KPI covering the findings of all previous mentioned authors, which is presented in table 4.3. Moreover, the analysis provides a classification of the CRE KPI’s according to Neely (2005). The list as presented includes both financial and non-financial, both lagging and leading, both short-term and long-term and both internal and external performance indicators.
<table>
<thead>
<tr>
<th>Real estate strategy</th>
<th>Key performance indicator</th>
<th>Financial</th>
<th>Non-financial</th>
<th>Lagging</th>
<th>Leading</th>
<th>Short-term</th>
<th>Long-term</th>
<th>Internal</th>
<th>External</th>
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<td>x</td>
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<td>x</td>
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<td>Real estate return on investment</td>
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<td>x</td>
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<td>Real estate return on equity</td>
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<td>Sales or revenue per square meter</td>
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<td>Space (meters) per unit (euro) of revenue</td>
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<td>Book value</td>
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<td>Market capital value vs. book value</td>
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<td>Cost of acquisitions vs. returns/IRR</td>
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<td>Ownership cost comparisons</td>
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<td>Cost of disposal of property vs. savings</td>
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</tr>
<tr>
<td>Supporting flexibility</td>
<td>Percent leased space relative to total space</td>
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<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td>Length of lease terms</td>
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<td>x</td>
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<td>Use of virtual and flexible workspaces</td>
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<td>x</td>
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<tr>
<td>Managing risks</td>
<td>Status of risk management activity</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Promote marketing</td>
<td>Distance to required transportation</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>and sales</td>
<td>Distance to customers</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of company logos and colors</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Image rating based on building attributes</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Energy consumption</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of energy audits</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Environmental sustainability of buildings</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase employee satisfaction</td>
<td>Location success factors</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Survey rating with work environment</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quality of indoor environment</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Workspace</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provision of amenities</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quality of CREM services</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ratio of office space to common areas</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Amount of space modifications</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contribution to societal priorities</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Facility appropriateness ratio</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase innovations</td>
<td>Number of teamwork settings</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of workstations per employee</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase collaboration</td>
<td>Number of teamwork settings</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of workstations per employee</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase productivity</td>
<td>Perceived productivity</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Location success factors</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time wasted with interruption</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percentage shared services</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loss of business due to real estate service</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Real estate spending</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CRE unit quality</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absentee rates</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Support culture | None |


Although this list provides an overview of KPI themes specific for strategic CREM use, many authors argue that the appropriate performance measures and KPI's differ for each organization (Den Heijer, 2011; Jensen et al., 2012; and Riratanaphong, 2014). Therefore, each organization should select and prioritize its performance measures and KPI's according to their strategy statement, capturing both organizational and CRE strategies.

### 4.6. Towards a theoretical corporate real estate sustainability performance management framework

Within the context of strategic CREM, several theories and theoretical frameworks are introduced within this chapter and compared with strategy, strategic CREM and performance management theories. Based on the characteristics a BPM framework should meet, the works of Den Heijer (2011) and Riratanaphong (2014) came forward.

Figure 4.6 illustrates the conceptual framework concerning CRE performance management that is drafted based on the previously presented theories, several comparative analyses and inductive reasoning.
Figure 4.6: Conceptual framework of CRE sustainability performance management

The proposed framework shows the relation between the different aspects of CRE performance management based on the work of Kaplan and Norton (2006) and the internal relation between the performance of CRE strategies and organizational performance. The framework is a rotated adaption of the performance measurement framework of Riratanaphong (2014) to engage more with the work of Kaplan and Norton (1996). Within the processes box, a distinction is made between portfolio, asset and property management to involve all strategy levels of CREM as discussed in paragraph 2.3. However, the main adaption took place within the outcome box. Within the existing framework, it is unclear how performance is measured and the outcome is determined. To connect with CRE sustainability theory as discussed in chapter 3, the output box relates to the operational real estate decisions, which are assumed to affect real estate sustainability performance. Real estate sustainability performance is included in the outcome box, which is assumed to affect real estate performance. The CRE strategies are used for the various areas of real estate performance. The framework of Den Heijer (2011) is used as the basis of the connection between organizational performance and CRE performance. Analysis of studies on classifications of KPI’s results in the connection between the three compound variables of
performance based on Tangen (2005), the various performance categories presented by Kaplan and Norton (2006) and the CRE strategies as summarized in table 4.4. This table provides guidance to connect the various areas of real estate performance with organizational performance.

<table>
<thead>
<tr>
<th>Performance</th>
<th>Category</th>
<th>CRE strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profitability</td>
<td>Financial</td>
<td>Reduce cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increase value of assets</td>
</tr>
<tr>
<td>Internal business processes</td>
<td>Increase financial flexibility</td>
<td>Controlling risk</td>
</tr>
<tr>
<td>Competitive advantage</td>
<td>Support culture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Promote marketing and sales</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Support sustainability</td>
<td></td>
</tr>
<tr>
<td>Productivity</td>
<td>Increase innovation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increase collaboration</td>
<td></td>
</tr>
<tr>
<td>Customer</td>
<td>Increase employee satisfaction</td>
<td></td>
</tr>
<tr>
<td>Learning and growth</td>
<td>Increase productivity</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.4: Relation between classifications of KPI's

The relation between organizational performance and CRE performance forms the input of the performance variables in the conceptual framework. By illustrating the mutual relation between the CRE strategies and in which manner they are related to the compound variables of corporate performance as discussed in figure 3.1, more insight is given into how CREM affects corporate performance making this framework both descriptive and predictive.

The proposed framework places CREM in its corporate environment as defined in chapter 2. The CRE strategy is derived from the internal and external corporate environment of interaction as discussed in paragraph 2.4 and sets the CREM targets, which forms the main input for the CREM organization. Together with the other sources of competitive advantage, the CREM organization processes the input on all strategy levels of CREM to generate a certain output. Analyses of the difference between actual outcome compared to the CREM targets as defined in the CRE strategy statement determine performance. The real estate strategies are used as guidance for the various areas of real estate performance and to determine which performance indicators are relevant. Nevertheless, each organization should select and prioritize its performance measures according to their strategy statement, capturing both organizational and CRE strategies. Adding both organizational and real estate performance indicators to the specific areas of performance makes the model quantitative. By doing so, information regarding the outcome can be communicated to all relevant stakeholders. Providing a double loop feedback that communicates between stakeholders, corporate management and the CREM department that takes both the internal and external corporate environment into account and generates a controlling system and continuous input for both corporate and CRE strategy. However, although this framework includes all relevant requirements that a BPM framework should meet, the actual relation between output and performance and the relation between real estate sustainability performance and real estate performance are lacking. Hence, it is still unclear how to actually influence real estate performance and organizational performance with operational real estate sustainability decisions.

### 4.7 Conclusion

According to the available theory, an answer on sub-question II "How can the performance of corporate real estate be managed to optimally align corporate real estate decisions to the overall corporate strategy?“ will be provided in this paragraph.
Performance management can be seen as a compound variable including competitive advantage, profitability and productivity and is a process of control and adjustment, involving measurement and analysis of performance and response to the outcomes. This results in five different categories of action in which business performance management can be subdivided: measure performance, strategy management, learning and improvement, communication and influence behavior. Moreover, several business performance management frameworks are discussed, each with its advantages and shortcoming, resulting in five characteristics that a business performance management framework should meet. First, a business performance management framework involves all relevant aspects of the organization, including both financial and non-financial measures. Second, a business performance management framework should be multidimensional. Third, a business performance management framework represents organizational performance concisely and straightforward. Fourth, a business performance management framework involves all levels of strategy and the various functions of the organization. Fifth, performance is a consequence of its drivers and should measure therefore both the results (organization) and their drivers (corporate real estate management).

Within the context of corporate real estate management, several theories and theoretical frameworks are introduced within this chapter and compared with strategy, strategic corporate real estate management and performance management theories to develop a new conceptual framework that involves all relevant aspects of corporate real estate performance management. Moreover, the most significant aspects of corporate real estate sustainability management are included in the framework. This framework derives its input from the strategy statement, wherein the real estate strategy is aligned with the corporate strategy. Subsequently, the real estate targets are set in consultation with the all individual corporate resource, which forms the input. The input is then processes on all strategy levels of corporate real estate management to generate a certain output. Output is determined as the products and services offered by the corporate real estate management department, which are the operational real estate sustainability decisions in this specific case. This results in the actual outcome, consisting of real estate sustainability performance, real estate performance and organizational performance. Analyzing the difference between actual outcome compared to the targets as defined in the strategy statement determines performance. However, the framework is still a qualitative management framework, although the various performance indicators as presented in paragraph 4.5 can be used to make the framework quantitative and to communicate the outcome to all relevant stakeholders. Feedback on the actual performance and consultation between stakeholders, corporate management and the corporate real estate management department that takes both the internal and external corporate environment into account generates a controlling system and continuous input for adjusting both corporate and corporate real estate strategy when needed.

In relation to the five characteristics that a business performance framework should meet, the proposed framework meets all five characteristics to a large extent. First, by considering both exchange value and use value strategies, it contains both financial and non-financial measures. In addition, it contains internal and external measures by taking both corporate and real estate strategy into account. Second, the framework involves input from all corporate resources, making it multidimensional. Third, the framework represents real estate performance fairly simple and is open for interpretation and adjustment based on the specific characteristics of each organization. Fourth, it integrates the various levels of strategy and various functions. Fifth, it takes also the drivers into account by involving both corporate and real estate strategy. Hence, it enables the possibility to compare input, actual outcome and desired outcome with each other.

The proposed framework can thus be used as the basis for making deliberate real estate (sustainability) decisions. It provides insight in all relevant aspects of corporate real estate performance management. Moreover, it gives insight in how corporate real estate performance affects organizational performance. The outcomes on both organizational performance and corporate real estate performance provide input feedback and consultation between stakeholders, corporate management and the corporate real estate management department to
make rational and deliberate strategic corporate real estate decisions. However, it does not provide insight in the relation between actual output and performance and the relation between real estate sustainability performance and other areas of real estate performance. Therefore, it is still unclear how to actually influence real estate performance on the operational level. The next chapter discusses how various stakeholders are involved in decision-making and which methods are available to make those decisions deliberately.
5. Strategic decision-making

"Most of us are going through life without interrogating whether our decision-making processes are fit for purpose. And that’s something we need to change - especially when the stakes are high and the decisions are of real importance."

— Noreena Hertz

This chapter introduces strategic decision-making and discusses existing decisions frameworks in the field of CREM. It also discusses how mental representations of decision problems work and how these can be used to create a means-end-chain that represents the tacit knowledge of CRE managers. Sub-question III; “How can a strategic corporate real estate decision be made and which methodology can be used to gain more insight into the decision-making process and added value of corporate real estate management on organizational performance?” will be answered in this chapter. The first paragraph provides an introduction and clarification of strategic decision-making (§5.1). The subsequent paragraphs explore CRE decision-making, (§5.2), discusses the underlying framework to provide insight in causal relation within decision problems (§5.3) and how this framework can be used within a semi-structured interview. The last paragraph will answer sub-question III (§5.4).
5.1. Strategic decision-making

According to Eisenhardt and Zbaracki (1992), strategic decision-making involves fundamental decisions that set the direction of the firm. Strategic decision-making can be defined as:

"An important decision in terms of the actions taken, the resources committed, or the precedents set" (Mintzberg, Raisinghani & Theoret, 1976, p. 246).

Thus, strategic decisions are decisions that are taken infrequent by the corporate management and that have a significant effect on the future direction of the firm and its competitive advantage. Organizations are mostly quite capable of making decisions regarding activities that occur on a regular basis because choices can be made based on intuition and experience (Arentze, Dellaert & Timmermans, 2008). However, when situations arise that require important decisions that affect the organization’s future direction and competitive advantage, decisions should be made based on an active analysis of the problem exploration and evaluation of possible outcomes.

In order to make the best strategic decisions, the decision maker is “rational and makes consistent, value-maximizing choices within specific constraints” (Robbins, Judge & Campbell, 2010, p. 513). The rational decision-making model describes how managers can maximize the outcome of a strategic decision and identifies six steps to make rational strategic decisions (Harrison, 1999; in Robbins et al., 2010):

I. Define the problem;
II. Identify the decision criteria;
III. Allocate weights to the criteria;
IV. Develop alternatives;
V. Evaluate alternatives;
VI. Select the best alternative.

The strategic decision-making model is based on the three important assumptions concerning the decision-maker. First, the decision maker has complete information. Second, the decision-maker is able to process the information in an unbiased manner. Third, the decision-maker chooses the option with the highest utility. However, Russo, Carlson and Meloy (2006) states that in reality few decision-makers are able to act conform these assumptions and make decisions by judgment instead by a defined prescriptive framework, resulting in suboptimal decisions.

According to Taticchi (2010), the potential for making rational strategic decisions is influenced by the cognitive limitations of the decision-maker. This results in a limited capability of processing the information that is involved with a complex problem. Therefore, decision-makers reduces the problem to a level at which they are able to understand the problem. This limitation of processing complex problems with full rationality and producing simplified models that captures only the essential features from problems without all their complexity is known as the bounded rationality of human decision-making process (Robbins et al., 2010). Based on bounded rationality, decision-makers identify a problem and think of possible criteria and alternatives. However, the selected possible criteria and alternatives are far from complete and both easy to find and highly visible. Evaluation of the alternatives based on these criteria is then not comprehensive, because of a focus on alternatives that only differ to a small degree of the current situation. As a result, the decision made is mostly the first alternative encountered that meets the acceptable level of performance and therefor acceptable rather than optimal.

The least rational method of decision-making is making decisions based on intuition. Intuitive decision-making is an unconscious decision-making process based on distilled experience (Robbins et al., 2010). However, intuitive decision-making occurs outside conscious thoughts and relies on holistic associations and is therefore a fast and affectively charged decision based on emotions. But although this method is not rational, it can complement the rational analysis, although it must be noted that the context and decision maker its expertise highly influences the
efficacy of intuitive decision-making (Hodgkinson & Gerard, 2008). Lacking appropriate skills might result in errors in judging the decision-problem (Kahneman & Tversky, 1982, in Steptoe-Warren et al., 2011). So rational analysis may be useful for smaller, less important decisions, a strategic decision should always involve rational analysis of the decision-problem.

5.2. CRE decision-making

As discussed in the previous chapters, organizations can improve their competitive advantage by aligning the CRE strategy with the overall corporate strategy. Being able to understand and control the CRE decision-making process may therefore positively affect organizational success. Grabowski and Mathiassen (2013) argue that a bounded rational perspective can be helpful to make proper real estate decisions, whereby the aligned CRE strategies as discussed in chapter 2 reflect the corporate strategy statement and act as guidelines for the decision-making process. In addition, the decision making process provides criteria for e.g. location, duration, quality, size, design, signage, systems, amenities, financing, risk and control based on the CRE strategies. Contrary to what one may think, real estate decisions are still often made without proper alignment and based on intuition. Nunnington and Haynes (2011) argue that, especially in smaller organizations, detailed evaluation is not always reached, due to a lack of recourses to make rational decisions.

Arkesteijn and Binnenkamp (2012) developed a preference based portfolio design (PBPD) framework that allows real estate decision-makers to iteratively enter criteria and allocate weights in order to evaluate possible portfolios. Selection of the intervention that satisfies all set goals can be seen as a multi-criteria decision. The PBPD is based on the multi-criteria decision analysis (MCDA) methodology, which ”enable the aggregation of the performance rating of alternatives on different criteria into an overall performance rating” (Arkesteijn & Binnenkamp, 2012). Based on the view that the criteria are features that measure the performance of a building or portfolio on the goals set in the strategy statement, a MCDA approach can be used as a tool to select the best interventions in order to align the corporation’s real estate with the organizational strategy, as is illustrated in table 5.1.

<table>
<thead>
<tr>
<th>Alternatives</th>
<th>Stakeholder 1</th>
<th>Stakeholder 2</th>
<th>Stakeholder 3</th>
<th>Total weight (Score x weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C1</td>
<td>C2</td>
<td>C3</td>
<td>C4</td>
</tr>
<tr>
<td>Weight</td>
<td>P1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>P3</td>
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<td>P4</td>
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<td></td>
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<tr>
<td>P5</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Table 5.1: Preference based portfolio design (Arkesteijn & Binnenkamp, 2012)**

Arkesteijn and Binnenkamp (2012) argue that a real estate (portfolio) decision is in general more complicated than a decision that is usually addressed with the MCDA approach. Therefore, they made a few adjustments to the MCDA approach. In summary, the PBPD framework consists of six steps that are highly related to the steps taken in the MCDA approach, although the underlying mathematical approach is slightly different:

I. Specifying the decision criteria;
II. Determine the decision-maker’s preferences for each decision variable;
III. Assigning decision-maker’s weight to each decision variable;
IV. Determining the design constraints;
V. Generating all design alternatives;
VI. Using the PFM algorithm to yield an overall preference scale.
Nourse and Roulac (1993) identify fourteen critical distinct real estate operating decisions. These operational decisions are location, quantity, tenancy duration, identity/signage, building size/character, building amenities, exterior quality, company space, mechanical systems, information/communications systems, ownership rights, financing, control and risk management. An overview and definition of the operational real estate decisions can be found in box 2.

However, Nourse and Roulac (1993) argue that there is a "plethora of different alternatives that might be considered" when taking these real estate operating decisions into account. In addition, many authors (e.g. Nourse and Roulac, 2003; and Lindholm, Giber and Levänen, 2006) state that these operational real estate decisions should be aligned with the other supporting functions as discussed in §3.2. However, it must be noted that every organization has its own specific characteristics with a corresponding organizational structure (Acoba & Foster, 2003). Thus, every organization has its own specific decision-making process, which is influenced by the type of organization, its size, corporate structure and culture (Greenhalgh, 2008). So although the

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**Box 2: Real estate operating decisions**

| I. Location: | Broad regional location strategies including country, region, city and building. |
| II. Quantity: | Amount of space needed considering current needs as well as future needs. |
| III. Tenancy duration: | Minimum and maximum duration of usage, controlled by lease lengths, options to extend and/or buy or direct ownership. |
| IV. Identity/signage: | Usage of the building for the corporate identity by sending an advertising message through signage on the building, lobby, entrance and perception of space. |
| V. Building size/character: | The ambiance of the work environment and real estate strategy consequences are influenced by being the dominant tenant, one of many in a multitenant building or being a minor tenant amongst other organizations. |
| VI. Building amenities: | Availability of amenities in the area such as leisure, stores and public space and available within the building such as stores and restaurants influences the perception and experience of the building users. |
| VII. Exterior quality: | The visual attractiveness and functionality of space is determined by the quality of landscape, building design and materials, public space and building systems. |
| VIII. Company space: | The interior space, layout, design, finishes, furnishings and art influence the ambiance and functionality of the work environment. |
| IX. Mechanical systems: | Heating, ventilation, air conditioning systems and transportation influences the quality and comfort of workspace. |
| X. Information/communication systems: | Building facilities that provide communication and processing information influences the functionality of space and organizational productivity. |
| XI. Ownership rights: | Operating and financial implications are influenced by which ownership rights are obtained through the transaction (short-term rental, long-term leases, options and full ownership). |
| XII. Financing: | Financial obligation agreements influences the financial position of the organization. |
| XIII. Control: | The degree of control over the property and what type of use influences property operation. |
| XIV. Risk management: | Liability to third parties for acts and accident at the property, responsibilities for employees working in the space, financial exposure to disaster and how these risks are insured. |

Source: Nourse & Roulac, 1993
provided list of Nourse and Roulac (1993) gives a quite extensive overview of various real estate operating decisions and is utilized by many authors (e.g. Den Heijer, 2011; Lindholm, Gibler & Levainen, 2008; and Riratanaphong, 2014), it is not necessarily exhaustive.

Concerning the implementation of a CRE sustainability strategy, the operational real estate decisions have a direct impact on the physical building characteristics as discussed in chapter 4. Therefore, these operational decisions determine the extent to which real estate can achieve a certain level of sustainability. In addition, they affect some of the non-physical building characteristics such as site and location, construction processes, sustainable facility management and ease of use. Therefore, the operational decisions have an impact on the actual real estate sustainability performance during operation as well. This supposed relation between the real estate operational decisions and real estate sustainability performance illustrates the more that sustainability goals and targets must be aligned on all levels of strategy in order to actually add value to the organizations as planned.

5.3. Mapping strategic decisions

A widely used qualitative research technology to uncover the drivers of decision-making is laddering (Reynolds & Philips, 2015). The theoretical foundation is based on the means-end theory, the belief that decisions are based on a specific desired end-state or outcome. For example, the desired end-state within this thesis is to assess a certain level of sustainability. Although this theory finds its origin within marketing based on consumers, it can also be applied to corporations. Within the original theory, it is assumed that “individual behavior is driven by personal values, defined as the desired end-states of existence that individuals strive for in their lives”. Based on the theory in previous chapters, this can be translated into the hypothesis that corporate behavior is driven by its corporate values, defined as the goals and desired future state as incorporated within the strategy statement.

Laddering and means-end research is primary used to gain more insight into qualitative associations and why certain attributes and benefits are considered important. By obtaining why something is important, laddering create a top-down causal network in which the importance of the higher levels is derived from the lower levels, known as a means-end chain (MEC). By obtaining MECs for a sample population (in this case the decision-makers for implementing a CRE strategy) it is possible to construct a lexicon of meanings and the causal connection that explains the assumed importance of the lower levels by the decision-maker. Combining and summarizing these meanings and connections provides additional insight within the underlying perceptual motivators of the CRE decision-making process. Thus, laddering and means-end research allows one to summarize meanings and connections of various respondents, yielding a graphical representation of decision-making processes or a hierarchical value map (HVM).

Although there are a variety of specific laddering methods, this research will use the method as presented by Arentze, Dellaert & Timmermans (2008) as the underlying theory for mapping the decision-making process. This method is fit for purpose because it specifically aims on the context in which decisions are made. Moreover, this proposed method has a higher degree of quantification than basic laddering methods, which makes it possible to connect KPI’s to the attributes and benefits.

The proposed method of Arentze et al. (2008) is based on the principle that individuals need a mental representation (MR) of a decision, including the variables judged for evaluation and a model to assess the outcome of actions, to make rational strategic decisions and to find possible outcomes. This MR can be represented as a type of cognitive map, where the concept of a person’s notions of available action alternatives, causes and effects, and utilities of action outcomes are linked in a graph representation using causal relationships. This method involves the six steps of the rational decision-making framework and provides a quantitative method of analyzing possible outcomes of strategic decision issues. Figure 4.1 schematically represents the components of a MR of a decision problem.
Figure 5.1: Components of a mental representation of a decision problem (Arentze, Dellaert & Timmermans, 2008)

The alternative action possibilities are the decisions alternatives that refer to the alternative actions that a person can choose. The situation represents states of the system that a person cannot change, but that still have effect on possible outcomes of action. The causal network represents the knowledge in which a person is able to assess likely outcomes of actions in a situational setting at a specific moment. Individual needs refer to a person’s basic needs that are relatively stable across situations, such as goal attainment, safety, social acceptance and effort. The utility weights indicate the relative importance of dimensions to which outcomes are evaluated within a possible state of the system in a situational setting at a specific moment. However, a specific MR conceptualization is drafted according to the task and situational setting at that specific moment.

This MR of a decision problem shows that variables of a system can be given and available for choice, which is determined by the task and situational variables. Moreover, they determine which needs are activated in a specific situation and what weight is given to which needs, and what the consequences from the alternative actions might be. Thus, when the task and situation differ, a different selection of variables and links will be triggered. This makes the MR of a decision model a dynamic model that differs in each situational setting at a specific moment.

A MR of a decision problem can be represented as a decision network (DN); it consists of decision alternatives, a causal network that requires causal knowledge and value judgments by assigning utility weights to specific needs. The DN represents “the decision variables and preferences of a decision maker in the same network structure, and is an extension of the Bayesian network (BN)”. The BN is a causal network that includes a mechanism for making inferences and consists of two components. The first component is the directed acyclic graph (DAG), the MECs in original laddering theory, which exists of nodes that represent stochastic variables and directed arcs that represent dependencies between variables. The second part is a conditional probability distribution that specifies the dependency relationships for each node that is captured with the DAG (Pearl, 1998; in Arentze, Dellaert & Timmermans, 2008). Schachter (1986; in Arentze, Dellaert & Timmermans, 2008) states that the DN is an extension of the BN, where the nodes represent options of a decision maker and the utilities values associated with the outcomes.

To describe the causal network, a distinction is made between situational, decision and outcome variables. The decision variables represent the decision alternatives a person can choose in a specific situation. Situational variables represent the situation and are not directly influenced by the decision alternatives. The outcome variables are the consequences of the decision made on relevant dimensions. According to Gutman (1982; in Arentze, Dellaert & Timmermans, 2008) distinction is made between attribute and benefit variables within the outcome variables. Attribute variables represent the states of the system that are directly observable. Benefit variables represent outcomes on a more abstract level, closer to need dimensions. However, in
reality most outcome variables can be scaled somewhere between these two levels, so a dichotomous distinction is not always realistic.

When implementing a sustainable real estate strategy, for example, the CRE manager might have to decide what mechanical systems are used within the property, making the type of mechanical system a decision-variable. When the real estate in-use is renovated to make it more sustainable, the location is already set. However, although not influenced by the CRE manager, the location has a significant influence on assessing sustainability (e.g. public transport accessibility or the proximity to amenities). Thus, it is a situational variable in the case of renovation. The actual choice of the types of mechanical systems might be important because of corresponding energy and water use, but also because of the health and wellbeing of employees, which makes energy use, water use and/or health and wellbeing possible attribute variables of the decision-variable mechanical systems. Benefits regarding health and wellbeing might be e.g. increase employee satisfaction, increase productivity and/or promote marketing and sales, which can be classified as benefit variables. The ultimate utility in this case is increasing sustainability in its broadest sense, although more utilities are possible.

So According to Arentze et al. (2008; 2015), a MR of a decision problem consist of decision, situational, attributes and benefits variables and the causal relation between them which forms the causal network of the MR that are presented in figure 5.2.

Figure 5.2: Classification of decision problem variables and directions of causal relationships (Arentze et al., 2008)
Situational and attribute variables have a more operational nature and are physical observable states of the choice alternatives, and therefore measurable. Situational variables can be seen as the context and can therefore not be influenced, although change of these variables will affect the outcome. Attribute variables are of a more instrumental nature, being used to affect the outcome in the choice.

This classification means that both decision and situational variables cannot have an incoming link within the causal relation between the variables. This results in a causal relation between decision and attribute variables, but not between decision and situation variables. Moreover, there is also no link from benefit to attribute variables, because the benefit variable is the logical consequence of attributes. Because an MR illustrates a specific situation, the situational variables should only be included when their states are uncertain and the decision-maker wishes to involve the possible outcomes of these variables before making the decision.

In addition, conditional probabilities and weights provide the essential knowledge that is needed to use the DN for reasoning and to evaluate possible courses of action. The extent of uncertainty of inferences determines the uncertainty of the outcome of possible courses of actions. The expected outcome, or utility, for each benefit variable is the weighted sum of utilities across outcomes, whereby the probabilities are the weights. The overall outcome of an action is the sum of each expected utility across each benefit variable.

So a MR of a (strategic) decision problem can be seen as a reduced representation of the decision problem and thus a bounded rationality approach. However, when integrated within the six steps of the rational decision-making framework, it can be a useful tool to determine how certain decisions influence possible outcomes and provide a quantitative method to measure the possible outcomes of those decisions. The MR can be drafted and measured by determination of the causal network \(G_i\), probability parameters \(P_i\) and utility parameters \(U_i\). According to Arentze et al. (2008), the required information can be acquired following the causal network elicitation technique (CNET) in a semi-structured face-to-face interview.

### 5.4. Conclusion

The answer sub-question III "How can a strategic corporate real estate decision be made and which methodology can be used to gain more insight into the decision-making process and added value of corporate real estate management on organizational performance?" can be given in this paragraph.

A strategic decision is a fundamental decision with an outcome that has a significant effect on an organization. Although decisions can also be made based on intuition, strategic decision should be made based on thorough analysis and evaluation of the decision problem and possible outcomes. The rational decision-making model identifies and describes six steps that should be followed to make rational, deliberate decisions. However, due to cognitive limitations, decision-makers tend to reduce the decision-problem to a simplified model that captures the essential features without all their complexity, known as a bounded rational perspective. Within the corporate real estate decision-making process, this bounded rational perspective is needed to make deliberate real estate decisions. The corporate real estate strategy, aligned with the corporate strategy statement, act as guidelines for the decision-making process and provide criteria upon which decisions are made.

Concerning the implementation of a corporate real estate sustainability strategy, the operational real estate decisions have a direct impact on the physical building characteristics as discussed in chapter 4. Therefore, these operational decisions determine the extent to which real estate can achieve a certain level of sustainability. In addition, they affect some of the non-physical building characteristics such as site and location, construction processes, sustainable facility management and ease of use. Therefore, the operational decisions have an impact on the actual real estate sustainability performance during operation as well. This supposed relation between the real estate operational decisions and real estate sustainability performance illustrates even more that
sustainability goals and targets must be aligned on all levels of strategy in order to actually add value to the organizations as planned.

Fourteen critical distinct real estate operating decisions are distinguished, which are location, quantity, tenancy duration, identity/signage, building size/character, building amenities, exterior quality, company space, mechanical systems, communications systems, ownership rights, financing, control and risk management. All of these decisions are assumed to have a direct or indirect impact on the extent to which corporate real estate sustainability can be achieved and the actual corporate real estate sustainability performance. Based on the strategy statement and alignment with other supporting functions, the operating decisions provide a variety of alternatives that should be considered when making real estate (sustainability) decisions. Well-known decision-making frameworks within the real estate sector that are based on bounded rationality are the preference based portfolio design and multi-criteria decision analysis frameworks, although due to the specific characteristics each organization has its own decision-making process.

To gain more insight into the CREM decision-making process, the laddering methodology can be used to uncover the drivers of decision-making. This technique is based on means-end theory, the belief that decisions are based on a specific desired outcome. Based on this means-end theory can be concluded that corporate behavior (and thus decisions) is driven by its corporate values, defined as the goals and desired future state as incorporated within the strategy statement. Laddering creates a hierarchical value map that graphically represents the causal network that reveals the underlying meanings and explanatory connections of the decision-making process. Although there are a variety of specific laddering methods, this research will use the method as presented by Arentze, Dellaert & Timmermans (2008) as the underlying theory for mapping the decision-making process. This method is fit for purpose because it specifically aims at the context in which decisions are made. Moreover, this proposed method has a higher degree of quantification than basic laddering methods, which makes it possible to connect performance indicators to the attributes and benefits. How this theory is used within this research will be discussed in the next chapter.
6. Research plan

“An expert is one who knows more and more about less and less.”

― Nicholas M. Butler

Previous chapters have discussed existing theory concerning CRE strategy, performance measurement, real estate sustainability and strategic decision-making. This chapter discusses how the findings of the theoretic framework can be used to gather new insights into the CRE decision-making process and how to capture tacit knowledge concerning the relation between real estate sustainability decisions, real estate performance and organizational performance. The first paragraph summarizes the theoretical framework by providing the current states of affairs (§6.1). The subsequent paragraphs capture the research design (§6.1) discus and explain the used methodology (§6.3), discus the necessary steps to collect the required data (§6.4) and examine the validity of the proposed research plan (§6.5). The last paragraph (§6.6) concludes this chapter.
6.1. Current state of affairs regarding the theoretical framework

The previous chapters discussed the relevant theory concerning the research objective as discussed in chapter 1 and form the input for the actual research design. In chapter 2, the topics strategy and CREM were part of the literature review and combined into strategic CREM. Strategic CREM can add value to an organization by being subject to the corporate strategy statement. This means that CREM must be strategically aligned with the long-term goals and objectives of the organization on all organizational levels by deriving the CREM targets from the strategy statement its mission and objectives. By doing so, a CRE strategy can be drafted that is fully aligned with the corporate strategy statement and therefore provide optimal added value to an organization. Chapter 3 discussed the most relevant topics in relation to sustainability. Although both academics and professionals in the field of CREM recognize the importance of sustainable real estate, implementing a sustainability real estate strategy is a relatively young and developing strategy. Several academic attributions are made within this field that argues increasing sustainability within the real estate portfolio might affect various other real estate strategies such as, example given, cost reduction, employee satisfaction or employee productivity. However, how the specific areas of CRE sustainability as discussed in chapter 3 might affect the various areas of real estate performance and organizational performance is still unclear. Chapter 4 discussed performance management and connected it with strategic CREM and CRESM. The relation is mapped into a strategic CRE performance management framework that contains the basic requirements to manage real estate performance and is used as an input for the research design. By doing so, the theoretical relation between the CRE strategies, which can been seen as real estate performance areas, and organizational performance is established. Thus, based on the literature review, it seems that alignment of the CRE strategy with the organizational strategy and gaining insight in the actual performance can add value to the organization and affect organizational performance. Within this specific context, it might be that adding a sustainability strategy acts as a catalyst that improves the performance of the current operational strategy. However, the actual relation between real estate sustainability decisions and performance is still unclear.

6.2. Research design

As discussed in the previous paragraph, the aim of this study is to gain more insight into the consequences of real estate sustainability decisions on real estate sustainability performance and how it affects CRE performance and organizational performance. The research units within this research are large national or multinational corporations with a mature CREM organization who have recently undertaken a CRE sustainability decision with an impact on the corporate workplace environment. However, creating a sustainable industrial real estate environment cannot be compared to creating a sustainable office real estate environment (Rutherford & Stone, 1989). Creating a sustainable industrial real estate environment is also influenced by highly technical work processes, which are outside the scope of the CRE manager. Therefore, the scope of the research is limited to office workplaces.

So first of all, the participating corporations should have incorporated an experienced CREM department. Second, the CREM department involved in taking sustainable CRE decisions that have taken place in the past five years or will take place in the future. Seven corporations will be selected to participate in the case studies with a variety of characteristics. To gain insight in the decision-making process in daily practice in relation to sustainability theory, both CRE managers connected to the selected organizations as real estate advisors will be interviewed to obtain in-depth information regarding operational decisions subject to sustainability goals and the expected impact on real estate performance and organizational performance. Three real estate advisors will be selected with several years of experience in both strategic and operational real estate sustainability advisory.

The aim of this research is to gain more information regarding operational real estate decisions and how these decisions might be subject to the sustainability goals of an organization. In order
to do so, an in-depth qualitative research with a relative small selection of experienced CRE managers is more suitable then a more superficial quantitative research design.

6.3. Methodology

The selected methodology for this study is qualitative research with an exploratory and descriptive character. Qualitative research is most suitable because the aim of this research is to gain more insight in strategic CREM performance and explore coherence between real estate sustainability performance, CRE performance and organizational performance. Baarda, de Goede & Teunissen (2005) identify three methods for data collection in qualitative research: use of existing information, conduct interviews and observation. Existing information is used to obtain relevant information about the selected corporations, their CREM departments and implementation of a sustainable CREM strategy. Interviews are held to obtain in-depth information concerning the sustainable CREM strategy decision-problem. Therefore, semi-structured interviews are held with CRE managers and real estate advisors that are involved in real estate sustainability decisions. The selected semi-structured interview protocol is the causal net elicitation technique (CNET) in a semi-structured face-to-face interview, based on the work of Arentze et al. (2008). This method is described in detail in chapter 4. Within the face-to-face interview, the participant is presented with a CRE decision problem. The CRE decision problem used in this research is to implement a sustainability strategy that supports the overall organizational sustainability strategy. By conducting a semi-structured interview it is possible to reconstruct the MR of the participant that is presented with the CRE decision problem and capture this in a means-end-chain, although the protocol has been modified to fully and appropriately map how a specific decision is made retrospectively.

In order to determine the participant’s attribute, benefit and situational variables, the interviewer uses a predefined list of those variables. Within the proposed interview protocol this list does not necessarily have to be exhaustive and can be complemented during the interview (Arentze et al., 2008). However, the aim of this interview is primarily to retrospectively identify how certain choices related to implementing a sustainable CRE strategy are made. Therefore, a closed format will be applied and presented to the interviewee to reduce risk of suggestion and to be sure that all considerations are mapped adequately. The input of the closed format is based in the theoretical framework and will be discussed in paragraph 6.3.

Decision variables are presented to the participant as if they are given in a task description. However, within the specific context of this research, it might be that specific decisions are determined outside the scope of the CRE manager, resulting in an uncertainty regarding the nature of decision and situational variables. When decision variables are determined outside the scope of the CRE manager, they become eventually situational variables. To clarify the nature of these variables before determining the causal network, an additional step is added to the interview protocol. The priority of the decisions may differ per participant, which have to come forward in the interview. Only the decisions that were actually subject to the organizational sustainability goals are included subsequent steps.

Another apparent modification to the interview protocol is the omission of probability parameters. The aim of this research is to design a management framework and to record the tacit knowledge of CRE managers. However, development of a theoretical framework consists of two steps. The first step is to determine the structure of the framework, which has a more qualitative nature. Only when the structure is determined, the quantitative parameters can be linked to the model. As discussed in the theoretical framework, it seems that the required causal relations for this research are yet to be determined. Hence, mapping probability parameters in this stage of research goes beyond the aim of this research.

The last modification concerns the utility parameters. The scope of this thesis is to determine how a sustainable CREM strategy is implemented, which operational decisions have been subject to sustainability goals and how to quantify the outcome of this specific decision. This can be achieved
by linking specific performance indicators to the attribute and benefit variables. So instead of asking for certain preferences in outcome of utility parameters, the interviewees are asked if and how they measure certain outcomes on the variables. If certain variables are not measured, the participants will be asked how they think they can measure the outcomes on those variables for future benchmarking. The proposed interview protocol contains five steps:

I. Gathering general information concerning the CREM department. Some questions regarding e.g. maturity and activities done by the CREM department are presented to the CRE manager to retrieve general information of the CREM department.

II. Determine the nature of the proposed operating decision variables. The as given real estate operating decisions are presented to the participants, who have to label these variables as a decision variable, determined by the CRE manager, or as a situational variable.

III. Determine preferred decisions subject to sustainability goals. The as given decisions variables are presented to the participants, who have to select the decision variables that are considered important and were subject to sustainability goals.

IV. Determine the causal network. An overview of the CNET protocol as used in the semi-structured interviews and the corresponding questions for each relation is given in figure 6.1. The causal network is determined by answering four questions:
   a. *In what way did the corporate real estate management department wanted to support the sustainability goals of your organization with their corporate real estate?*
   b. *Why was decision variable X important for the corporate real estate department to support the sustainability goals of their organization with their real estate?*
   c. *Why was real estate sustainability performance variable X important for the corporate real estate department to support the sustainability goals of their organization with their real estate?*
   d. *Why was real estate performance variable X important for the corporate real estate department to support the sustainability goals of their organization with their real estate?*

The first question is based on the list of decision variables in order to appoint the operational decisions that were used to support the organizational sustainability goals. When the decision variables are determined, the same kind of question is asked for each decision variables to determine why this decision variable was important in relation to the organizational sustainability goals. The corresponding answers are compared with the sustainability variables to determine the first relation. This step is repeated to determine relations between sustainability variables and real estate performance, and between real estate performance and organizational performance. However, the subject of the previous question will become the new parent variable, resulting in multiple attribute and benefit variables.

V. Determine the performance indicators. When the causal network is drafted, the participant has to indicate for each variable whether it is currently measured or not. When it is currently measured, the participant will be asked how it is measured. When it is not measured, the participant will be asked how it could be measured for future benchmarking.
6.4. **Data collection**

The previous paragraph discussed the main methodology used to collect data with the semi-structured interviews. Additional to the semi-structured interviews, the complete data collection method involves four steps to gather all data required, which are sampling, document reviews, the actual interviews and a cross-case analysis.

1. **Sampling**

Seven corporations are selected that have incorporated a sustainable CRE strategy by relocating the corporate headquarters to a newly build sustainable office, by sustainable redevelopment of the current headquarters with at least a BREEAM-NL good certification or some other form of implementing sustainability within the real estate portfolio with a significant impact. Moreover, the organizations that are selected have to be large national or multinational organizations with a mature CREM department. Potential organizations are selected based on the BREEAM-NL project map, key figures from the corresponding annual reports and by the internal network (BREEAM, 2016; and Company Info, 2016). Besides the experience from the selected organizations and corresponding managers as discussed above, three real estate advisors are selected to give their views and to analyze whether discrepancies can be found between the expert views of real estate advisors and the expert views of daily practice. All participating real estate advisors should have a broad experience in CRE advisory and in particular in real estate sustainability.
II. Document review

The case study starts with analyzing existing information in the form of a document review. The document review contains two parts to gain more information concerning the corporation and the sustainable CRE office. This first part gives more insight in the corporation by analyzing general documents such as company documents and annual reports. Analyzing these documents obtains more information regarding the company profile, company history, number of employees, revenues etc. The second part involves analysis of CRE department information that consists of general information regarding the CREM department such as the operating model, number of employees, maturity, alignment with corporate strategy and current CRE strategy.

III. Interviews

To obtain more insight into operational real estate decisions and the presumed cause-effect relations between both sustainability variables, real estate variables and organizational performance variables, semi-structured interviews are conducted. Moreover, a list of both real estate and sustainability performance indicators is presented to obtain insight in the CRE related benchmarking processes. To obtain maximum insight into these processes, both CRE managers as real estate advisors are interviewed.

In order to conduct the semi-structured interview following the CNET method as presented in paragraph 5.2, lists of decision variables, attribute variables, benefit variables, situational variables and utilities are needed as input to determine the causal network (Arentze et al., 2008). An overview of the decision variables situational variables, attribute variables, benefit variables and utilities that forms the theoretical input of the semi-structured interview can be found in the interview protocol, which is included in appendix 4.

As discussed previously, the real estate operating variables as discussed in paragraph 4.2 might be set by the corporate direction resulting in certain restrictions. The requirements and restrictions on some of these variables are usually set by the corporate management and highly influence the playing field in which the CRE manager can make operating decisions. So the situational variables can be seen as the statement of requirements from the corporate management. Therefore, the operating variables can be both decision and situational variables.

The first tier of attribute variables is derived from the list of sustainability categories as presented in paragraph 3.6. The sustainability categories represents the actual sustainability solutions a CRE manager can implement to support the sustainable strategy set by the corporate management. The corresponding credits form the second tier and represent the underlying importance of the sustainability categories. These sustainability implementations subsequently influence the performance of the CRE portfolio. Therefore, the third tier of attribute variables includes the CRE performance areas derived from the CRE strategies as discussed in paragraph 2.4. So each CRE strategy represents a specific area of CRE performance. Finally, the benefit variables represent organizational performance, which consists of productivity, profitability and competitive advantage as illustrated in paragraph 3.1. Table 6.1 presents the selected interviewees.

<table>
<thead>
<tr>
<th>#</th>
<th>Function</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CRE manager</td>
<td>ABN AMRO Bank</td>
</tr>
<tr>
<td>2</td>
<td>CRE manager</td>
<td>AkzoNobel</td>
</tr>
<tr>
<td>3</td>
<td>CRE manager</td>
<td>a.s.r. Nederland</td>
</tr>
<tr>
<td>4</td>
<td>CRE manager</td>
<td>Deloitte Nederland</td>
</tr>
<tr>
<td>5</td>
<td>CRE manager</td>
<td>EY Nederland</td>
</tr>
<tr>
<td>6</td>
<td>CRE manager</td>
<td>Shell International</td>
</tr>
<tr>
<td>7</td>
<td>CRE manager</td>
<td>UWV</td>
</tr>
<tr>
<td>8</td>
<td>Real estate consultant</td>
<td>Arcadis</td>
</tr>
<tr>
<td>9</td>
<td>Real estate consultant</td>
<td>Brink management</td>
</tr>
<tr>
<td>10</td>
<td>Real estate consultant</td>
<td>Deloitte Real estate</td>
</tr>
</tbody>
</table>

Table 6.1: List of interviewees
When the causal network is drafted, the CRE decision-makers are asked which KPI’s are used to measure performance and which KPI’s can be added based on the list of KPI’s presented in chapter 3, table 3.3.

IV. Cross-case analysis

The results of the semi-structured interviews are analyzed by means of a cross-case analysis. Comparing outcomes of the interviews with CRE decision-makers regarding the decision-making problem and cause-effect relations between the various types of variables might give new insights in how operational decisions are used to support organizational sustainability goals and how CRE affect overall organizational performance according to the CRE decision-makers within the organization and CRE advisors.

The interviews and cross-case analysis are analyzed for similarities and discrepancies and results are written down. Moreover, these results are translated into several means-end-chains that illustrate and describe the presumed relations between the variables that are included in the network.

6.5. Validation

The input for the data collection methods is based on widely accepted literature concerning strategic management of CRE, performance management, sustainability in relation to CRE and strategic decision-making literature. Moreover, the applied interview protocol is based on the CNET technique to measure what is intended and ensure reliability. This semi-structured interview approach combined with participants that have significant experience within this field and can be seen as experts in the field of CRE management results in a relatively high internal validity.

The external validity of this research is relatively low due to the low sample size, although the selected organizations all have a mature CREM department with relevant sustainability experience and can therefore be seen as illustrative examples for other CREM departments. The relative small sample size makes it possible to conduct an in-depth analysis regarding real estate sustainability practices at these organizations. However, the participants are selected on a sustainability maturity level and thus not randomly selected. Sustainability might therefore be image driven at some organizations, which might result in a better picture of reality than it actually might be in daily practice. So although the results can be used as an illustrative example with various examples that show how to implement sustainability in the CRE portfolio and how this might affect real estate performance and organizational performance, results from this research are not generalizable for every organization that implemented a sustainable real estate strategy.

6.6. Conclusion

By conducting the proposed interview protocol of Arentze et al. (2008), the cause-effect relations between the various variables of a mental representation of a decision-problem can be captured and translated into a causal network for each case study. Moreover, the results of the cross-case analysis are written down and remarkable similarities and differences are discussed. The outcome of this analysis leads to an integrated causal network that reflects the considerations and expected consequences when implementing a sustainability strategy that supports the overall organizational sustainability strategy in these specific cases, complemented with the expert opinion of the selected corporate real estate advisors.
7. Semi-structured interview results

"Corporate social responsibility is not just about managing, reducing and avoiding risk, it is about creating opportunities, generating improved performance, making money and leaving the risks far behind."

— Sunil Misser

This chapter combines the results from the various semi-structured interviews conducted with both CRE managers and CRE consultants. By means of data collection and analysis, more insight will be given in decisions subject to sustainability goals, the assumed effects of these decisions and real estate performance management in the context of sustainability. The first paragraph provides an introduction and relevant information concerning the participating organizations (§7.1). The second paragraph provides information regarding the involved CREM departments and real estate advisors (§7.2). The third paragraph contains the cross-case analysis that discusses the results regarding operational decisions subject to sustainability goals, real estate sustainability performance and real estate performance and the extent in which the participating organizations measure their real estate performance and sustainability performance (§7.4). The fourth paragraph discusses what changes should be made to the theoretic corporate real estate sustainability performance management framework as presented in chapter 4 based on the outcome of the interviews. The last paragraph (§7.5) discusses the results and provides an answer to sub-question V “Which organizational corporate real estate management decisions are subject to strategic sustainability goals and how do these decisions affect real estate performance?” by establishing the means-end-chains for all relevant operational decisions. Second, it will provide an answer to sub-question VI “How is real estate performance connected with organizational performance and which performance indicators are used to measure the impact of strategic real estate decisions?”
7.1. Sample description

The selected organizations vary in characteristics. To give an indication of the participating companies, table 7.1 gives an overview of the annual revenue, net profit, number of employees and the industries in which they operate.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Annual revenue (€)</th>
<th>Net profit (€)</th>
<th>Employees</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABN AMRO Bank</td>
<td>8.055</td>
<td>1.134</td>
<td>22.200</td>
<td>Banking</td>
</tr>
<tr>
<td>AkzoNobel Global</td>
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<td>1.573</td>
<td>45.600</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>a.s.r. Nederland</td>
<td>4.092</td>
<td>601</td>
<td>3.650</td>
<td>Insurance</td>
</tr>
<tr>
<td>Deloitte Nederland</td>
<td>657</td>
<td>96</td>
<td>4.280</td>
<td>Accountancy</td>
</tr>
<tr>
<td>EY Nederland</td>
<td>710</td>
<td>147</td>
<td>3.730</td>
<td>Accountancy</td>
</tr>
<tr>
<td>Shell International</td>
<td>264.960</td>
<td>1.939</td>
<td>93.000</td>
<td>Petroleum</td>
</tr>
<tr>
<td>UWV</td>
<td>24.411</td>
<td>-2.439</td>
<td>17.100</td>
<td>Employment</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>45.392</strong></td>
<td><strong>436</strong></td>
<td><strong>27.080</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 7.1: Sample description

The sample consists of seven organizations from which one is operating in the banking industry, one in manufacturing, one in insurance, two in accountancy, one in petroleum and one in job employment. The average annual revenue of the seven participating organizations is 45.392 million euros, ranging from 657 million euros to 264.960 million euros. The relatively high annual revenue is explained by one company that is the second largest company in the world with a turnover of 264.960 million euros. The average net profit is 436 million euros, although this is negatively affected by a net loss of -2.439 million euros of one company. The net profit range is from -2.439 million euros to 1.939 million euros. The average amount of employees consists of 27.082 fulltime equivalents (FTE), ranging from approximately 3.650 FTE till approximately 93.000 FTE. So although all participating organizations are considered large multinational and national companies, this overview shows that there are still some large differences between the participating organizations based on annual revenue, net profit and the number of employees.

7.2. Descriptives CREM departments

From the seven participating companies, eight CREM managers participated in the interviews. One interview was held with two participants simultaneously. The results of this interview are processed as a single participant. An overview of the interviewees is given in table 7.2. Six out of seven participants have a clear background in property management, which is reflected in a number of years of experience above ten. One participant has a financial background and operates as an overall business support manager who was to a large extent involved in the sustainable renovation of the corporate headquarters.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Function</th>
<th>Experience (yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABN AMRO Bank</td>
<td>Product and contract manager corporate buildings</td>
<td>12</td>
</tr>
<tr>
<td>AkzoNobel</td>
<td>Manager corporate real estate</td>
<td>20</td>
</tr>
<tr>
<td>a.s.r. Nederland</td>
<td>Adjunct director business support</td>
<td>4</td>
</tr>
<tr>
<td>Deloitte Nederland</td>
<td>Senior manager procurement and workplace services</td>
<td>12</td>
</tr>
<tr>
<td>EY Nederland</td>
<td>Region Real Estate Leader BeNe</td>
<td>20</td>
</tr>
<tr>
<td>Shell International</td>
<td>Real estate manager / Building Services Manager</td>
<td>10</td>
</tr>
<tr>
<td>UWV</td>
<td>Manager Real Estate &amp; Projects</td>
<td>15</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td><strong>13.3</strong></td>
</tr>
</tbody>
</table>

Table 7.2: Participating CRE managers characteristics
An overview of the real estate portfolios that lies within the responsibility of the participating managers is given in table 7.3. The real estate portfolios of five participants consist of merely offices. All of these participating companies are active in some form of financial business. Two of the participating companies produce or sell tangible goods resulting in a large amount of industrial real estate within the real estate portfolio. As discussed in chapter 1, this research focuses only on office real estate. Therefore, other types of real estate are excluded from this overview. The average size of the involved office real estate within the total real estate portfolios is approximately 453.150 m², ranging from approximately 80.000 m² to approximately 2.000.000 m². The number of objects varies from 1 to 471 with an average of approximately 90, although all participants indicate that they are engaged in a densification of the real estate portfolio or that densification already has taken place. It is also notable that five out of seven portfolios consist of merely leasehold objects, which is explained by the participants due to a need for flexibility within the real estate portfolio or real estate is not considered as the core business of the organization. One portfolio consists of 100% freehold, although the involved real estate consists of one object, and one portfolio is merely freehold. The involved participants indicated that the objects are used as investment property or that real estate investment is part of the core business of the organization.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Size (m²)</th>
<th>Objects</th>
<th>Type</th>
<th>Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABN AMRO Bank</td>
<td>400.000</td>
<td>18</td>
<td>Office</td>
<td>Mainly freehold</td>
</tr>
<tr>
<td>AkzoNobel</td>
<td>85.000</td>
<td>3</td>
<td>Office</td>
<td>Mainly leasehold</td>
</tr>
<tr>
<td>a.s.r. Nederland</td>
<td>91.000</td>
<td>1</td>
<td>Office</td>
<td>Freehold</td>
</tr>
<tr>
<td>Deloitte Nederland</td>
<td>80.000</td>
<td>16</td>
<td>Office</td>
<td>Leasehold</td>
</tr>
<tr>
<td>EY Nederland</td>
<td>80.000</td>
<td>14</td>
<td>Office</td>
<td>Leasehold</td>
</tr>
<tr>
<td>Shell</td>
<td>2.000.000</td>
<td>471</td>
<td>Office</td>
<td>Mainly leasehold</td>
</tr>
<tr>
<td>UWV</td>
<td>436.100</td>
<td>109</td>
<td>Office</td>
<td>Leasehold</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>453.157</strong></td>
<td><strong>90</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7.3: Real estate portfolio data

The leading real estate strategy might influence sustainability practices within the real estate portfolio and how real estate performance is measured. When presented with the list of possible real estate strategies as discussed in chapter 2, the participants indicated that several real estate strategies are implemented within the real estate portfolio. An overview of the mentioned strategies is given in figure 7.1.

![Figure 7.1: Real estate strategies of participants (n=7)](image)

When asked which real estate strategy is leading, all participants except one indicated that reducing costs is the leading real estate strategy. In most cases this is due to the aftermath of the
recent economic crisis, although others indicate that cost reduction has always been leading. In addition, several participants indicate that the real estate strategies are inextricably connected and are the result of a more comprehensive strategy. Example given, one participant stated that real estate is becoming more important in attracting new talent due to the ongoing ‘war on talent’. This results in an indirect strategy that combines employee satisfaction, employee productivity and support sustainability. Increase value of assets is mentioned as a real estate strategy by one participant, which is explained by real estate investment as a part of the core business of the organization.

Notable is that two participants indicated that safety performance within their real estate is a leading or secondary driver for the real estate department’s strategy statement and added this to the presented list of real estate strategies. Both related organizations produce and sell tangible goods in a relatively accident-sensitive working environment, which explains why safety performance is considered important.

All participants stated that densification of the used office area and number of offices has been one of the leading strategies in the past few years. This is achieved by implementing some form of new ways of working\(^1\), which combines aspects of several real estate strategies. However, the real estate strategy reduce costs was in all cases the leading reason for implementing new ways of working. Real estate strategies that were often mentioned by the participants as secondary strategies are increase employee satisfaction and increase flexibility. Notable is that supporting sustainability is only mentioned four times as a real estate strategy. This is mainly attributable to the fact that sustainability is nowadays attached to the real estate strategies of all participants, but not the objective in itself. So sustainability is in such a way intertwined within these companies that implementation of sustainability is more a matter of course than a notable real estate strategy. Increase collaboration is mentioned twice and increase employee productivity, support culture and controlling risks are mentioned once. None of the participants mentioned promote marketing and sales as a real estate strategy.

When presented with the five evolutionary stages of CREM as discussed in chapter 2, all participants indicated that they are operating at least at the business level of strategy as a dealmaker. An overview of the perceived maturity of the real estate departments by the participants is given in table 7.4. Four participants are operating on the corporate level as a business strategist, enhancing business processes and operating as fully recognized business unit. However, all participants mentioned cost reduction as leading real estate strategy. Therefore, it is expected that the CREM departments are operating on the level of controller. On the other hand, all participants indicated to strive for the level of business strategist in the near future. So although their leading strategy is cost reduction, the CREM departments are becoming more strategic by convening the workforce with their secondary real estate strategies.

<table>
<thead>
<tr>
<th></th>
<th>ABN</th>
<th>AkzoNobel</th>
<th>a.s.r.</th>
<th>Deloitte</th>
<th>EY</th>
<th>Shell</th>
<th>UWV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business strategist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrepreneur</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dealmaker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controller</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taskmaster</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7.4: Maturity of the real estate departments

\(^1\) “New ways of working is time and place independent working, focus on results, free access to information and flexible labour relations” (Baane et al, 2010).
Based on the leading real estate strategies and maturity level of the participants, and CREM management theory of de Jonge (1996) as discussed in chapter 2, it is expected that all participants perform activities in the field of general management and portfolio management. Figure 7.2 illustrates that all CREM managers are indeed involved with the general management of their CRE. One participant indicated that the CREM department is not involved with portfolio management. The participant argued that this can be explained by a fragmented real estate portfolio that is the result of historical mergers and acquisitions, resulting in a relatively immature state of the concerned CREM department. The participants who are leasing their real estate mainly outsource asset and property management, although these participants are sometimes still involved in those areas of real estate management. Regarding the freehold real estate, asset and property management is considered part of the business activities of the CREM department.

**Figure 7.2: Management tasks of CREM departments (n=7)**

An overview of the core activities of the various CREM departments is given in figure 7.3. When it comes to the actual CRE core activities, all participants are mainly active in activities related to the provision of space and disposition based on the CREM activities model of Kämpf-Dern and Pfün (2014) as discussed in chapter 2. Based on the management activities, maturity level and real estate strategies of the participants, it is expected that most operational activities such as facility management and maintenance are completely or partly outsourced, which is indeed the case. Only three managers are involved in project development.

**Figure 7.3: CRE core activities of the CREM departments (n=7)**

Besides the experience from the selected organizations and corresponding managers as discussed above, three real estate advisors have been selected to give their views to analyze whether discrepancies can be found between those views and daily practice. An overview of the interviewees is given in table 7.5.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Function</th>
<th>Experience (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deloitte Real Estate</td>
<td>Senior consultant</td>
<td>5</td>
</tr>
<tr>
<td>Arcadis</td>
<td>Consultant</td>
<td>4</td>
</tr>
<tr>
<td>Brink Management &amp; Advies</td>
<td>Senior consultant</td>
<td>8</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td><strong>5,7</strong></td>
</tr>
</tbody>
</table>

**Table 7.5: Participating real estate advisors characteristics**
All participating managers have a broad experience in CRE advisory and particular in sustainability aspect. Each of them has been involved in large and complex sustainability issues within the field of CRE. Their relevant experience ranges from four to eight years with an average of 5.7 years and all participants have a clear background in real estate. In the next paragraphs, the obtained results from both the participating CRE managers and real estate advisors are combined in the given overviews. Notable similarities and discrepancies are described in the corresponding paragraphs below.

### 7.3. Cross-case analysis

This part describes and analyses the results of the semi-structured interviews by means of a cross-case analysis to establish the means-end-chain. An overview of the steps taken to conduct the mean-end-chains for each specific case and an illustrative example is given in box 3. The first part describes which operational decisions are subject to the sustainability goals of the participating organizations. Moreover, it analyses which real estate sustainability variables are mentioned in relation to the operational decisions to establish the first part of the means-end-chain. The second part describes the underlying real estate performance variables that are indicated as important and are affected by the mentioned real estate sustainability variables to establish the second part of the means-end-chain. The last part is established by analyzing which organizational performance variables are referred to as influenced by the real estate performance variables.

### Box 3: The example of a single case

To clarify the process of establishing the causal network and drafting the means-end-chain, this box provides the results of one operational decision of a single case and the related means-end-chain. To guarantee a certain level of anonymity and to safeguard sensitive strategic information, this illustrative example is anonymous.

When presented with the list of operational decisions and asked how the CREM department wanted to support the organizational sustainability goals with their CRE, the participant mentioned company space, quantity, mechanical systems and information systems as subject to organizational sustainability goals. To keep this example clear and simple, only company space is covered in this example case.

The second step is to establish the first relations in the means and chain for this specific case. When asked why company space was important for the CREM department to support the organizational sustainability goals, the participant stated that this was important because of health and wellbeing, waste and materials for a variety of reasons. Therefore, these real estate sustainability variables are included in the means and chain as illustrated in figure 7.4.

![Figure 7.4: Step 2: establish the relation between operational decisions and real estate sustainability variables (n=1)](image-url)

The third step is to establish the relations between the real estate sustainability variables and the real estate performance variables. This was clarified by presenting the list of real estate
performance areas and asking why each mentioned sustainability variable was important for the CREM department to support the organizational sustainability goals. However, it must be noted that these relations are not determined for each decision variable individual. Hence, these relations are generally applicable. For materials, the participant mentioned flexibility, marketing and sales, value of assets, reduce costs and innovation as variables that might be affected by the variable materials. Cost reduction, innovation and employee satisfaction were mentioned in relation to waste. Health and wellbeing is considered important because of employee satisfaction and employee productivity. All of the aforementioned variables are then also included in the means-end-chain as illustrated in figure 7.5.

Figure 7.5: Step 3: establish the relations between real estate sustainability variables and real estate performance variables (n=1)

The last step is to establish the relations between the real estate performance variables and organizational performance variables. This is determined by asking why each mentioned real estate performance variable is important. However, it must be noted that these relations are not determined for each decision variable individual. Hence, these relations are generally applicable. The participant indicated that employee productivity, employee satisfaction and innovation might affect all three variables of organizational performance, which are productivity, competitive advantage and profitability. Marketing and sales, value of assets and cost reduction are mentioned as a reason because these variables might affect both competitive advantage and profitability. In addition, the participant mentioned flexibility because it might affect both productivity and competitive advantage. Figure 7.6 illustrates the established relations between real estate performance and organizational performance based on the expert opinion of this participant.

Figure 7.6: Step 4: establish the relations between real estate performance variables and real estate performance variables (n=1)

The last step necessary for mapping the whole network is to connect all relations as established in the previous steps into one single framework, resulting in a single means-end-chain as illustrated in figure 7.7.
In general, all participants were able to appoint the operational decisions that were used to support the organizational sustainability goals and indicate why these decisions are important. However, when presented with the list of sustainability sub-variables, three participants indicated that these variables are too technical and decided to only use the higher-level variables as a reason for an operational decision. Specific reasons why operational decisions were important could still be extracted from their explanations and are categorized in the sustainability variables as used within this research. Moreover, to ensure a certain degree of validity, a specific assumed relation between an operational decision and a sustainability category is included in the means-end-chain when mentioned by more than two participants. All mentioned operational decisions and their assumed attributes are described and discussed in more detail below. The operational decisions mentioned as subject to sustainability goals are presented in figure 7.8.

**7.3.1. Operational decisions subject to sustainability goals**

In general, all participants were able to appoint the operational decisions that were used to support the organizational sustainability goals and indicate why these decisions are important. However, when presented with the list of sustainability sub-variables, three participants indicated that these variables are too technical and decided to only use the higher-level variables as a reason for an operational decision. Specific reasons why operational decisions were important could still be extracted from their explanations and are categorized in the sustainability variables as used within this research. Moreover, to ensure a certain degree of validity, a specific assumed relation between an operational decision and a sustainability category is included in the means-end-chain when mentioned by more than two participants. All mentioned operational decisions and their assumed attributes are described and discussed in more detail below. The operational decisions mentioned as subject to sustainability goals are presented in figure 7.8.

**Figure 7.7: Means-end-chain of company space for this specific example case (n=1)**

This illustrative example gives a clear overview of the steps that are undertaken to establish the various relations to determine the means-end-chains for each specific case. The results of the other conducted interviews are each summarized in a single means-end-chain per mentioned operational decision, which are provided in appendix 5. However, the aim of this research is to find similarities and discrepancies between various cases to gather new insights in the underlying reasons of implementing a real estate sustainability strategy and the supposed effects of implementing more sustainability within the real estate portfolio. Therefore, it is redundant to deal with each case in its entirety. Performing a cross-case analysis is sufficient to achieve the aim of this research.

**Figure 7.8: Operational decisions mentioned as subject to sustainability goals (n=10)**
When presented with the list of operational decisions and asked which operational decisions are used to support the organizational sustainability goals, all participants mentioned quantity and mechanical systems. Eight out of ten participants mentioned location and six out of ten participants mentioned company space. Exterior quality and information and communication systems were mentioned twice and risk management and tenancy duration were mentioned one time. Ownership rights, identity, financing, control, building size and building amenities were not specifically mentioned at all, although some aspects of these operational decisions were mentioned at some point in the interview. Moreover, it must be noted that the vast majority of the participating CRE managers indicated that the power of decision of the real estate portfolio lies with the CRE department or issues an advice that is generally adopted one on one by the general management. Therefore, no distinction is made regarding the nature of the operational decisions and all operational decisions will be treated as decisions variables for these specific cases. All mentioned operational decisions subject to the organizational sustainability goals and corresponding attributes are discussed in more detail below.

**Quantity**

All participating managers indicated that the amount of space needed for business operations has an indirect and/or direct relation with sustainability and has therefore been subject to the organizational sustainability goals. All participating advisors support this view as well. An overview of the reasons why it is considered important by the managers and advisors in relation to the organizational sustainability goals is given in figure 7.9.

![Figure 7.9: Sustainability categories mentioned in relation to quantity (n=10)](image)

The main reason given why quantity is considered important is that using less real estate and thus less square meters results in a reduction of energy use and carbon emissions. Remarkable is that all participating managers indicated that densification of the real estate portfolio is achieved or will be achieved through implementation of some form of new ways of working. So although supporting the sustainability goals of the organizations is a logical consequence of this strategy, some participants stated that sustainability was just one driver for implementation besides cost reduction, more efficient operations, employee satisfaction and collaboration. In addition, two advisors argued that telecommuting as a result of implementing new ways of working results in more people working from their own dwelling. Although this might result in less energy use for organizations, these workplaces at home must also meet the basic needs of employees resulting in more energy use at home. So new ways of working might be profitable for merely organizational sustainability purposes, it is questionable whether it is sustainable from a global point of view.

An important consequence of real estate portfolio densification mentioned by both managers and advisors is accommodating more people on less surface, thus other requirements will be imposed on health and wellbeing of the building users. So in order to secure building users its health and wellbeing when accommodating more people, requirements for indoor air quality, thermal comfort, acoustic performance and safety and security were mentioned as important. Some participants also stated that using surface more efficiently and providing less workplace might result in being more efficient in material use, although it is argued that this is especially applicable.
in new buildings. In addition, some participants argued that the amount of space used by the organization influences water consumption due to a more efficient and less use. However, other participants argued that, when the amount of building users remains equal, the quantity per se has no direct influence on water consumption. So when densification of the real estate portfolio results in a reduction of workplaces, building quantity might influence water consumption as well. Figure 7.10 illustrates the supposed relation between quantity and sustainability by the participants. Moreover, it illustrates the additional underlying benefits of the mentioned sustainability variables. These underlying benefits are adopted when mentioned at least once by the participants.

Figure 7.10: Overview of sustainability benefits mentioned for densification of the real estate portfolio (n=10, a reason is included when mentioned by n≥1)

**Mechanical systems**

All participating managers indicated that the mechanical systems used within the real estate portfolio have an indirect and/or direct relation with sustainability and have therefore been subject to the organizational sustainability goals, which is supported by the participating advisors. An overview of the reasons why it is considered important in relation to the organizational sustainability goals is given in figure 7.11.

Figure 7.11: Sustainability categories mentioned in relation to mechanical systems (n=10)

Mechanical systems are considered important because they have a significant effect on energy use and are useful to implement more sustainability within the real estate portfolio. Specific reasons to invest in sustainable mechanical systems that were mentioned by the participants are energy monitoring, low carbon design, energy efficiency, on-site renewable energy and green power. All participating managers indicated that they actively manage energy use and steer on energy reduction. In addition, the participants indicated that mechanical systems contribute to less emissions and pollution.

Another explicitly mentioned reason why mechanical systems are considered important mentioned by all participants is water. Some participating managers stated that they actively manage their water consumption by monitoring water use and leak detection. Moreover, the
The majority of the participants stated that they implement innovative and water efficient equipment to support sustainability goals.

Moreover, all participants stated that the mechanical systems are considered important because they have an influence on the health and wellbeing of the building users. All participants indicated that they try to influence health and wellbeing with their mechanical systems on one or more of the following fields: indoor air quality, thermal comfort, acoustic performance, safety and security, low-emitting materials and controllability of systems. The participating advisors support this view and argued that measurement of health and wellbeing is increasingly important, although measurement practices are hard and often lag behind in the Netherlands compared to other regions. In addition, some advisors argued that there are still no objective ways to measure all relevant outcomes of real estate related health and wellbeing improvements. Therefore, most organizations still steer on the financial aspects when it comes to mechanical systems because it is relative less complicated to make performance agreements regarding the financial performance, which is supported by some managers when confronted with this view.

Three participants argued that the choice of a particular mechanical system is partly based on the materials from which it is made, such as responsible sourcing of materials, designing for durability and resilience and material efficiency. Reduction of operational waste is mentioned twice as reasons why mechanical systems support organizational sustainability goals. Land use and ecology and transport were not mentioned at all, although this was to be expected because these categories do not relate to the physical building itself. The supposed relation between mechanical systems and sustainability by the participants is presented in figure 7.12. In addition, it gives an overview of the additional underlying benefits of the mentioned sustainability variables. These underlying benefits are adopted when mentioned at least once by the participants.

Three participants argued that the choice of a particular mechanical system is partly based on the materials from which it is made, such as responsible sourcing of materials, designing for durability and resilience and material efficiency. Reduction of operational waste is mentioned twice as reasons why mechanical systems support organizational sustainability goals. Land use and ecology and transport were not mentioned at all, although this was to be expected because these categories do not relate to the physical building itself. The supposed relation between mechanical systems and sustainability by the participants is presented in figure 7.12. In addition, it gives an overview of the additional underlying benefits of the mentioned sustainability variables. These underlying benefits are adopted when mentioned at least once by the participants.

Figure 7.12: Sustainability reasons mentioned to invest in sustainable mechanical systems (n=10, a reason is included when mentioned by n≥1)

**Location**

Five participating managers indicated that the location of their real estate has an indirect and/or direct relation with sustainability and has therefore been subject to the organizational sustainability goals. All three advisors support this view. An overview of the reasons why it is considered important in relation to the organizational sustainability goals is given in figure 7.13.
So location is considered important to support the organizational sustainability goals. However, all participants that mentioned location mentioned transport as the main, and mostly only, reason that location contributes to sustainability goals. Although this seems a relatively small impact, two advisors argued that the vehicle fleet is often one of the biggest emissions factors of an organization. In addition, one participating manager indicated that, due to the location, they were able to connect with the ecological structure in the area and therefore mention land use and ecology as a reason why location is important to support sustainability goals. Related to land use and ecology, some participants mentioned that they value the impact on existing site ecology and long term impact on biodiversity, although they argued that the location choice is not necessarily based on land use and ecology. Another participant mentioned that location is also considered important for the health and wellbeing of the organization's employees, whereby location might influence visual comfort. The remaining sustainability subjects were not mentioned at all as a reason.

Figure 7.14 illustrates the supposed relation between mechanical systems and sustainability by the participants. In addition, it illustrates the additional underlying benefits of the mentioned sustainability variables. These underlying benefits are adopted when mentioned at least once by the participants.

**Company space**
Four participating managers indicated that the design and use of company space has an indirect and/or direct relation with sustainability and has therefore been subject to the organizational sustainability goals, which is specifically supported by two advisors. An overview of the reasons given why it is considered important in relation to the organizational sustainability goals is given in figure 7.15.
All companies that specifically mentioned company space stated that they try to choose design and materials in such a way that it contributes in the best possible way to a circular economy\(^2\). By doing so, material aspects including life cycle impacts, hard landscaping and boundary protection, responsible sourcing of materials, insulation, designing for durability and resilience and material efficiency were mentioned as important. In addition, two advisors support this view and argued that a circular economy is indeed receiving more attention.

Another important reason to use the company space to support sustainability mentioned by the participants is health and wellbeing. With the design and materials of an organization's company space visual comfort, indoor air quality, thermal comfort, acoustic performance, safety and security, low-emitting materials and controllability of systems might be positively influenced. Moreover, some participants stated that the design and material used for company space might influence the amount of waste produced during both construction and use of the company space. In addition, pollution, water and energy were each mentioned by two participants as a reason to invest in a sustainable company space design. Land use and ecology and transport were not mentioned. The supposed relation mentioned by the participants between company space and sustainability with the underlying benefits is presented in figure 7.16.

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\(^2\) "The circular economy is an economic and industrial system that is restorative by intention and design in terms of ecology and economy, where the value of natural resources is maximized and depreciation of resources is minimized throughout the whole system" (Rood, 2015).
Remaining operational decisions

Although quantity, mechanical systems, location and company space were mentioned as leading operational decisions that are used or should be used to support the organizational sustainability goals, some other operational decisions were mentioned during the interviews as well.

Two participating managers indicated that the organization uses its information and communication system to provide building users, employees and visitors with information regarding sustainable performance of the building and public transport information. Although these participants argued that this does not necessarily improve the sustainable performance of their real estate, it does support corporate sustainability goals by creating awareness among building users. Notable is that this is not mentioned by one of the participating advisors.

One participating manager explicitly mentions exterior quality, although in relation with quantity. This participant implemented a double and green façade to support sustainability goals that results in approximately 50 percent energy reduction, but argues that a significant utility can only be reached when the building quantity is sufficient. One advisor shares this view, although rather in combination with mechanical systems such as solar panels.

Moreover, one participant mentioned that, although not leading for supporting sustainability goals, tenancy duration might influence sustainability. This organization's CRE is mainly leasehold, resulting in the real estate owner as a mayor stakeholder concerning sustainability related investments. In order to make sustainable physical real estate investments such as sustainable mechanical systems, organizations must reach an agreement with the real estate owner. This participant argued that engaging into a long-term lease agreement makes it possible to implement more sustainable investments because the payoff period for both the owner and tenant is longer. When the CRE is freehold, the payoff period might become even longer resulting in a higher profitability on the sustainability investments. Therefore, ownership might also influence sustainability in the same way as tenancy duration. One of the advisors added that a long-term lease agreement or freehold might result in more commitment with the involved real estate and its nearby environment. On the other hand, one advisor argued that real estate owners are nowadays forced through market forces to invest in sustainability. The building users pressure real estate owners by demanding more sustainability. Top-down, more and more instruments are available to measure sustainability performance, which engage mortgage lenders to only invest in sustainable real estate. Hence, although long-term engagements might increase the users influence on sustainability investments, it is questionable whether this is still necessary in the near future.

Some participants mention financing sideways on the one hand because some mortgage lenders charge lower interest rates nowadays for sustainable real estate investments, although this can be seen more as an incentive that a direct result. On the other hand, the choice for a specific bank might influence sustainability because some invest their liquid assets more sustainable that others.

The leading operational decisions that support the organization's sustainability goals mentioned by the participants were location, quantity, mechanical systems and company space. These are considered important because of the health and wellbeing of building users, reduction energy use, reduction of water use, reduction of pollution sustainable materials, reduction and processing of waste and transportation of building users. Notable is that land use and ecology is not mentioned frequently enough at all in relation to these organizational decisions. The means-and-chain of operational decisions that support the organizational sustainability goals is presented in figure 7.17.
7.3.2. Real estate sustainability performance

Within the next part, all participants were presented with the sustainability categories as discussed above and asked if a specific sustainability category is considered important in relation to the real estate strategies as discussed in chapter 2. In other words, the participants indicated if a specific real estate sustainability category might have an influence on the performance of the real estate strategies. A specific real estate performance variable is included in the means-end-chain when mentioned by more than two participants. An overview of each real estate sustainability category in relation to the specific areas of real estate performance is given in table 7.6. Frequently mentioned relations or other remarkable results are discussed below.

<table>
<thead>
<tr>
<th>Real estate sustainability variables</th>
<th>Health and Wellbeing</th>
<th>Energy</th>
<th>Materials</th>
<th>Transport</th>
<th>Water</th>
<th>Land use and Ecology</th>
<th>Pollution</th>
<th>Waste</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce costs</td>
<td>4</td>
<td>10</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>10</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Increase employee satisfaction</td>
<td>10</td>
<td>4</td>
<td>9</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Increase value of assets</td>
<td>1</td>
<td>9</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>7</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Promote marketing and sales</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Increase innovation</td>
<td>4</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Increase employee productivity</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Increase flexibility</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Controlling risks</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Supporting culture</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Increase collaboration</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>57</strong></td>
<td><strong>48</strong></td>
<td><strong>37</strong></td>
<td><strong>31</strong></td>
<td><strong>27</strong></td>
<td><strong>21</strong></td>
<td><strong>21</strong></td>
<td><strong>12</strong></td>
<td><strong>8</strong></td>
</tr>
</tbody>
</table>

Table 7.6: Frequency table of sustainability categories in relation to the real estate performance areas (n=10)

The various real estate strategies were mentioned most frequent by all participants together in a direct relation to health and wellbeing. Notable is that all participants mentioned both increase employee satisfaction and increase employee productivity as a reason why health and wellbeing might affect real estate performance. Energy is related to the various real estate performance
areas second most. Besides cost reduction, energy is also considered important because it might affect the value of assets.

The participants mentioned cost reduction most frequently as important when asked why a specific sustainability variable is considered important, especially in relation to energy and water usage. However, taking cost reduction into account as the leading real estate strategy of the majority of the participants, this result is not specifically conspicuous. On the other hand, it is notable that increase employee satisfaction is the second most frequently mentioned real estate performance variable. According to the participants, it is most likely to affect employee satisfaction with the sustainability variables health and wellbeing and transport.

The real estate sustainability variables that are mentioned by more than two participants and therefore related to the most individual real estate performance variables are materials and health and wellbeing, followed by energy, transport, water, pollution and waste in descending order. They are considered important because of a variety of reasons, although cost reduction, marketing and sales and employee satisfaction are mentioned the most besides supporting sustainability goals. Increasing collaboration was not mentioned sufficient in relation to a specific sustainability variable to be included in the means-end-chain. The means-and-chain of real estate performance areas and their relation to the sustainability categories is presented in figure 7.18.

**Figure 7.18: Means-end-chain of real estate sustainability variables related to real estate performance (n=10, a relation is established when mentioned by n>2)**

### 7.3.3. Influence of real estate performance on organizational performance

For this part of the analysis, all participants were presented with the list of real estate performance areas based on the real estate strategies as presented in chapter 2 and asked if they have a direct influence on one of the three variables of organizational performance based on the model of Tangen (2005) as discussed in chapter 2. A specific relation between a real estate performance area and an organizational performance area is included in the means-end-chain when mentioned by more than two participants. An overview of the number of times a specific area of real estate performance is mentioned in relation to organizational performance is given in table 7.7 and discussed in more detail below. Frequently mentioned relations or other remarkable results are discussed below.
Increase employee satisfaction is considered important by all participants because it might affect productivity, which is mainly attributed to the opinion that a satisfied employee is willing to provide more work and is able to work more efficiently when provided with a sustainable, and thus healthy and satisfying, work environment. Another reason mentioned by nine participants is competitive advantage. Some participants argue that satisfied employees produce a positive word of mouth that might positively influence the image of the organization. Moreover, all participants mentioned productivity as a reason why increase employee productivity is considered important, although this might be evident. Providing more flexibility within the real estate portfolio is indicated as important by nine participants because it might influence productivity. The main explanation given is that a flexible real estate portfolio creates the opportunity to quickly react to changes in the environment in which the organization acts, which results in a more effective and efficient usage of real estate. As discussed in chapter 2, effectiveness and efficiency are related to the three variables of organizational performance. Therefore, it is expected that flexibility is also considered important because it might affect profitability and competitive advantage, which are indeed mentioned by respectively six and four managers. Notable is that cost reduction is mentioned relatively few, although it is mentioned by almost all participants as leading real estate strategy. However, it is evident that cost reduction has a direct influence on profitability and none too little influence on productivity and competitive advantage. All participating managers confirmed this, although five managers argued that cost reduction has an indirect influence on competitive advantage as well. Support sustainability is one of the two, besides promote marketing and sales, variable that is considered important by the participating managers because it might affect competitive advantage directly. So although most participating organizations implement sustainability in their real estate from a cost-saving perspective, it is mostly expected that it will influence competitive advantage as well. In addition, some participants argued that increase value of assets is irrelevant because their organization's real estate portfolio is fully leasehold.

So although the real estate performance areas and organizational performance are highly intertwined with each other, the cross-case analysis shows that some clear connections can be found as a result from the interviews. Employee satisfaction, employee productivity, flexibility and innovation are all considered important because of all aspects of organizational performance. Reduce costs, marketing and sales and controlling risks are considered important because they might affect both profitability and competitive advantage. Increase value of assets is mentioned as important because it might influence profitability. Culture is considered important because it
might affect productivity and competitive advantage. The means-and-chain of real estate performance areas and their relation to organizational performance is presented in figure 7.19.

![Means-end-chain of real estate performance related to organizational performance](image)

**Figure 7.19: Means-end-chain of real estate performance related to organizational performance (n=10, a relation is established when mentioned by n>2)**

### 7.3.4. Real estate performance measurement

Previous paragraphs give an insight in the assumed relations between the various fields of real estate performance, sustainability performance and organizational performance. For this part of the analysis, all participating CRE managers were presented with the list of real estate related performance indicators as discussed in chapter 3 and asked which indicators are currently used for internal or external benchmarking practices. By doing so, insight is obtained in current real estate measurement practices within the participating organizations. One organization indicated that real estate measurement practice is sensitive information and could therefore not indicate for all given indicators whether the indicator is used by this organization.

First of all, it is notable that all participating organizations perform some form of real estate performance measurement by measuring real estate metrics and that all organizations use this metrics to benchmark their real estate performance internally or externally. The frequency in which the various basic indicators are implemented by the CREM departments is given in figure 7.20. As is expected by the maturity and leading strategies of the real estate departments, all participants are currently using indicators in order to get insight into their real estate costs and financial performance. Moreover, all participating organizations have insight in basic technical indicators. The basic indicators used by the participants are number of employees and/or FTE, the amount of area, number of workplaces, occupancy costs, and/or rental costs.

![Frequency of basic indicators implemented as a benchmark](image)

**Figure 7.20: Frequency of basic indicators implemented as a benchmark**

In addition, most organizations use these basic indicators to determine key ratios. Almost all possible combinations are used as a benchmark by one or more organizations, although real estate costs per square meter is mentioned most frequently. Taking into account the leading real estate strategy cost reduction by all organizations except one, this result was to be expected. Figure 7.21 presents the frequency in which each real estate ratio is implemented as a benchmark by the CREM departments of the participating organizations.
Within the area of sustainability performance, all participants except one have insight into their CO2 emission and energy use. Other often mentioned sustainability indicators are energy use, water use, material use and separation of waste and quality of the indoor environment. Moreover, the majority of the participants use qualitative indicators such as an employee satisfaction survey and/or an occupier satisfaction survey. An overview of the real estate sustainability performance indicators and their frequencies is given in figure 7.22.

Other often mentioned real estate indicators are mostly financial and some kind of derivative of the real estate costs. One participant mentioned safety as an important indicator and added the number of potentially high-risk incidents and the number of accidents per million exposure hours as indicators. Besides these two indicators, no other indicators have been added to the provided list. Figure 7.23 presents the remaining performance indicators mentioned.

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### 7.4. Corporate real estate sustainability performance management framework

Based on the outcome of the semi-structured interviews on the relation between real estate performance and organizational performance, the conceptual framework of CRE performance management as discussed in chapter 4 is complemented and adjusted in order to include all
aspects of corporate real estate sustainability management in the knowledge of the mental representations of the participants to arrive at the figure as presented in figure 7.24. First, it must be noted that the causal relations as determined in the paragraphs above are excluded from this specific framework in order to represent all aspects of real estate sustainability performance management concisely and straightforward. However, combining this framework with the means-end-chains that represents the causal relations for the four operational decisions that are subject to sustainability goals as discussed in the subsequent paragraph provides the insight needed to actually control sustainability performance of these decisions effectively. Within the output box, the four distinct operational decisions that might have a positive relation with sustainability performance have been added. Land use and ecology is excluded from the real estate sustainability performance to arrive at the seven real estate sustainability variables that might be affected by the operational decisions. Moreover, the performance areas of the real estate strategies support collaboration and support sustainability are excluded from the real estate performance box.

Figure 7.24: Corporate real estate sustainability performance management framework
### 7.5. Conclusion

The interviews gave insight in how real estate decisions might support organizational sustainability goals, how the various real estate strategies affect organizational performance and how real estate performance is currently measured in daily practice. An answer to sub-question V “Which organizational corporate real estate management decisions are subject to strategic sustainability goals and how do these decisions affect real estate performance?” and sub-question VI “How is real estate performance connected with organizational performance and which performance indicators are used to measure the impact of strategic real estate decisions?” is provided in this paragraph.

The most frequently mentioned operational decisions that are subject to sustainability goals are quantity and mechanical systems. The means-end-chain for quantity is presented in figure 7.25. The main reason given why quantity is considered important is that using less real estate and thus less square meters results in a reduction of energy use and carbon emissions. Moreover, it is considered important because it results in changing requirements for the health and wellbeing of the building users, being more efficient in material use and a possible reduction of water usage. Hence, quantity seems to have a relation with the majority of the real estate performance areas except for collaboration and therefore affects all areas of organizational performance.

![Figure 7.25: Means-end-chain of quantity (n=10, a relation is established when mentioned by n>2)](image)

All participants also mentioned mechanical systems. The means-end-chain for mechanical systems is presented in figure 7.26. The main reasons given why mechanical systems should be subject to sustainability goals are energy, pollution, water and health and wellbeing. Some participants also mentioned materials. Taking these sustainability aspects into account, mechanical systems might affect the majority of the real estate performance areas except for collaboration and controlling risks.

![Figure 7.26: Means-end-chain of mechanical systems (n=10, a relation is established when mentioned by n>2)](image)
Although mentioned slightly less often, the majority of the participants consider location as an important operational decision subject to sustainability goals. The means-end-chain for location is given in figure 7.27. It is noteworthy that the presumed impact of location on the sustainability variables is less than the previous mentioned decisions and is primarily restricted to transportation. However, two advisors emphasized the importance of location because the vehicle fleet is often one of the biggest emission factors of an organization. The main reason given why location and transport are considered important besides sustainability is employee satisfaction. Other reasons mentioned are employee productivity, flexibility, cost reduction and marketing and sales. These real estate performance areas together might affect productivity, competitive advantage and profitability.

![Means-end-chain of location](image)

Figure 7.27: Means-end-chain of location (n=8, a relation is established when mentioned by n>2)

The last frequently mentioned operational decision subject to sustainability goals is company space. The means-end-chain for company space is given in figure 7.28. All companies that specifically mentioned company space state that they try to choose design and materials in such a way that it contributes in the best possible way to a circular economy. By doing so, company space is considered important because of materials, waste and health and wellbeing. These sustainability categories together might affect the majority of real estate performance areas except for collaboration.

![Means-end-chain of company space](image)

Figure 7.28: Means-end-chain of company space (n=6, a relation is established when mentioned by n>2)

The means-end-chains as presented above give an overview of the most important real estate decisions subject to organizational sustainability goals and how they might affect real estate performance. Based on the views of the participants can be concluded that the various sustainability areas together are mostly mentioned in relation to cost reduction, which corresponds with their leading real estate strategies and drivers for sustainability. However, it is also notable that employee satisfaction seems to receive considerable attention given the high ranking of health and wellbeing. Leading comprehensive real estate strategy statements that combine various real estate strategies, such as new ways of working and the war on talent, seems to anticipate mostly on cost reduction and employee satisfaction, whereby sustainability is implemented as a matter of course as much as possible. Other frequently mentioned real estate performance areas that are relatively often related to are marketing and sales and value of assets.
From all real estate performance areas based on the real estate strategies, only employee satisfaction, employee productivity, flexibility and innovation are mentioned in relation to all aspects of organizational performance. Cost reduction, marketing and sales and controlling risks are mentioned to both profitability and competitive advantage. Collaboration and culture are mentioned in relation to competitive advantage and productivity. Value of assets is mentioned only in relation to profitability.

The performance indicators used by the participants to measure their real estate performance cover various categories of performance, although it seems that basic indicators such as costs, area and employees are still most frequently used. However, it is notable that five out of seven participants have an insight into basic real estate sustainability performance indicators by benchmarking their CO2 footprint and energy costs. Waste, water and energy usage and energy labels are also mentioned by the majority of participants, as well as health and wellbeing oriented indicators such as indoor quality and qualitative employee satisfaction surveys.
8. Conclusion and recommendations

This chapter combines the results from the theoretical framework and the information that can be drawn from the cross-case analysis to provide the conclusion of this research. Moreover, it reflects on the results and provides recommendations for further research and daily practice. The first paragraph (§8.1) provides answers to the main research question “What is the potential added value of sustainability decisions for the performance of the real estate portfolio and for the organization as a whole?” by combining the conclusions that form the answers of the drafted sub questions as discussed in chapter 1. The next paragraph (§8.2) reflects the perspective of the researcher and discusses the theoretical and practical value of the research and the process in which this research has been established. The subsequent paragraph (§8.3) provides recommendations for corporate real estate managers and suggestions for further research. The last paragraph (§8.4) concludes this chapter.
8.1. Conclusion

The conclusion is drafted by answering the main research question. The main research question and the resulting sub-questions together reflect the research objective. The main objective of this research was to develop a real estate performance management framework that gives insight in the added value of strategic corporate real estate sustainability management decisions for organizational performance.

The aim of the research objective was to gain more insight into how to add value to an organization by implementing sustainability measures within the real estate portfolio. An adequate performance management framework is needed to align corporate real estate decisions with the long-term organizational goals and objectives and to actually obtain an understanding of the value added with strategic corporate real estate management. Figure 8.1 illustrates the corporate real estate performance management framework that includes all fundamental elements that should be taken into account when managing the sustainability performance of the corporate real estate portfolio.

Figure 8.1: Corporate real estate sustainability performance management framework
To add value, the corporate real estate sustainability management targets must be derived from the strategy statement’s mission and objectives. By doing so, a real estate strategy that is fully aligned with the corporate strategy statement and therefore provides optimal added value to an organization, can be drafted. In relation to sustainability, this means that the strategy statement must contain a specific corporate sustainability strategy statement that is leading for the real estate sustainability strategy statement. Based on the drafted strategy statement, each source of competitive advantage composes its input that affects real estate and sets the real estate sustainability targets. These targets are the main input for the corporate real estate management organization. The input is processed in collaboration with the other four sources of competitive advantage on all strategy levels of corporate real estate management to generate a certain output. The output provides guidance for aligning the operational real estate decisions with the corporate sustainability goals. The outcome of the operational real estate decisions determines performance.

The most frequently mentioned operational decisions that are mentioned as subject to strategic sustainability goals are quantity, mechanical systems, location and company space. An overview of the relations between these operational decisions, real estate sustainability performance, real estate performance and organizational performance for each of these operational real estate decisions is captured in the means-end-chains that are presented in figure 8.2 to figure 8.5.

![Means-end-chain of quantity](image1)

**Figure 8.2: Means-end-chain of quantity**

Operational decisions considering the quantity of the corporate real estate have a relation with the real estate sustainability areas health and wellbeing, materials, energy, pollution and water. In the mental representation, there is causal relation with all real estate performance variables as included in the management framework.

![Means-end-chain of mechanical systems](image2)

**Figure 8.3: Means-end-chain of mechanical systems**
Operational decisions that affect mechanical systems have a relation with health and wellbeing, materials, energy, pollution and water. In the mental representation, there is causal relation with all real estate performance variables, except controlling risks.

Figure 8.4: Means-end-chain of company space

Decisions regarding company space have a relation with health and wellbeing, material and waste. In the mental representation, there is causal relation with all real estate performance variables.

Figure 8.5: Means-end-chain of location

The location of real estate has a relation with transport. In the mental representation, there is causal relation with increase employee satisfaction, increase employee productivity, increase flexibility, promote marketing and sales and reduce costs. In general, regarding the real estate performance areas based on the real estate strategies, a relation with all aspects of organizational performance is found for employee satisfaction, employee productivity, flexibility and innovation. Cost reduction, marketing and sales and controlling risks are related to both profitability and competitive advantage. Collaboration and culture are related to competitive advantage and productivity. Value of assets is only related to profitability.

The performance indicators used by the participants to measure their real estate performance covers various categories of performance, although it seems that basic indicators such as costs, area and number of employees are still most frequently used. However, it is notable that the majority of the participants have an insight into basic real estate sustainability performance indicators by benchmarking their CO2 footprint and energy costs. Waste, water and energy usage and energy labels are also mentioned by the majority of participants, as well as health and wellbeing oriented indicators such as indoor quality and qualitative employee satisfaction surveys.

The presented figures are additional to the corporate real estate sustainability performance management framework in order to provide insight in the relations between real estate sustainability decisions and the various areas of performance. Hence, the management framework combined with the means-end-chains can be used as a guidance to manage corporate real estate sustainability performance strategically. It provides insight in all relevant aspects of corporate real estate sustainability performance management and the way real estate sustainability affects
real estate performance. In addition, it provides guidance for how specific areas of real estate performance might influence organizational performance. By doing so, the corporate real estate management department can select and prioritize its performance measures according to the corporate sustainability strategy statement for each relevant aspect of performance, making the framework quantitative. When the performance variables and corresponding performance indicators are selected, the differences between real estate sustainability performance and real estate performance requirements can be analyzed. Results from this analysis provides valuable information for the stakeholders. Providing a double loop feedback that communicates between stakeholders, corporate management and the corporate real estate management department that considers both the internal and external corporate environment generates a controlling system and continuous input for both corporate and corporate real estate strategy. The outcomes on both real estate performance and organizational performance provide an ongoing input for the stakeholders to benchmark and communicate results, manage and adjust strategy when needed and to make rational and deliberate real estate sustainability decisions that lead to an improved corporate real estate performance.

8.2. Reflection

A number of remarks should be made to interpret the results of this research correctly. The following section reflects on the literature that forms the foundation of this research and the methodology used to arrive at the results as presented in this research.

Various literature sources have been assessed to conduct this research. Although the number of literature regarding sustainable real estate is growing, theories concerning implementation of sustainability as a real estate strategy are rather scarce. However, combining existing strategic corporate real estate management literature with the more general real estate sustainability literature provided a solid foundation for this research. This research provided the academic field of corporate real estate research with scientific based evidence and best practices on how to positively affect real estate performance by implementing a real estate sustainability strategy, based on both tacit knowledge of mature corporate real estate departments and an extensive amount of existing literature. Hence, this research established various relations between real estate sustainability, corporate real estate performance and organizational performance. By doing so, it determines the relations between various areas of organizational real estate performance management that were undefined in the provided existing management frameworks. In addition, this research provided the academic field of corporate real estate research with a new research method that has proved to be valuable to capture the explicit knowledge of corporate real estate managers and therefore brings academic research and daily practice together.

Regarding daily practice, this research provides corporate real estate managers with characteristic examples that provides guidelines to successfully implement and manage a real estate sustainability strategy. In relation to the five characteristics that a business performance framework should meet, the proposed framework meets all five characteristics to a large extent. First, by considering both exchange value and use value strategies, it contains both financial and non-financial measures. In addition, it contains internal and external measures by taking both corporate and real estate strategy into account. Second, the framework involves input from all corporate resources, making it multidimensional. Third, the framework represents real estate performance fairly simple and is open for interpretation and adjustment based on the specific characteristics of each organization. Fourth, it integrates the various levels of strategy and various functions. Fifth, the framework also considers the drivers by involving both corporate and real estate strategy. Hence, it enables the possibility to compare input, actual outcome and desired outcome with each other. Moreover, it provides guidance to select and prioritize specific areas of real estate performance and corresponding performance indicators. Last, even although the provided framework is not quantitative in itself, it provides a solid foundation to develop a tailor-made quantitative framework that meets all the requirements to manage all areas of sustainability performance as determined in the corporate sustainability strategy statement.
In addition, this management framework can be used to make rational decisions. The first part, concerning alignment of the corporate real estate sustainability strategy with the corporate strategy, or the differences between actual performance and desired performance, defines the problem. The various performance types and performance variables as presented in the framework provide guidance to identify the decision criteria and to allocate weights to the criteria. Due to a variety of alternatives to influence specific performance variables with the operational real estate decisions, alternatives can be developed and evaluated with decision-making frameworks such as the preference based portfolio design framework or multi-criteria decision analysis to select the best alternative.

It is also notable that the real estate sustainability performance variables energy, materials and health and wellbeing are mentioned most often in relation to real estate performance. Analysis of the real estate sustainability assessment methods showed that these three variables happened to receive a considerable focus compared to the other criteria. The majority of the participants is well known with assessment tools, especially BREEAM. Hence, it seems that the criteria with the highest weights receive more attention from the corporate real estate managers than less weighted criteria. However, further research should reveal whether these sustainability variables actually add more value to the organization.

Based on the literature, it was expected that, although the corporate real estate management departments have become more mature over the years, the real estate strategies are not or partly aligned with the corporate sustainability goals. Although the results vary per participating organization, it seems that almost all participating companies somehow aligned their real estate sustainability goals with the sustainability goals of their organizations. However, it must be noted that a few measures are only taken from the sustainability point of view. Without exceptions, all participating organizations indicated that cost reduction was still the leading driver for implementation of sustainability within the real estate portfolio and only one mentioned ethical corporate behavior additionally. A possible explanation for the increase in alignment of the real estate sustainability strategy with the organizational sustainability goals might be stricter legislation related to sustainability and an increasing social awareness regarding the subject. This result in supporting sustainability as an extrinsic motivation for organizations, while the intrinsic motivation is mostly profitability.

Moreover, existing literature suggested that implementing a sustainable real estate strategy might affect both economic aspects, such as occupancy costs and real estate value, and building-use related aspects, such as employee satisfaction, marketing and sales, work engagement and employee productivity. However, research relating to these subjects was limited. The results from this research show that the organizations that are consciously working on implementation of a sustainable real estate strategy, share this view to a large extent. Cost reduction was mentioned most frequently as a benefit from the various sustainability variables, followed by increase employee satisfaction as the second most frequently mentioned benefit. However, all participating organizations followed the recent corporate real estate management trend new ways of working with densification of their real estate portfolio, which is mainly implemented from an economic point of view. This also explains why quantity is mentioned by all organizations. However, it is noteworthy that the motives to implement sustainability might differ when implementing a sustainability strategy in a different way. Also value of assets and promote marketing and sales were mentioned frequently as important, which was expected based on existing literature. On the other hand, employee productivity was considered relatively less important.

The original focus of this research was on the relation between real estate performance and organizational performance and the way this can be measured in order to provide a tool for making strategic real estate decisions. Implementation of the CNET protocol required decision, situational, attribute and benefit variables. However, corporate real estate performance and organizational performance can best be seen as benefit variables. Therefore, the theme sustainability was added to provide decision and situational variables. This resulted in broader
aim of this research, adding the relation between operational decisions and sustainability performance and the relation between sustainability performance and real estate performance. This certainly provided some valuable new insights that can be used in daily practice and for further research, but it changed the type of research from explanatory to a more exploratory research. On the other hand, it is notable that using a laddering technique in corporate real estate management research is a relatively less applied and valuable method to identify underlying motives of corporate real estate managers and therefore very useful for descriptive and exploratory research.

The used list of sustainability categories and variables presented in a closed format was too technical for the majority of the participants. Most participants were able to identify the specific categories that were considered important as subject to sustainability goals and could openly speak about the measures taken and why they were considered important. However, presentation of the complete list of variables often resulted in confusion among the participant, increasing the time needed to retrieve the correct answers and the likelihood of biases. So although it seemed more practical to apply a closed format, it is advisable to limit information given to broad categories and let the participants themselves explain what is important and why when using a laddering technique.

The means-end-chains are the outcome of the conducted interviews. A variable was included in the means-end-chain when mentioned by more than two participants. However, no clear rules could be found regarding the establishment of relations between variables when performing qualitative research. In the end, the means-end-chains would look different when for example \( n>1 \) or \( n>5 \) was maintained within this research. Therefore, although it is made clear when a relation is included, the chosen criterion has a significant impact on these specific results. Therefore, it must be noted that the final results of this research do not exclude relations that are not specifically included in the means-end-chains as presented in this research. However, the actual means-end-chain as a result from all individual interviews showed no remarkable changes after processing approximately half of the interviews. Hence, it is expected that conducting additional interviews among organizations with comparable corporate real estate management departments will not result in new insights regarding the matter. However, it must be noted that this method is subjective, although it does ensure validity in a certain sense.

Moreover, the conducted semi-structured interviews were held among seven participating organizations in various large national and international organizations and three real estate consultants. It was a very time-consuming and relatively prolonged process to retrieve the contact information of the corresponding corporate real estate managers and to schedule the appointments to actually conduct the interviews. In order to prevent delays, it is advisable to start this process in an earlier stage, even when the theoretical framework is not entirely drafted. In addition, conducting the actual interviews and processing the results was a time-consuming process as well. The length of each interview was approximately one and a half hour and for some participants this seemed not enough to discuss all relevant answers and a few questions had to be sent afterwards. This resulted in slightly less comprehensive answers. This could be prevented in future research by limiting the list of decisions or only discuss the most important ones, because experience shows that interviewees tend to dwell on each subject and illustrate it with an example.

8.3. Recommendations

This section discusses further recommendations based on this research for corporate real estate managers and for further research within the academic field of corporate real estate management.

8.3.1. Recommendations for corporate real estate managers

For organizations who have the ambition to implement more sustainability within their real estate portfolio, it is recommended to reflect on their CREM department and current management practices. In order to actually add value to the organization with a sustainable real estate portfolio,
CREM practices have to be mature. Thus, the real estate strategy must be fully aligned with the corporate strategy. Moreover, the corporate strategy statement must involve corporate sustainability in such a way that real estate sustainability targets can be derived from the strategy statement. When real estate sustainability targets are set, a custom-made real estate performance management framework can be established that should contain at least the following five processes:

I. **Inventory, selection and design of measures.** Within this process, the current measures are mapped and evaluated to connect with the real estate and corporate sustainability targets. If necessary, new measures should be selected and designed in order to fully align the performance measurement framework with sustainability targets.

II. **Data gathering.** This includes the process of collection and manipulation of the data in order to perform suitable data analysis.

III. **Information management.** Information management includes the actual decisions making process. Gathering the outcome of the data analysis and comparing the results forms the input for decision-making. The results as discussed in paragraph 8.1 can be used as guidance for the decision-making process and to select the right operational decisions for the right real estate sustainability targets.

IV. **Evaluating performance.** This includes evaluation of the sustainability performance on all organizational levels.

V. **Review of outcomes.** Various review procedure should be implemented within the measurement framework to ensure the double-loop mechanism that provides both the real estate strategy and corporate strategy with up-to-date input at the first process.

These five steps give an overview of the necessary processes to implement a suitable and fit for purpose real estate performance management framework. However, because the real estate performance management framework should contain all important aspects of the strategy statement that distinguish the organization from its competition, the explicit details of the management framework differ for each organization. However, the strategic corporate real estate sustainability performance management framework as discussed in paragraph 8.1 can be implemented as a performance management system that provides guidance to successfully implement and manage sustainability within the corporate real estate portfolio.

### 8.3.2. Recommendations for further research

The literature concerning the impact of corporate real estate on organizational performance and frameworks for real estate performance measurement outline performance management as fairly straightforward. However, this relation seems to be much more complicated and although the real estate strategy is nowadays often aligned with the corporate strategy, it seems that corporate real estate management does not have a clear view on the actual impact of real estate performance on organizational performance. So although this research does outline the presumed impact of various areas of real estate performance on the organization, each relation found should be further examined in order to prove the actual relation. In the end, the conducted research is explorative and descriptive instead of prescriptive. However, this research shows that laddering methods are useful for capturing the underlying motives of corporate real estate managers and organizations that are subject to certain decisions and corporate behavior. Therefore, this method can be implemented in various fields of corporate real estate research to gain more insight into the motivations for specific decisions in daily practice to provide the academic field of corporate real estate management with additional scientific based evidence and best practices.

In addition, most of the mentioned sustainability measures are related to the physical building characteristics, although two participants mentioned their communication and information systems as subject to sustainability goals as well. This assumes that corporate real estate managers mainly try to affect the maximum sustainability potential, which is determined by the physical building characteristics, and are less involved in the actual sustainability performance itself, which is influenced by the non-physical building characteristics. However, theory into how to optimally affect these non-physical characteristics and best practices is lacking. Therefore, it is
recommended to further examine this matter in future research. Furthermore, it seems that the criteria based on the sustainability assessment tools with the highest weighs receive more attention from the corporate real estate managers that less weighted criteria. However, it is unclear if these variables actually add more value to the variables and the added value of these variables should therefore be further explored.

Moreover, this study has a wide focus involving operational decisions, sustainability performance, real estate performance and organizational performance resulting in relatively superficial relations between the used variables. However, to find more detailed relations between variables and eventually perform quantitative research, future research within this field should contain fewer variables. In addition, the conducted interviews made no distinction between various sectors and regions, which is mainly a result of a lack of respondents. It might be possible that certain relations differ for certain sectors or across regions, resulting in different conclusions and recommendations for specific sectors and regions. Finally, it is recommended to perform quantitative research regarding the causal relation between sustainability performance, real estate performance and organizational performance to make (parts of) this framework quantitative. Although this research reflects the findings of mature corporate real estate management departments, the number of respondents is limited. By performing quantitative research, it becomes easier to establish and proof relationships between the various variables.

8.4. Endnote

This research provided both the academic field of corporate real estate management and daily practice with valuable new information in relation to sustainable real estate management. In addition to existing theory, this research provided new insights in real estate sustainability decisions, various areas of performance and mutual relations between these areas, useful as an input for further research. It provided insight in a method to capture tacit knowledge, which proved to be valuable for establishing new relations between variables. Corporate real estate managers can use the proposed management framework based on scientific based evidence and best practices as a guidance to successfully implement and manage sustainability within the real estate portfolio and to make deliberate and strategic real estate sustainability decisions. Hence, this research adds value to the academic field of corporate real estate management and daily practice.
Bibliography


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