



EVALUATING THE IMPORTANCE OF SUSTAINABILITY IN THE PROJECT MANAGEMENT PROCESS

Master Thesis

Supervisor: XXXXXXXXXXXXXXX

Student: Martin Padickakudy

Abstract

Sustainability is getting more and more attention till the 1980s. Organizations should not only focus on profit and expansion, but do this in a way, which will not compromise the chances of the next generations. As projects are getting more attention throughout different sectors, sustainability should be implemented within the project management lifecycle and not only for the output.

The literature is mentioning a missing link between project management processes and sustainability. This gap was closed the last 10 years, as more research was conducted in this area. A common opinion among researchers is that sustainability must be implemented in the project management processes as this leads to a long-term success of the organization.

During this research a multi method approach is chosen to address the objectives defined for this project. A structured secondary data analysis will be performed to get the current status of this topic. After analysing the data, the possibilities and limitations of this topic will be discussed. Additionally, an interview will be conducted with an expert on sustainability, who has a project management background.

After collecting, analysing and evaluating the collected data, it appears as sustainability plays an important role while conducting projects. Organizations are implementing sustainable factors to their values and processes and integrate it into the strategic perspective of the company. This strategic perspective must be translated into operational goals, which are executed on a daily basis.

Throughout the literature, a higher focus on sustainability was recognized. Organizations and societies are trying to deliver value and simultaneously consider environmental and social aspects. The thinking, that economic growth is the only important factor for organizations and societies is shifting, it becomes more important to deliver value in a holistic view, integrating environmental, economic and social factors.

The aim of the research was to show the importance of sustainability in project management processes. The link between sustainability and project management was discovered and the growing importance shown. Training and education are needed to fully integrate sustainability in the mindset of future project managers. Additionally, new tools and techniques must be developed to address sustainability and help the project team to fully integrate and understand the value and benefits of it.

Declaration of Originality

This project is all my own work and has not been copied in part or in whole from any other source except where duly acknowledged. As such, all use of previously published work (from books, journals, magazines, internet, etc) has been acknowledged within the main report to an item in the References or Bibliography lists.

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I acknowledge that the copyright of this project and report belongs to Coventry University.

Signed:

A handwritten signature in blue ink, appearing to read 'M. B. King', is written over a faint, light blue rectangular stamp.

Date: 06.12.2019

Acknowledgement

First of all, I want to thank the almighty God for his blessing and his help throughout my entire life. I want to thank some people who supported me during my life and helped me to reach my goals.

My parents who helped me my whole life, supported me during difficult times and never doubted me for a second. My brother, who I can count on no matter what problems I have, go for advice and who will always be there for me.

A very special thanks goes to my girlfriend and wife-to-be, who is not only the most important support in my life, but also my source of inspiration and joy. She always stays by my side, supports my decisions, make me think and will have my back no matter what, thank you for that.

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List of abbreviation

APM	Association for Project Management
BRE	Building Research Establishment
BREEAM	Building Research Establishment Environmental Assessment Methodology
CAW	Centre for Academic Writing
CSR	Corporate Social Responsibility
CU	Coventry University
EPA	Environmental Protection Agency
EU	European Union
GDPR	General Data Protection Regulation
ICB	Individual Competence Baseline
IPMA	International Project Management Association
kBTU	Kilo British Thermal Unit
KPI	Key Performance Indicator
LEED	Leadership in Energy and Environmental Design
NGO	Non-Governmental organization
PERT	Program Evaluation Review Technique
PMA	Project Management Austria
PMI	Project Management Institute
PRINCE2	Projects in controlled environments 2
PRISM	Projects integrating sustainable methods
PRME	Principles for Responsible Management Education
SAPM	Sustainable agile project management
SP2	Sustainable projects in controlled environments 2
TBL	Triple Bottom Line
UNCED	United Nations Conference on Environment and Development
USGBC	United States Green Building Council
WBS	Work Breakdown Structure
WCED	World Commission on Environment and Development

1. Introduction

1.1. Aim of the research

In our current economic situation, change plays an important role; projects are delivering new products and benefits for organizations which addresses those changes (Petala et al. 2010). Due to our limited resources available and other restrictions, sustainability is getting more important. Sustainability was neglected for a long time, economic growth and profit was more important (Silvius and Schipper 2014b). Several authors recognise a change in thinking as sustainability becomes more important and gets more attention within organizations (Silvius et al. 2017; Martens and Carvalho 2016; Sánchez 2014; Silvius 2012).

Sustainability in general got more attention due to climate change and other happenings, but the topic sustainability in project management is quite new; the last 10 years more research was conducted in this area. Projects are delivered using some kind of project management methodology; therefore, sustainability should be implemented, not only in the organization, but also in the practical methodologies to address sustainability within projects as this topic will play an important role in the future (Martens and Carvalho 2017).

In the modern era, it is impossible to grow and adapt to changes as an organization without taking sustainability e.g. protecting the environment or benefitting the society into account (Chofreh et al. 2019; Martens and Carvalho 2016). Organizations use projects to integrate changes into their businesses and deal with the fast-paced environment. As one major goal of organizations is to grow and increase profitability, this goal leads to conflicts with sustainability, as growth in business means less attention on environmental and social factors (Purvis, Mao and Robinson 2018). It is important for the organization to embed sustainability into their values and try to take all aspects of sustainability (economic, environmental and social) into account.

As the construction industry is mainly working in projects, the focus will be on this industry and especially the sustainability aspect of it. The main centre of interest will be the sustainable thinking during the projects and the impact of the project for the future concerning economic, environmental and social sustainability.

This paper will focus on sustainability in project management, what role it plays and how it is integrated and if not, how it could be implemented. Additionally, obstacles and limitations are discussed as well as the benefits described.

1.2. Method of research

A structured literature review will be performed to cover the current understanding of the topics sustainability, project management and project management methodologies. After careful evaluation of the data, two case studies will be presented and analysed. Additionally, the author will conduct an interview with an expert in the field of sustainability, who has a

background in project management to get an insight into his knowledge in that area. The results of the literature review and the case studies/interview will be discussed and critically evaluated.

1.3. Relation to studies

As the author has a background in Engineering and Project Management, the studies should demonstrate the knowledge of those areas especially focussing on Project Management.

1.3.1. Relation to sustainability

Sustainability plays a crucial rule, most of the organizations and countries are aware of the importance of this topic. During his undergraduate studies, the author completed several modules on sustainability, sustainable economic activity and how to incorporate sustainability into the values of an organization.

As this topic is a hot topic at the moment, many discussions arise and the importance to act and take sustainability seriously is given. The way, mankind threats this topic today will define the future of the next several generations and this should be in every person's head.

1.3.2. Relation to Project Management

As the author has a working knowledge in project management as well as an educational background of this topic, it was his intention to apply this knowledge and link it with a topic, which is becoming more and more important. Change is constantly happening and organizations way of dealing with change is through projects, which are an essential part of the business at the moment.

Project Management is a discipline, which will become more important due to changing environments and the author wants to actively participate and address this topic.

1.4. Objectives of the research

As every dissertation needs a justification, the objectives of the research are:

1. Understand the concept of sustainability
2. Identify reasons why sustainability is not taken into account in project management processes
3. Discover the link between Project Management and Sustainability
4. Examine the definition about sustainability within different project management associations in order to identify the differences
5. Review the topic project management
6. Research about agile and sustainable project management methodologies
7. Perform a systematic literature review to compare different research methods
8. Analyse the different aspects/areas of sustainability

9. Compare two projects in the construction industry
10. Assess the impact of sustainability for project management processes
11. Summarise the benefits and obstacles of sustainable project management processes
12. Suggest an addition to the TBL
13. Prove the importance of sustainability in project management

These objectives will be answered throughout the dissertation and in chapter 8 summarized again.

1.5. Approach

A mixed method approach is performed to understand the concept of sustainability and project management. Sustainability will be closely analysed and future challenges will be discussed. A deeper research about project management, its methodologies and the link between sustainability and project management will be analysed and summarized. The use of case studies and the performance of an interview should assist the points made in this dissertation.

2. Literature Review

2.1. Introduction

This chapter discusses the main topics of this dissertation with assistance of papers published in renowned journals and books. A short summary of each topic will be presented and structured in a way, which provides the reader the necessary information to deal with the topics. Furthermore, the collection method of data is described and what databases are used to gather all the needed information.

2.2. Collection of data

2.2.1. Sources of data

The data collected for this dissertation is mainly from reports, publications in peer-reviewed journals and books. After carefully reviewing the data, it should be summarized and presented in chapter 2.3. Additionally, an interview will be performed to get further information. This interview will be with an expert, who has knowledge about sustainability and project management.

2.2.2. Method of collection

This research will be carried out as a multi-method approach, first a literature review will be performed, journal articles and books will be critically analysed (Saunders, Lewis and Thornhill 2019). Six important databases with focus on management and sustainability will be used to search for relevant articles. The six databases are:

- Business source complete
- Green file
- Academic search complete
- Science direct
- Emerald
- Scopus

Articles are considered, which were published in the timeframe from 2008-2019 in well-respected journals. The keywords for the search in the databases are:

- Sustainability AND project management
- Sustainability AND Project Management Methodology
- Sustainability AND Project
- Sustainability AND Project Management AND Project Management Methodology
- Project Management Methodology AND Agile
- Project Management Methodology AND Agile AND Sustainability

The search with the combination of the keywords provided following results:

Keywords	Results			
	<i>Greenfile & Business Source Complete & Academic search complete</i>	<i>Science Direct</i>	<i>Emerald</i>	<i>Scopus</i>
Sustainability AND project management	7644	8202	>3000	11459
Sustainability AND Project Management Methodology	778	162	55	139
Sustainability AND Project Management AND Project Management Methodology	17785	258649	>25000	173425
Project Management Methodology AND Agile	228	120	59	300
Project Management Methodology AND Agile AND Sustainability	3	54	14	43

Figure 1: Results of database search

After careful evaluation of the literature, an expert from PMA in the field of sustainability with a project management background will be interviewed to get his opinion on sustainability and what could be done to improve the sustainable way of working for project managers.

2.3. Areas of research

This research project covers several topics, which are described in chapter 2.2.2. (keywords). Furthermore, a combination of the topics sustainability and projects management will be analysed and the literature available critically reviewed.

2.3.1. Projects

Axelos (2017) mentions, that due to constant change of the business environment, business as usual is getting more challenging. Furthermore, new products and ways must be introduced to organizations to cope with this aspect and work as a modern-day business. Projects and programs offer this kind of possibilities, as they are unique, temporary, have a certain budget and timeframe and need one or more specific objectives.

Many companies are shifting their way of working to projectized concepts as projects allow them to adapt quicker to changing environments, customer needs and legal issues (Chofreh et al. 2019). Projects as well as programmes are designed to generate value for the company, either profit wise or growth of the company (Purvis, Mao and Robinson 2018).

The result of a project can be a product, a new process/way of working or a service. It is managed on day-to-day basis and the person responsible to deliver the big picture and the product, service or process is the project manager (Wells and Kloppenborg 2015). Projects use the iron triangle to define the quality, time and cost aspects of it seen in figure 2.

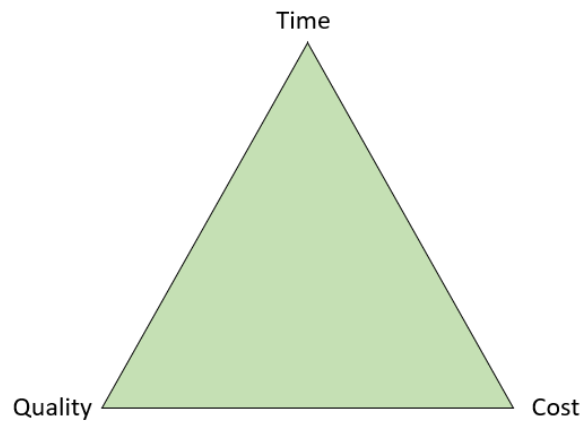


Figure 2: Iron Triangle

The three dimensions are related, a change in one dimension leads to changes in one or both other dimensions. Most organizations use this triangle to simply show the cost, time and quality aspects of the project. This triangle is also used by the main project management organizations and in their standards.

There are some leading organizations which address the topic of project management. For this research only the APM, which is part of IPMA, and PMI will be considered. As each organization created its own standards, there are slightly different but the core elements in both of them are uniqueness, a given timeframe, a defined budget and the need to achieve certain objectives.

2.3.1.1. APM definition

According to the APM body of knowledge (Association for Project Management 2019), 'projects are unique, transient endeavours, undertaken to bring about change and achieve planned objectives, which can be defined in terms of outputs, outcomes or benefits. A project usually deemed to be a success if it achieves the objectives according to their acceptance criteria, normally within an agreed timescale and budget'.

Projects are temporary and therefore, temporary organizations are set up, apart from the organizational structure, to manage and execute the project (Association for Project Management 2019).

2.3.1.2. PMI definition

According to the PMBOK (Project Management Institute 2017), the definition of a project is 'a temporary endeavour undertaken to create a unique project service or result'. The nature of projects is temporary and after delivering the objectives the project closes down.

Each organization and institution have its own definition of project even though they have many similarities. Projects are part of the organization and project management is responsible for planning and executing the project.

2.3.2. Project Management

Project Management was handled as additional business process, not really worth of considering it to become a big part in the organization. This thinking changed, Project Management shifted to one of the important business processes and is necessary for the company to cope with the changing environment and customer needs (Kerzner 2017). Project Management is the management of change (Katsarelis and Adamopoulou 2014).

Every organization has objectives and goals which it wants to achieve. According to Silvius and Goedknecht (2012a), the operational business secures profits, market shares and other financial aspects. Every company needs to review their goals and objectives and need to change them, if they are not achievable. This change comes through projects, which is also shown in figure 3. Change is implemented through projects which deliver an asset to the organization's way of working.

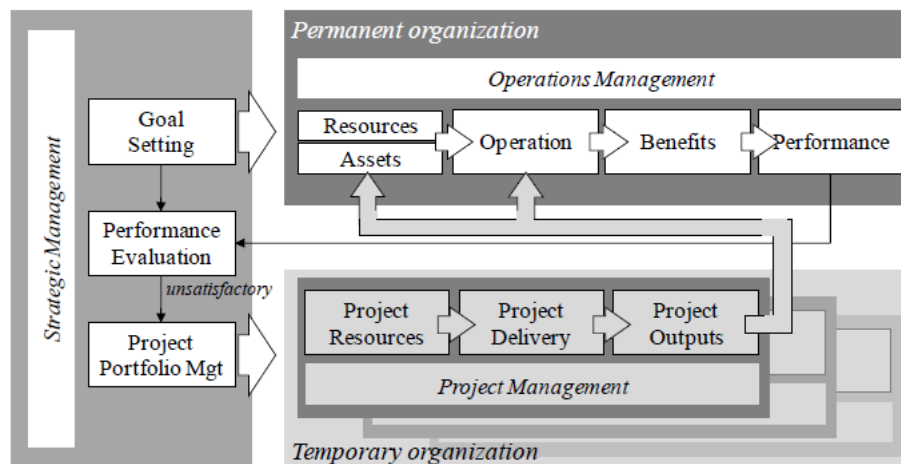


Figure 3: Companies structure with permanent and temporary organization (Silvius et al. 2017)

Changes were part of our history, the roots of projects and project management as a profession can be found in ancient times.

2.3.2.1. History of project management

Projects were performed throughout the history e.g. the construction of the great wall in China or the pyramids in Egypt. The origin of the word project comes from the combination of two Latin words, pro which means forward and jacere which means throw. It means to throw forward or translated to modern language to plan (Aichelle 2006). Henry Gantt was one of the most important pioneers in this discipline, his study of Navy ship building developed a widely known and commonly used scheduling tool, the Gantt-Chart (Silvius et al. 2017).

According to Layton and Ostermiller (2017), modern project management was introduced in the middle of the twentieth century. The United States military used formal project management processes to complete projects. The Critical Path method and the PERT (Program Evaluation Review Technique) analysis were used to schedule project tasks and define the duration in combination with the Gantt-Chart.

Throughout the time, several bodies and institutions of project management were created in different parts of the world. The IPMA and PMI are the leading organizations in the field of the project management profession (Lock 2013). In 1965 the International Project Management Association (IPMA) was founded in Austria, 4 years later in 1969, the Project Management Institute (PMI) was established in the United States of America. The Association for Project Management (APM) was found 1972 in the United Kingdom, which is part of the IPMA (Maylor 2010). These institutes promote the profession, develop standards and provide certifications for members. Since that time, the organizations constantly develop their standards and integrate new topics, which are related to project management to deal with the changing environment.

2.3.2.2. *Project Management definitions*

Each project management organization has its own definition of project management, the differ in some points but have similarities too.

2.3.2.2.1. *APM*

The APM sees Project Management as ‘application of processes, methods, skills, knowledge and experience to achieve specific project objectives according to the project acceptance criteria within agreed parameters’ (APM 2019).

2.3.2.2.2. *PMI*

Project management is ‘the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements’ (PMI 2019).

2.3.3. *Project Management Processes*

The project management process is divided into 5 different steps, each one of them is describing a different part and time in the project (Project Management Institute 2017). In figure 4, the process is shown simplified. The Monitoring and controlling process is interacting with the planning and execution processes, which is not shown in figure 4. Each process will be summarized shortly (Project Management Institute 2017):

- **Initiation:** In this phase the projects starts, the feasibility of the project will be checked and the project charter and the basic supporting documents created
- **Planning:** All necessary documents are created and the plan to execute the project is developed
- **Execution:** Delivers the output of the project according to the plans of the planning stage
- **Monitoring and controlling:** The progress is monitored and the achievement of objectives controlled; if an anomaly occurs, adjusting actions are carried out
- **Closing:** Delivery of project and acceptance by owner; formally close of project

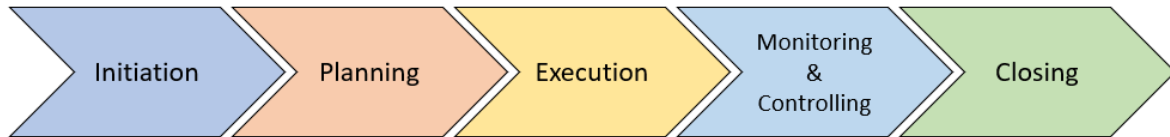


Figure 4: Project Management Process

These processes are integrated in each of the organizations way of performing projects and also in different type of project methodologies which will be introduced in chapter 2.3.5.

2.3.4. Project Management methodologies

A methodology is a set of guidelines or principles which can be tailored for a specific situation (Charvat 2003). Sustainability can be integrated into different project management methodologies, in chapter 2.3.4.1. and 2.3.4.2. two methodologies will be described which are very suitable for the sustainable principles or have already integrated it.

2.3.4.1. Agile methodologies

Agile methodologies are getting more popular and more organizations and companies use them to deliver their projects. Agile Project Management has its roots in software development: 2001 a group of developers met in Utah, United States of America, and described the process of software development (Beck et al. 2001). This group of 17 developers introduced the principles and values of software development and created the agile manifesto (Layton and Ostermiller 2017). The four values of the agile manifesto are:

- ‘Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan’ (Beck et al. 2001)

These are the fundamental principles of agile software development projects. The 17 developers discussed several points of agile development and summarized their results in the agile manifesto, which is the core of agile methodologies which is described in chapter 2.3.4.1.2.

2.3.4.1.1. What is an agile methodology

Agile methodologies use iterative cycles to deliver the product or parts of it at an early stage. Continuous improvement of the product and the processes, team collaboration, stakeholder engagement and scope flexibility are key values of the agile methodology (Layton and Ostermiller 2017). In agile so-called sprints are used, which are described in figure 5.

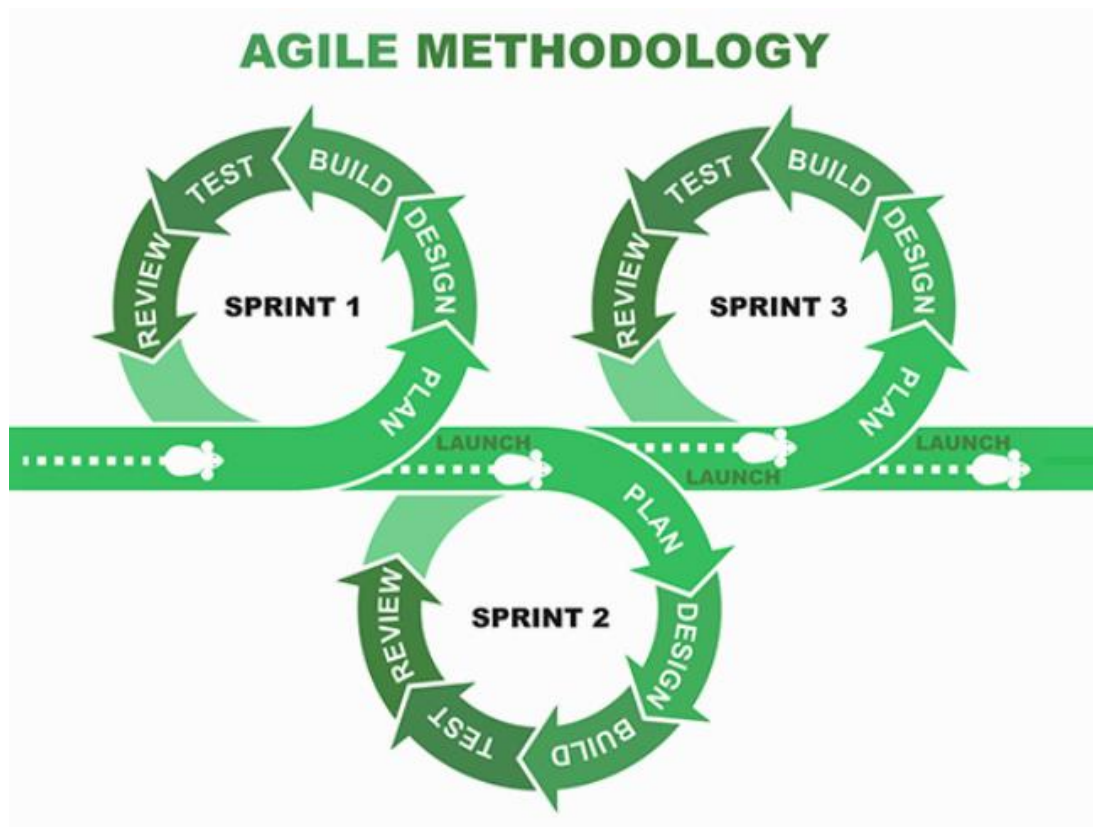


Figure 5: Agile Project Management process (Openxcell 2017)

These are iterative circles, where the steps planning, design, build, test and review are included. Each iterative circle lasts between 2 and 4 weeks and each step is carried out in the sprint. At the end of each stage a review of the stage is conducted and what was learned during this cycle, which should be applied in the next one. Constant stakeholder engagement and interaction between business and developers ensure, that the product at the end is according to the requirements and the customer is satisfied (Layton and Ostermiller 2017).

2.3.4.1.2. The Agile Manifesto

The agile manifesto consists of several principles, which have to be applied and followed to ensure an agile approach in projects. These principles are (Beck et al. 2001):

1. 'Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
4. Business people and developers must work together daily throughout the project.
5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
7. Working software is the primary measure of progress.

8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
9. Continuous attention to technical excellence and good design enhances agility.
10. Simplicity--the art of maximizing the amount of work not done--is essential.
11. The best architectures, requirements, and designs emerge from self-organizing teams.
12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behaviour accordingly.' (Beck et al. 2001)

These principles should guarantee, that the project runs smoothly; collaboration with the customer, welcoming changes until the final delivery stage and the other principles assist the team in their work.

2.3.4.1.3. Why use agile methodologies

According to Rico (n.d.), there are many benefits for the use of agile methods. As this approach has daily stand ups, where the members describe, what they did yesterday and what they are planning to do today, everyone in the team gets an idea, what the other members are doing. Agile methodologies are very popular in software development projects because stakeholders are highly engaged throughout the project. In contrast to the traditional methodologies e.g. waterfall methodology, where the product is delivered at the end of the project, agile methodologies deliver iteratively results to the customer in predefined cycles (Layton and Ostermiller 2017).

This has the benefit that the customer is UpToDate with the development and get an idea of what the final product will look like. An additional advantage is the possibility for change; in traditional methodologies changes cost more time and money if they are requested in the final stage of the project, agile methodologies welcome these changes until the end of the project. The business benefits from agile methodologies, which were analysed by Rico (n.d.) are:

- 'Higher quality due to constant delivery of part results
- Quicker time to market speeds which is crucial in some business areas
- Better overall business value
- Cost and time efficient due to constant delivery of part results and constant controlling' (Rico n.d.)

Agile methodologies deliver products in iterative cycles, where changes are embraced until the end as they create value and make the end product better. This change aspect can be found in sustainability; sustainable processes change the way organizations use to work. Therefore, the GPM introduced a new framework, the SAPM (Sustainable Agile Project Management). It combines the features of PRISM, which is described in chapter 2.3.4.2., with agile methodologies, to integrate the factors of sustainability into the methodology (Green Project Management 2019). SAPM has the goal to help project members understand the organizations sustainability values and how to incorporate them into their agile projects.

2.3.4.2. PRISM

PRISM (Projects integrating sustainable methods) is a project management methodology, which incorporates sustainable factors into the management approach. It combines economic, environmental, governance, social and technical aspects to deliver a framework, which is a merger of best practices from several standards (Katsarelis and Adamopoulou 2014):

- ISO 9000 Quality standards
- ISO 14000 Environment standards
- ISO 50001 Energy standards
- ISO 21500 Project management standards
- ISO 26000 Social responsibility standards

2.3.4.2.1. What are the ISO standards?

The International Organization for Standardization was found 1946 in London and wanted to create a new organization, which ‘facilitates the international coordination and unification of industrial standards’ (ISO 2019a). This organizations develops and publishes standards in almost every sector to have a certain level of quality and safety in any area of business. Those standards are developed and introduced by professionals from each sector to ensure a certain level of standardization and give professionals a guideline (ISO 2019b).

Another important point of acquiring a standard is the globalization. To deliver a product, often a collaboration between companies in different countries is needed. Each country could have their own standards regarding sustainability, social responsibility and other areas. If two or more companies work together it is important, that they have the same level of expertise and standardization to ensure a successful collaboration. Many big companies also look for ISO certifications from their suppliers, before the start collaborating as they want to ensure, that the supplier works according to ISO standards and has a certain level of proficiency.

2.3.4.2.2. PRISM methodology

The Green Project Management Organization introduced the PRISM framework, to address sustainability in project management. This framework includes several aspects of sustainability and integrates several ISO standards described in chapter 2.3.4.2.; it is focussing on long term benefits and the future generations. PRISM is working with the 5 Ps which are (Alvarez-Dionisi, Turner and Mittra 2016):

- People
- Planet
- Profit
- Product
- Process

This framework provides a better focus on the entire lifecycle of the project and the product. PRISM is the first framework introduced by the GPM, which actively addresses the topic sustainability and integrates it into the project as well as the product lifecycle.

2.3.4.2.3. PRISM principles

PRISM follows six principles, which are introduced to integrate sustainability and sustainable development into an organization. According to the GPM (Green Project Management 2019), the six principles are deviated from the UN Global Compact's Ten Principles, PRME (Principles for Responsible Management Education), Earth Charter and ISO:26000 Guidance on Corporate Social Responsibility. The organization is responsible to ensure the compliance with these principles (Green Project Management 2019):

- **Commitment and Responsibility:** The right for a safe and healthy environment, which supports equal opportunities, fair payment and respect the law
- **Ethics and Decision Making:** Follow organizational ethics and principles; prevent any harmful short and long-term impacts on society and environment
- **Integrated and Transparent:** Be aware of the interrelationship of social integrity, environmental protection and economic development
- **Principal and values based:** Look after natural resources and improve the usage of them and the development of new technologies
- **Social and ecological equity:** Evaluate human exposure to ecological sensitive areas
- **Economic prosperity:** Introduce strategies that balance current stakeholder needs and also of future generations

These principles must be applied in the framework and throughout the project. PRISM uses ISO standards and also standards from other organizations e.g. UN Global Compact standard, to deliver a way of planning and executing projects in a sustainable way (Katsarelis and Adamopoulou 2014). This framework can be applied within most project management methods e.g. Agile, PRINCE2 but in order for this framework to be successful, the organization must follow the principles and values of PRISM.

2.3.4.2.4. Green Project Management

The Green Project Management Organization was found 2009 and the goal of the organization is to implement sustainability into project management. It developed the PRISM methodology and framework and delivers trainings to companies and individuals. Several certifications are available and can be received after training and examinations. They follow the 6 principles from PRISM, which are described in chapter 2.3.4.2.3. and work according to the principles of sustainability provided by the United Nations (Green Project Management 2019).

2.3.5. The role of the project manager

Every project needs a leader, which is the project manager. According to APM Body of knowledge (Association for Project Management 2019), the project manager is responsible for the day-to-day management of the project. It is important, that he or she has knowledge

of the different methods and practices used to deliver a project successfully, but also strong soft skills are important to communicate effectively with his team (Layton and Ostermiller 2017). A project manager should have a variety of skills e.g. good leadership skills or conflict management skills and should lead by example.

According to Silvius and Schipper (2014b), project managers are the ones, who are in contact with the project every day and it would be beneficial, if they understand the concept of sustainability and the importance and value it brings to the project. They also have a certain influential role in projects, their knowledge and way of working could influence the project in a positive way. According to Deland (2009), project managers need a practical sustainability framework to really integrate it into projects, but to successfully use such a framework, competences and knowledge must be build up and the project managers must be educated and trained in this area (Silvius and de Graaf 2018; Silvius 2012; Gareis, Huemann and Martinuzzi 2010).

If properly educated and trained, the project manager could influence the project very much and help integrating sustainability into the processes of project management. This step requires the organization to develop itself and integrate sustainability into its values; if the organization did this step, the project manager can provide input to the projects of the organization and explain the possibilities sustainability offers in projects (Silvius and Schipper 2014a).

2.3.6. Sustainability

The topic sustainability is getting more attention from manufacturers, customers, suppliers and communities around the world. It is of utmost importance to integrate sustainability into the company's way of working and its core values (Chofreh et al. 2019). The word 'sustainability' comes from the Latin verb *sustinere* which means to maintain or to endure (Robertson 2017). In 1992, the United Nations defined sustainability during the UN Conference on Environment and Development (UNCED) as 'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. This topic becomes more and more important especially at times, where resources are scarce, climate debates are all over the media and global crisis is in the head of the societies (Chofreh et al. 2019).

2.3.6.1. Sustainability – the basic definitions

Humans are living on planet earth, the planet which provides us with everything we need to survive, grow and evolve. The concept of sustainability is the basic understanding of the link between economic growth, environmental quality and social equity (Pfister, Schweighofer and Reichel 2016). As economic growth became more important, human societies used more resources to satisfy their need, which led to an exploit of those resources. The way of living in industrial countries and the economic growth are responsible for harming the balance (Rasouli and Kumarasuriyar 2016). The idea behind sustainability is that resources of the earth cannot be used and exploited indefinitely (Portney 2015). The resources are limited and will disappear if overused e.g. water is limited and if this resource is overused, it will vanish. This would have

a huge impact on life, not only humans, also the wildlife and other parts as water is the key to life (Portney 2015).

In 1972, the Club of Rome presented a report, the limits of growth (Meadows et al. 1972 cited in Pfister, Schweighofer and Reichel 2016). This report was based on mathematical simulations and showed the correlation between growth and natural resources; the report predicted, that due to overuse of resources, fatal consequences would follow for global health and the environment (Pfister, Schweighofer and Reichel 2016).

As this paper focuses on sustainability in project management, topics like air pollution or water crises will not be discussed, even though they are of utmost importance for the topic and must be considered to get a holistic view on sustainability and the impact.

2.3.6.2. History of sustainability

The history of sustainability is a long, highly discussed and actively evolving one. Many people from different professions tried to analyse this subject and point out the key facts. The United Nations and its different departments were introduced to tackle this topic on a global level. The discussion about the importance and the areas of sustainability continues, but this topic must be taken into consideration to avoid serious harm to us, our planet and our future.

The history of sustainability will be briefly summarized in chapters 2.3.6.2.1. – 2.3.6.2.4.

2.3.6.2.1. The first steps

Pfister, Schweighofer and Reichel (2016) mention, that societies and human beings rely on the use of natural resources to grow and satisfy their needs. This phenomenon was already discovered in ancient Rome, where authors like Lucius Junius Columella or Marcus Terentius Varro recognised the effects of resource exploitation and economic growth. They understood the concept and relationship between the environment and people as well as how the negative effects could be removed to increase human well-being and the economic situation.

Hans Carl von Carlowitz, a German forester, made similar assumptions about the environment and human well-being. He described the negative effect of harvesting wood from the same forests in a continuous way in his text 'Sylvicultura Oeconomica' (Caradonna 2014). He also introduced a sustainable way to gather woods from the forests from a long-term perspective (Scoones 2010).

Portney (2015) mentions, that another root of sustainability can be found in the United Kingdom. Thomas Malthus, an economist and country pastor described the situation in the eighteenth century; an increase in food production led to a growing population. He developed the theory, that the growth of the human population will lead to the collapse of the human civilization as well as the natural resource systems. The only way to control the situation was to control the population growth.

Since that time, many documents were found, in which the basic idea of sustainability is mentioned (Caradonna 2014). The relationship between social well-being, economic growth

and environmental responsibility was clearly recognised and a systematic thinking was introduced at that time (Portney 2015).

2.3.6.2.2. Getting recognition and unite the people – start of the UN conferences

Many other people analysed this relationship and developed theories and assumptions about it, but the most significant event for the term sustainability and especially sustainable development as we know it today, was the publication of the report 'Our common future' by the United Nations World Commission on Environment and Development (WCED) in 1987 (Pfister, Schweighofer and Reichel 2016). This report introduced the term sustainable development, but it was not new (Dresner 2008). The term was already used by the World Council of Churches and the International Federation of Organic Agriculture Movements.

This report, which is also called the Brundtland Report, after the commission's chair, former Norwegian prime minister Gro Harlem Brundtland, describes and promotes sustainable development and the need to change economies and societies (World Commission on Environment and Development 1987). The definition of sustainability and sustainable development says that, 'sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development 1987).

Scoones (2010) mentions another important conference hosted by the United Nations, which was held in Rio in 1992. The United Nations Conference on Environment and Development (UNCED) was attended by members of 178 representatives, presidents from many countries and more than 1000 NGOs. The Agenda of this conference covered various topics such as climate change, biodiversity and desertification. The goal of this conference was to put the focus on sustainability and sustainable development and link it with global environmental issues.

Additionally, national action plans for local communities were established which covered social and economic sustainability, conservation and management of resources for development or the strengthening the role of major groups (Anon 2007).

Another important report was the Kyoto protocol, where countries obligate to reduce the emission caused by them (Schulze 2007). This protocol was created by the United Nations Framework Convention on Climate Change (UNFCCC) and was put into force in 2005. Nevertheless, the goals and binding agreements to reduce greenhouse-gas are very unlikely to be met, as some countries failed in their attempt and will not be able to achieve their goals (Henson 2011).

2.3.6.2.3. The challenges and obstacles

The goals defined in the conferences, especially the ones in the Brundtland report, were very ambitious. The members of the UN committed to those goals, but economical thinking and especially lobbying undermined the ambitions and so the United States of America did not participate (Scoones 2010). The other states, which committed to the report, faced several

challenges while developing and implementing new agencies, which should tackle the given tasks (Scoones 2010).

As the goals were not met and progress was slow, critiques argue, that the ambition from governments and the new created agencies is not visible to implement and reach the set targets (Vogler and Jordan 2003). A big part why these institutions and states failed was due to their politics, the power of lobbies in the countries and not committing to the targets set out.

2.3.6.2.4. Present situation

Scoones (2010) analyses, that after several conferences and creation of new institutions the members must admit that the goals set at the conferences were too ambitious. Politics, bureaucratism and other factors influence the achievement of that goals. But due to climate change and the risks associated with this, organizations have the opportunity to enforce this topic once again, set revised goals and thrive it to become an important topic around the globe.

2.3.6.2.5. Future of sustainability

According to Thiele (2016), technological developments and social changes are frequently happening, change is in every part of the daily life. Donald Rumsfeld, former US secretary of defence pointed out several important factors: Human beings know that there are some known unknown and there are unknown unknowns. Sustainability is a topic which lives from its past, but has an unknown future. Learning from the past is essential as the challenges which will arise are not even known at the moment.

2.3.6.3. *The triple bottom line (TBL)*

A key element to sustainability is the Triple-Bottom line (TBL). One of its roots can be found in the Brundtland reports, where the three parts of sustainability are explained, which are economy, environment and social (Portney 2015). John Elkington developed and introduced this concept and encouraged organizations to measure and assess their performance not only on profit, but use the 3 Ps instead: profit, planet and people (Henriques and Richardson 2004). These three pillars or circles as shown in figure 6 and figure 7 are thriving the sustainability topic which are (Purvis, Mao and Robinson 2018):

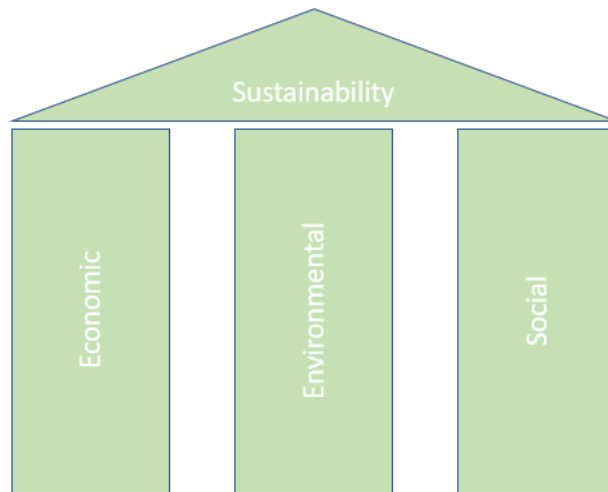


Figure 6: Three pillars of sustainability (Purvis, Mao and Robinson 2018)

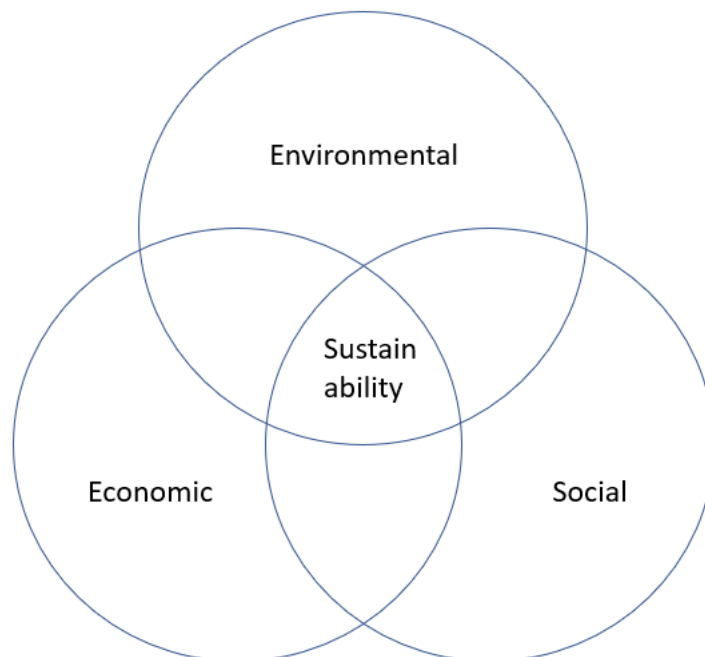


Figure 7: The circle diagram (Geisdoerfer, Vladimirova and Evans 2018)

According to the concept of the TBL, achievements in one pillar or circle should not have a negative impact on one of the other pillars or circles (Portney 2015). A common argument among experts is the fact, that in reality the growth in one pillar leads to a decrease in another one e.g. if the economic pillar grows, one of the other pillars must decrease (Purvis, Mao and Robinson 2018). This thinking is highly theoretical, because if the TBL approach is used for real word problems, there will be a decrease in one pillar or circle as the real world is much more complex and many more factors play an influential role (Jacques 2015).

Therefore, certain principles must be applied and followed to ensure, that sustainability and sustainable development is possible. The principles, which are designed by Herman Daly, state that (Jacques 2015):

- Renewable resources should not be gathered faster than they are renewed
- Non-renewable resources should not be exploited faster than new replacement products are introduced

According to these principles, the environment delivers human beings a limited amount of resources. These resources should not be overused to maintain a level, where the next generation still has the same possibilities as the former ones.

2.3.6.4. Sustainable development

Sustainability and sustainable development are often used as synonyms, which is wrong. While sustainability explores the link between the TBL factors, sustainable development is describing the process of development, which meets the needs of the present and the future generations (Rogers, Jalal and Boyd 2008). Sustainable development tries to balance different needs and try to incorporate the TBL factors, but there is a trade-off between environmental protection and economic growth (Pfister, Schweighofer and Reichel 2016; Blewitt 2015). According to Rogers, Jalal and Boyd (2008), sustainable development is influenced by political forces, which need to be aware of the importance of developing the society but also taking economic, environmental and social factors into consideration.

It is important to understand the fact, that the natural resources are limited and if we take more than that, the resources will vanish and not be available anymore. Sustainable development should meet current needs but also those of the next generation (World Commission on Environment and Development 1987). The current generation must understand, that the way we currently manage and develop is not sustainable (Enders and Remig 2014). Resources and other areas such as the climate should be protected and not exploited. Therefore, organizations and the societies should pay attention to the use of resources and try to use them in the most efficient way (Tricco et al. 2016). Not only are societies and organizations advised to look out for environmental factors but also the human side of sustainability, which is included in the Corporate Social Responsibility.

2.3.6.5. Corporate social responsibility

Corporate Social Responsibility (CSR) is getting more attention from organizations; it addresses customers, employees, suppliers and several other stakeholders (Schwartz 2009). According to Crane, Matten and Spence (2014), many different definitions of CSR are existing, which can be found in different resources as this topic is still evolving. The basic idea of CSR is for organizations to consider the impacts on the human factor and behave and treat their human factors ethically correct and with respect.

Sustainability is getting more attention on a global level, organizations and societies are trying to include sustainability into their values and way of working. A part of organizations business is project management, where sustainability needs to be introduced to achieve greater benefits.

2.3.7. Sustainability in project management

Several authors recognized, that in the last 10 years, the importance of sustainability in project management became widely recognized (Silvius et al. 2017; Martens and Carvalho 2016; Økland 2015). When talking about sustainability in projects, it is important to differentiate between sustainability of the product the project delivers and the project processes, which are used during the project (Carvalho and Rabechini Jr. 2017; Martens and Carvalho 2016; Silvius and Schipper, 2014b). If an organization decides to integrate sustainability into their Project Management, several aspects of the usual way of working in that organization changes, especially the system boundaries and the scope (Silvius et al. 2017). Project Management should not be seen as one task it must be seen as a holistic approach integrating economic, environmental and social factors, not only into the product of the project, but also in its processes (Silvius et al. 2017; Martens and Carvalho 2017; Gareis, Huemann and Martinuzzi 2010).

2.3.7.1. *Projects and change*

It is important to focus on the daily operational business of an organization, but change is a constant part while conducting business and organizations need to integrate this change into their values, systems and processes. Marcelino-Sádaba, González-Jaen and Pérez-Ezcurdia (2015) cited in Silvius et al. (2017) mention, that 'projects are the ideal instrument for change management'. Additionally, the change needed will be accelerated by using project management with sustainability. This opinion is commonly recognized by many researchers (Cerne and Jansson 2019; Silvius et al. 2017; Martens and Carvalho 2016; Silvius and Schipper 2014a).

2.3.7.2. *Challenges and limitations*

Several challenges are recognized from many researchers. They argue, that integrating sustainability will cause additional costs, as no appropriate materials and supplier are available for projects (Hwang and Tan, 2012). A qualitative research performed by Carvalho and Rabechini Jr. (2017) disproved this assumption.

Another challenge is the lack of knowledge within an organization about sustainability. For too long, economic KPIs were used to define, if the organisation is performing on the desired level. So only economic factors were addressed, environmental and social aspects were neglected. The organizations are moving toward a more sustainable way of development but knowledge about sustainability must be implemented into the organization to achieve sustainable development (Silvius et al. 2017; Carvalho and Rabechini Jr. 2017).

Several other challenges exist, which will be discussed in chapter 5.4.3., 6.3.3. and 7.3.1.

2.3.7.3. Benefits Management

Benefits management describes the 'identification, definition, planning, tracking and realisation of business benefits' (APM 2019). It should ensure, that a change implemented into the organization achieves maximum outcome. According to Badewi (2016), benefits management plays an important role in project management. The term benefits management is often used interchangeably with the term benefits realisation.

2.3.7.3.1. Use of benefits management in projects

According to the Association for Project Management (APM 2019), organizations use benefits to measure the positive impact of the change, which is delivered through the project, but also negative impacts on a short-term, which are called disbenefits.

The purpose of benefits management is the maximization of the value of the project and make the most out of the change. According to Melton, Yates and Iles-Smith (2011), there are several key roles in the benefits management approach:

- Organizations role: Responsible to integrate benefits management approach on portfolio, programme and project level
- Project Owner: Integrate benefits in the objectives of the project
- Project Manager: Manage the project on a day to day base and ensure concentration on defined benefits

The organization, the project owner as well as the project manager have the responsibility to focus on the defined benefits and try to achieve them.

2.3.7.3.2. Benefits management process

The benefits management process in project management consists of 5 steps (APM 2019):

- Define benefits management plan
- Identify and structure benefits
- Plan benefits realisation
- Implement change
- Realise benefits

The project could deliver benefits, which are measurable e.g. cost saving or non-measurable e.g. reputation of the company (APM 2019). The benefits management should be considered throughout the project, but needs to be implemented in the organization first (Melton, Yates and Iles-Smith 2011). Sustainability should be considered in benefits management, so the organization understands the value of sustainability and also integrate it into their projects (Brook and Pagnanelli 2014). If the project objectives are formulated in a way, that sustainability was already integrated, the project team would focus on achieving the

objectives and measure the progress with KPIs, which allow sustainability to be an integral part of the project and deliver the benefits of it.

2.3.7.4. APM Definition of sustainability

According to the APM body of knowledge, 'sustainability is concerned with balancing the environmental, social, economic and admirative aspects of project-based work to meet the current needs of stakeholders without compromising or overburdening future generations' (APM 2019).

Sustainability describes an environmental, social and economically integrated approach to development that meets present needs without compromising the environment for future generations (APM 2019).

2.3.7.5. PMI Definition of sustainability

The PMI stats, that 'sustainability is about how organizations manage financial, social and environmental risks to ensure their business can continue to operate, regardless of obstacles such as resource shortages, environmental disasters, and social and political events. It also relates to green practices and business continuity planning, as well as stakeholder engagement' (PMI 2019).

2.3.7.6. Sustainability in Construction

The construction industry is the largest one, which operates almost entirely with projects. It has a huge impact on the environment and can be considered as one of the big players regarding sustainability (Robertson 2017). The need for green buildings is rising. Throughout the projects, different aspects of sustainability are important e.g. reduce of energy consumption or use of sustainable materials. A number of certification programmes are used worldwide, to assess the level of sustainability of a construction project. In this dissertation, two of them will be analysed as they are part of the case studies, which are BREEAM and LEED.

2.3.7.6.1. BREEAM

According to Rezaallah, Bolognesi and Khoraskani (2012) was the Building Research Establishment Environmental Assessment Method (BREEAM) developed in the United Kingdom in the 1980s by the Building Research Establishment (BRE). The primary market of BREEAM is still the United Kingdom, the majority of its certifications are awarded to residential buildings.

BREEAM offers different kinds of certification levels, which are (BREEAM 2019):

- Pass ($\geq 30\%$)
- Good ($\geq 45\%$)
- Very Good ($\geq 55\%$)

- Excellent ($\geq 70\%$)
- Outstanding ($\geq 85\%$) → Highest possible certification

Each level has certain requirements which need to be fulfilled to be eligible to get the certificate with the aimed level. According to Roderick et al. (2009), a certified assessor is working with the company and evaluates the project according to defined standards from BRE, which addresses energy use, materials for construction and other categories. The assessor will calculate the score with tools and submit the report to BRE.

BREEAM certified projects consider their impact on the environment, the project management process and the health & wellbeing of the local community and the society, which is directly related to the TBLs factors (Roderick et al. 2009).

2.3.7.6.2. LEED

The commonly used program to assess the sustainability of construction projects in the United States is the Leadership in Energy and Environmental Design (Roderick et al. 2009). According to Azhar et al. (2010) was this framework developed in 1998 by the United States Green Building Council (USGBC) and can be used for any kind of construction project as it can be adapted.

LEED has different kinds of certification, which are (Azhar et al. 2010):

- LEED Certified
- LEED Silver
- LEED Gold
- LEED Platinum → Highest possible certification

The highest possible score in LEED is the Platinum with 110 points; several aspects of the project will be reviewed e.g. sustainable site, resource efficiency or looking after the local community. To get the LEED certification the project team needs to submit forms with the desired LEED certification to the Green Business Certification Incorporated. They will review the forms and approve the certification for the project (USGBC 2019).

Like BREEAM, LEED accredits construction projects this certificate, which considered sustainability in their project life cycle and also for the afterlife of the project.

2.4. Conclusion

To fully understand sustainability in project management, it is important to have a basic knowledge in each area. In chapter 2, sustainability and project management were introduced and several important aspects highlighted. After considering the topics as individuals, the combination of sustainability and project management was explored. Furthermore, an insight into construction projects and especially the sustainable certification programmes was provided. The reader got the basic information which will assist him/her throughout this research to understand concepts, methods and different areas.

In chapter 3, the research methodology will be introduced. Different aspects of research methodologies will be presented and analysed and the justification for the methods chosen to conduct research explained.

3. Research methodology

3.1. Introduction

Every research needs a reason, there is no research without an aim (Kumar 2019). The objectives, which were mentioned in 1.4. should be addressed in this research. Therefore, appropriate tools and methods must be used to answer those objectives. In this chapter, the term research will be explained and the philosophy behind research analysed. Different methods will be investigated and possible sources for data will be reviewed. Ethics plays an important role in research; it will be investigated in more detail and the reasons for considering it presented.

After the structured review of the research methods, the chosen method will be explained which will finalize this chapter.

3.2. Research

Research has different meanings in different disciplines, but the purpose of it is to investigate questions, explore issues and find answers to the research questions (Kumar 2019; Clough and Nutbrown 2012). According to Kumar (2019), research is a process for collecting, analysing and interpreting information, but this process must meet certain criteria's to be eligible to qualify as research (Kumar 2019):

- Rigorous: The process must be relevant, appropriate and justified to get to the answers.
- Systematic: A certain logical sequence must be followed.
- Valid and verifiable: The results are correct and could be verified by others.
- Empirical: Results are evidence based from collected information, experiences or observations.
- Critical: A precise verification of the tools and methods used must be done, which has to be valid and withstand examination from others.

Every research should have a clear purpose, the findings should be analysed and interpreted and it should also have a link to the real world and also provides a better understanding of the it (Saunders, Lewis and Thornhill 2019). It is possible to use different kind of methods or approaches to get to the answer, starting from informal ones until scientific ones (Kumar 2019).

3.2.1. Research philosophy

Every research is associated with assumptions about the nature, how the world is experienced and how this could be understood in the best possible way (Saunders, Lewis and Thornhill 2019). There is nobody, who could describe the best way to understand the world, therefore it is of utmost importance to describe the approach, which was taken, to understand, analyse

and answer the research questions and problems addressed by them. To understand the philosophy, several terms must be understood, to choose the right method and methodology to solve the research problem.

3.2.1.1. *Ontology*

Ontology describes the starting point of all research, it can be seen as a set of views, which the researchers use or have to describe the problem (Leavy 2017). Ontological assumptions, which are drawn by the researchers are impossible to disprove empirically. Grix (2019) is arguing, that the terms Ontology and Epistemology must be distinguished and not used as synonyms.

3.2.1.2. *Epistemology*

Grix (2019) describes epistemology as the theory of knowledge in regards to methods, validation and the ways of gaining knowledge in social realities. It describes the way something exists, which the researchers assume to be valid. The word epistemology comes from the Greek word episteme (knowledge) and logos (reason) (Greenfield and Greener 2016).

3.2.2. *Research process*

Saunders, Lewis and Thornhill (2019) research onion shown in figure 8 demonstrates the path of finding the right methods to collect data for the research. The starting point is at the outside with the philosophy, which is the first step. After going through the different layers, the researcher will choose and justify the method used to collect data and analyse it

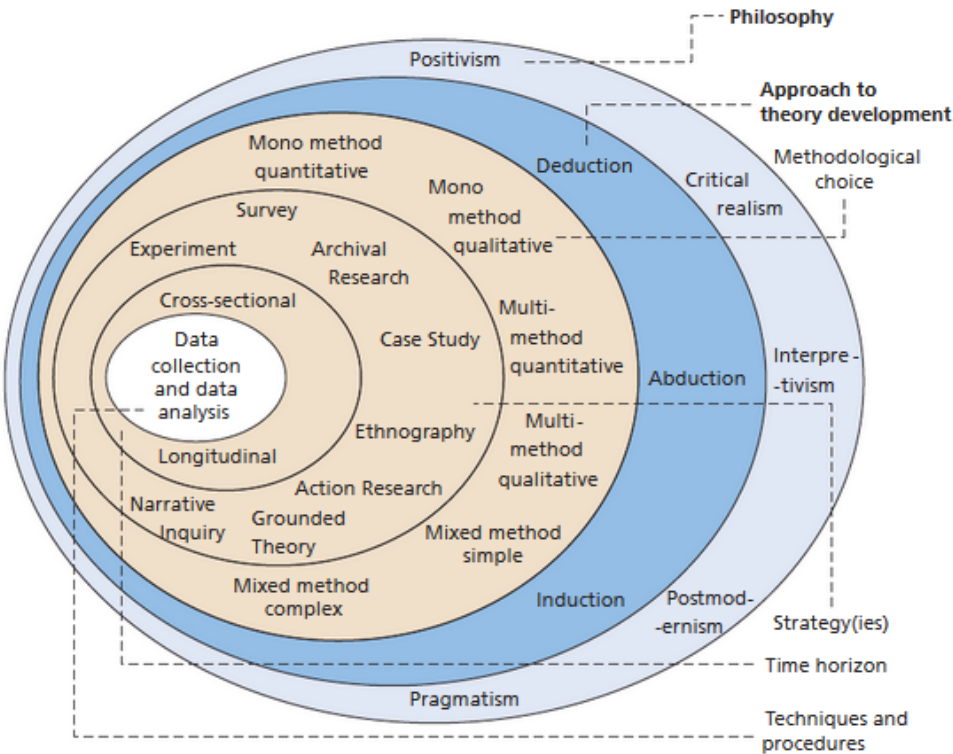


Figure 8: Research Onion (Saunders, Lewis and Thornhill 2019)

The research onion from Saunders, Lewis and Thornhill (2019) will be used for this research as it provides well-grounded methods and tools to collect and analyse data. To understand the methods and tools, the most appropriate ones for this research will be analysed and presented.

3.2.3. Qualitative research

Qualitative research follows an open, flexible and unstructured approach to collect data (Kumar 2019). It requires an in-depth investigation of knowledge of different methods and techniques (Grix 2019). According to Bouma and Carland (2016), qualitative research focuses rather on impressions and feelings than measurable data. Collecting data with a qualitative method is done in a descriptive and narrative way and not in an analytical manner (Kumar 2019).

Researchers using a qualitative method such as interviews or observations (see figure 9) are more flexible and can be more appropriate for the context of the research (Greenfield and Greener 2016). Ethics in qualitative methods play a vital role as the researcher have contact with people, he/she is interviewing or observing; confidentiality issues arise out of this context and must be taken seriously (Grix 2019).

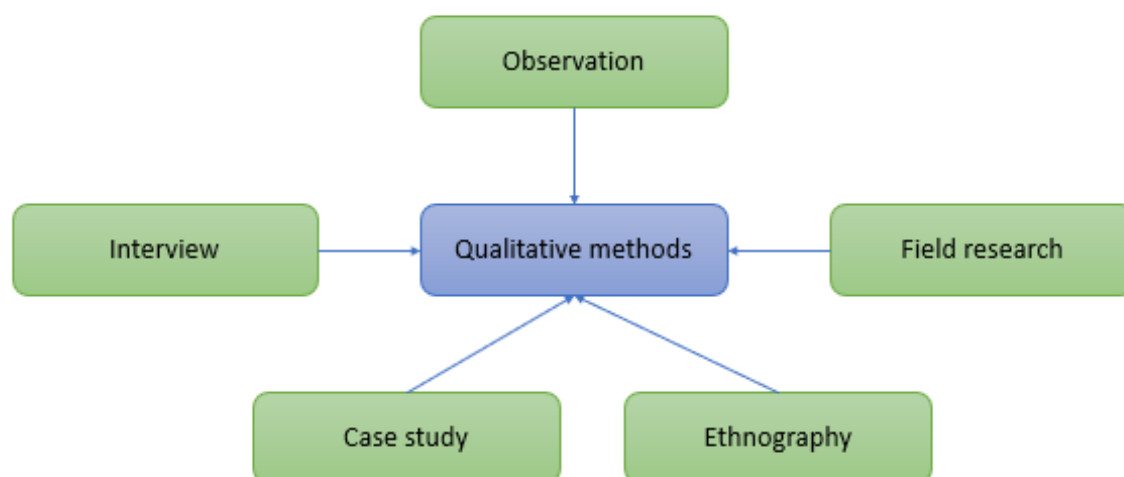


Figure 9: Qualitative methods (Queiros et al. 2017)

3.2.4. Quantitative research

Saunders, Lewis and Thornhill (2019) mention, that quantitative research is often associated with data collection which generates numerical data. Quantitative research is often used to collect and analyse data to check theories with the use of different methods e.g. questionnaires (see figure 10). In contrast to qualitative research, quantitative research focuses on variables and the relationship between them (Bell, Bryman and Harley 2019).

The goal of quantitative research methods is to collect numerical data from a group of people, understand the data and present it to a larger group so it is seen as generally valid. Researchers use quantitative research when they want to receive specific answers to a question (Leavy 2017).

Quantitative research can be used either in a mono-method or multi-method approach. The mono-method approach would be the distribution of a single questionnaire, the results are collected and analysed (Saunders, Lewis and Thornhill 2019). The multi-method approach would be the distribution of a questionnaire and also conducting an observation; a combination of two different methods from the set of quantitative methods is necessary (McBurney and White 2006).

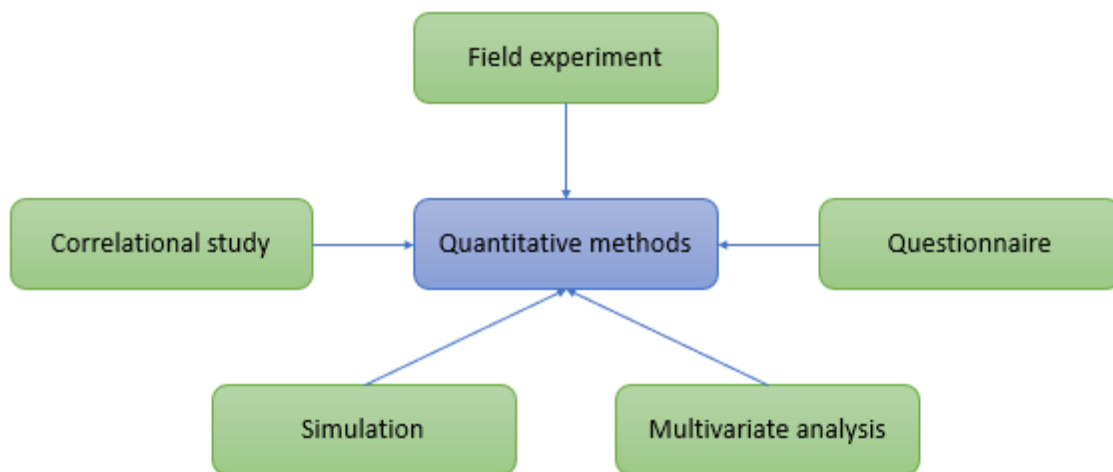


Figure 10: Quantitative methods (Queiros et al. 2017)

3.2.5. Inductive research

The aim of inductive research is to research and collect data to explore a phenomenon and create a conceptual framework (Saunders, Lewis and Thornhill 2019). Such research is not based on hypotheses, a theory is created and verified by the collected data (McNeil and Chapman 2005). Inductive research is often used (but not only) with interpretivist research and qualitative research (Grix 2019).

3.2.6. Deductive research

In contrast to inductive research, deductive research starts with a theory, which is generated after performing an academic literature review (McBurney and White 2006). The researcher designs a research strategy to test the theory and to conform or falsify the hypothesis (Grix 2019; Saunders, Lewis and Thornhill 2019). It is important, that enough theory is available for

the research and to create hypothesis based on that (Grix 2019). Deductive research is often used (but not only) with quantitative research (McNeil and Chapman 2005).

3.2.7. Research methods

Research can be performed with the mentioned research approaches mentioned in section 3.2.3. – 3.2.6. Researchers can use only one method e.g. case studies, which is defined as mono method. Only one type of method is used to collect data, analyse it and conduct the research (Grix 2019). Mono method research can be done in a qualitative but also quantitative way, the only requirement is to use only one of them (Bell, Bryman and Harley 2019).

If the researcher chooses to use more than one qualitative or quantitative method, it is considered to be a multiple methods research (Saunders, Lewis and Thornhill 2019). It is important that only quantitative or qualitative methods are used e.g. questionnaires and simulation.

The research can also be performed as a mixed method research, in this type of research a quantitative and a qualitative approach is used to perform the research (Kumar 2019). The researcher combines a qualitative and a quantitative method to gather data, analyse it and perform the research e.g. questionnaires and interviews (Saunders, Lewis and Thornhill 2019).

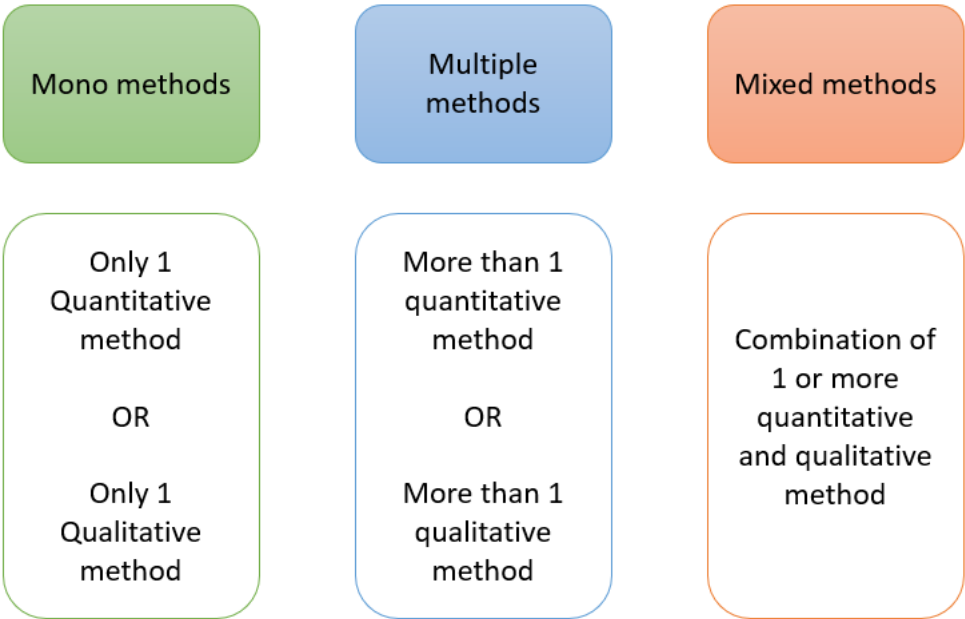


Figure 11: Research methods

3.3. Research methods and research methodology

According to Grix (2019), research methods and research methodologies are often wrongly used as synonyms or equal terms, but researchers need to differentiate between these two terms. Research methods are the techniques and processes to select, collect, organize and analyse data (Blaikie and Priest 2019). Both quantitative and qualitative research use methods

to gain information. The choice for certain methods used during the research is impacted by ontology and epistemology as well as the research questions, which need to be answered. The nature of methods is free from ontology and epistemology (McBurney and White 2006).

Methodology is the way including the methods to gain the knowledge and should not be confused with epistemology, which shows the philosophy of knowledge. It is the logic of scientific enquiry and is exploring the possibilities as well as the limitations of techniques or processes (Kumar 2019). Research methodology is the critical study of research methods, it is taking epistemology and ontology into consideration, not like the research methods which are ontology and epistemology free (McNeil and Chapman 2005).

3.4. Ethics

Ethics in research is a crucial topic, it is of utmost importance that the researcher understands the importance of this topic and uses the correct processes to avoid ethical issues (Simons and Usher, 2012). The research should include following items (Lo Piccolo and Huw 2009):

- Understand ethical research principals
- Demonstrate understanding of ethical issues of research method
- Show the research is done according to ethical rules

Each section is important and must not be neglected to ensure highest ethical standards.

3.4.1. Understand Ethical Research

While performing a research, literature will be reviewed, questionnaires will be created, distributed and analysed or interviews will be conducted. It is important, that the participants of questionnaires or interviews know the background of the research, why they have been chosen to take part and what kind of risk there is and what the result will be (Bell, Bryman and Harley 2019). There are principles, which must be followed by researches to ensure, that their research has no ethical issues and the participants are protected and know what they have agreed to. These principles are (Greenfield and Greener 2016):

- Minimise the risk of harm for the participants
- Collect informed consent form
- Protect anonymity and confidentiality
- Show benefits of the research
- Provide the participants the right to withdraw

Each principle is essential while conducting research, they should never be undermined or neglected. As ethics in research can vary slightly in different countries, these principles have a general validity and must be considered.

The most important point when talking about ethics in research is the fact, that participants of the research must be protected at any cause. The research should do something good (be beneficial) and also avoid doing harm to any part of the research. The author of this research

understands the importance of ethics and is ensuring to work according to the guidelines of the university and the ethical principles.

3.4.2. Ethical implications on research

For this research, case studies, books and an interview will be used to get the required data. As an interview has a high potential of ethical conflicts, the guidelines from Coventry University will be strictly followed. Several documents are created and handed out to the interview partner so he can understand the nature of the research, what data is collected, where it will be used and for which purpose. The documents are:

- **Participant information sheet:** In this document, all the relevant information is given to the interview partner, his rights to withdraw his consent to perform the interview, why he has been chosen, where the data will be stored and also the protection measures will be explained. He will also be informed of the publication of the results as well as the possibility for him to make a formal complaint, which he has to address directly to the supervisor of this dissertation.
- **Informed consent form:** This document should be filled out, after reading the participant information sheet carefully. There are several yes or no questions, which must be ticked by the interviewee. He has to answer questions like 'I am happy for the interview to be audio recorded'. After filling out the whole document, he signs it and sends it back to the researcher, before the interview will be conducted. With this sheet the interview partner acknowledges, that he read the participant information sheet and is comfortable with assisting the researcher with his work.

These documents are stored on the Coventry University OneDrive System. After conducting the interview, which was audio recorded (the fact was mentioned in the informed consent form which the participant signed and additionally mentioned at the start of the interview), the data was also uploaded to CU One Drive. These measurements should minimize the risk of data loss or theft.

As mentioned at the beginning of this chapter, case studies will also be used to collect data. As this data is secondary data, which is available online, the need to safe the documents on a safe drive is not given, if it does not include personal data or could be tracked down to certain people. It is important to ensure the anonymity of people, who contributed to the papers. The secondary data's source must be cited properly and if data is from a project inside the case study, the original project team must be asked for permission.

The files will be stored locally without additional security measurements, if there is no critical information in it. Nevertheless, secondary data also needs to be handled in the right ethical way and the ethical principles should not be neglected.

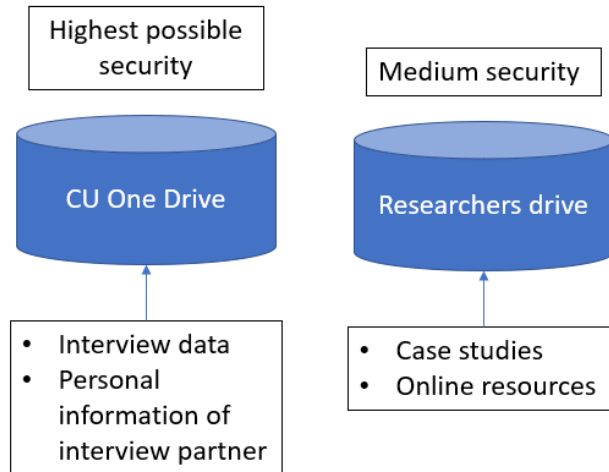


Figure 12: Data storage

As mentioned before, this research will strictly follow the ethical process of Coventry University, it has been approved by authorities and will be performed according to the data presented to the authorities. Any violation against Coventry University regulations has severe consequences and will lead to justification in front of academic committee.

3.4.3. Justification of following ethical guidelines

Chapter 3.4.1. and 3.4.2. demonstrates the importance of ethics in research. The impact on this research is shown and what the consequences are in case of misconduct. Several steps are taken to ensure, that no misconduct will happen.

3.4.3.1. Submission of ethical form in CU Ethic department

An application form for ethical research must be filled out on the ethic page of Coventry University. After the form is completed, the supervisor will approve this form. If any aspect is missing or could lead to ethical issues, the application will be rejected and sent back for correction. If the application form is approved by the supervisor, an authority person from CU for ethics will review the application (see figure 13). After final approval, the researcher gets his/her approval certificate, which can be found in appendix A.

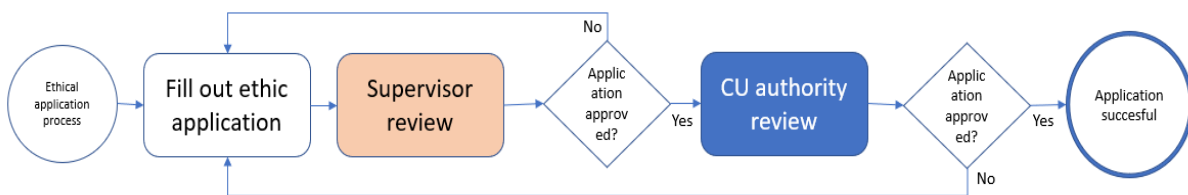


Figure 13: CU University ethical approval process

Additionally, the participant information sheet and the informed consent form templates will be presented in appendix A.

3.4.3.2. *General Data Protection Regulation (GDPR)*

GDPR defines the way data is protected and used. According to CU standards, data which contains personal or confidential information must be stored on CU One Drive. This will ensure, that GDPR are met and the data is carefully used. The researcher is aware of the security precautionary measures, he uses the CU OneDrive to safe the data on a safe place.

As this research is about sustainability, no paper copies of any document are used. After submission of this dissertation, the confidential data will be stored on CU OneDrive and secondary data on the personal hard drives. All files will be deleted after 20.03.2020, which is also mentioned in the participant information sheet.

3.5. Used research method

3.5.1. Case study

The reason to use case studies for this research paper is its real-world application of the subjects. Projects are getting more importance in most of the organizations work, therefore it is crucial to investigate real world cases in which sustainability played a vital role. Case studies present facts and information about projects, which are conducted by companies and also analyse the result of it.

For this research, two case studies were selected to be investigated and to critically evaluate the use of sustainability within their project management processes. These two case studies are from the construction industry. In chapter 4, both case studies will be presented in a more detailed way.

3.5.2. Interview

As this research is conducted as a mixed method approach, an interview will be performed with an expert on sustainability, who has a working knowledge in project management. This expert is from the Austrian project management association. He will answer the interview questions, which are part of appendix A. With the analysis of the answers of the interview, the topic sustainability within project management processes will be reviewed, not only from literature but also from a qualitative perspective.

3.6. Justification for used method

Sustainability within project management processes is quite a new area of research, there are only limited studies about this topic (Silvius and Nedeski 2011). To get a better understanding, the existing literature must be carefully analysed. Additionally, new insights from practitioners

could help to understand the challenges and risks about this topic and give a valuable understanding of this topic.

The combination of case studies (quantitative method) and an interview (qualitative method) should deliver the best possible outcome for this research.

3.7. Conclusion

The research methodology is very important to the research, as it describes the path, which the researcher is taking and also the tools, which will be used to collect, analyse and evaluate data. Many different approaches are available and the researcher must define, which one will be the right one to aid his research.

Ethics plays an important role while conducting a research. It is of utmost importance to follow the principles and protect the participants of the research and also show the benefits of it. Ethical misconduct is a severe violation and will be handled accordingly.

For this research, the chosen method is a mixed method, as cases studies (quantitative research) and an interview (qualitative research) will be combined. The collected data of the case studies as well as the basic information about the interview partner will be presented in chapter 4.

4. Case Study/Interview

4.1. Introduction

After carefully analysing the literature, this chapter will review 2 case studies of real projects. It should demonstrate the use of sustainability within the projects. The two case studies are from the same area of operation, both are from the construction industry. Both will be introduced; a short overview will be provided and the key facts will be pointed out. As both cases are from the same industry (construction), a comparison will be done in chapter 6 and the different sustainable standards discussed.

To further investigate this topic, an interview will be conducted with an expert on sustainability, who has an applied knowledge in project management. The interview partner will be introduced and the reasons for choosing him for this dissertation will be summarised.

4.2. Case study IKEA Greenwich

IKEA, worldwide known for its affordable furniture, has a vast interest in sustainability. Its vision is 'to create a better everyday life for the many people' (IKEA 2019e). Therefore, all of their stores and buildings in the United Kingdom must achieve a minimum standard of 'very good' according to BREEAM standards.

According to the IKEA financial summary report from the Inter IKEA Group (2018), IKEA has 422 stores worldwide, 19 new ones opened in 2018. The company employees over 200.000 people worldwide and the retail sales were 38.8 billion euros in 2018. Over 957 million customers visited IKEA stores worldwide and 2.5 billion people visited their website to purchase goods or to get inspiration.

For their 30th anniversary in the United Kingdom, IKEA wanted to build a new and more important, an environmentally friendly store. The new store in Greenwich, United Kingdom, is the first one of them, which achieved the 'outstanding' BREEAM standard, which shows a high commitment to sustainability.

4.2.1. General information of case study IKEA Greenwich

Every project has defined specifications, which are agreed on before the project start. The key aspects of this project are (Anon. 2019; BREEAM 2019; ENVISION 2019; IKEA 2019a):

Project Start:	2017
Project End:	02/2018
Budget:	100 Million pounds
Project Owner:	IKEA Properties Investments Ltd
Project Manager:	Rider Levett Bucknall UK Ltd

Contractor: McLaughlin & Harvey Construction Ltd

This project is a good example for sustainability in project management according to the variables used to implement sustainability, not only for the afterlife of the project, but also during its execution (Silvius and Nedeski 2011). The goal of the project was to create and build a store, which is outstanding regarding sustainability, which should not only help IKEA and its business, but also bring the people of the local community together and also protect the environment (IKEA 2019d).

4.2.2. Reason for consideration

This project is an excellent example of a construction side in the United Kingdom, which integrates sustainability during their projects but also thinks about this topic after completion. IKEAs integration of sustainability aids their goals and mission to help the environment, the social life in the communities and also grow as a company and increase their profit.

The IKEA Greenwich store includes all aspects of the TBL, the economic, environmental and social ones. In chapter 5 and 6, key elements will be reviewed and analysed.

4.3. Case Study King Street Station

The second case study is about the King Street Station in Seattle, United States of America. Originally owned by Burlington Northern Santa Fe Railway Company, the city of Seattle bought the King Street Station, which was originally built in 1906. This station is a gateway for millions of travellers, it helped the economic growth of Seattle and developed Seattle to a metropolitan city (EPA 2011).

This project was part of a program, which had the goal to preserve and modernize old train stations in the state of Illinois, to make them more efficient, safe, meet the present and future needs of users and be environmentally friendly. King Street Station should be modernized and adapted so it assists the local community and meets the silver level LEED standards. At the end of this project, the King Street Station achieved platinum level, which was a huge enhancement (EPA n.d.).

4.3.1. General information of case study King Street Station

The key details of the project are (EPA 2019; EPA 2011):

Project Start:	2008
Project End:	04/2013
Budget:	50 Million USD
Project Owner:	City of Seattle
Program Manager:	Trevina Wang
Project Manager:	Shiels Oblatz Johnson

Several sustainable characteristics were built in to ensure, that the output of the project was classified as sustainable. The heating system was completely changed to an eco-friendly ground-source heat pump and energy- and water-efficient lights and fittings were used (EPA 2011).

The risk management of this project was of utmost importance as the project team faced several challenges. One point was the change to the structure, which was necessary to provide the needed safety and a long-lasting building. Another defiance was the energy performance, as the system, which was currently in place was outdated and would not provide the needed energy for the building (EPA 2011).

It was the team’s vision to create a sustainable building and to implement and deliver a project, which affects the residents and the local community in a positive way and helps the city to and develop its economy (EPA 2011; EPA n.d.).

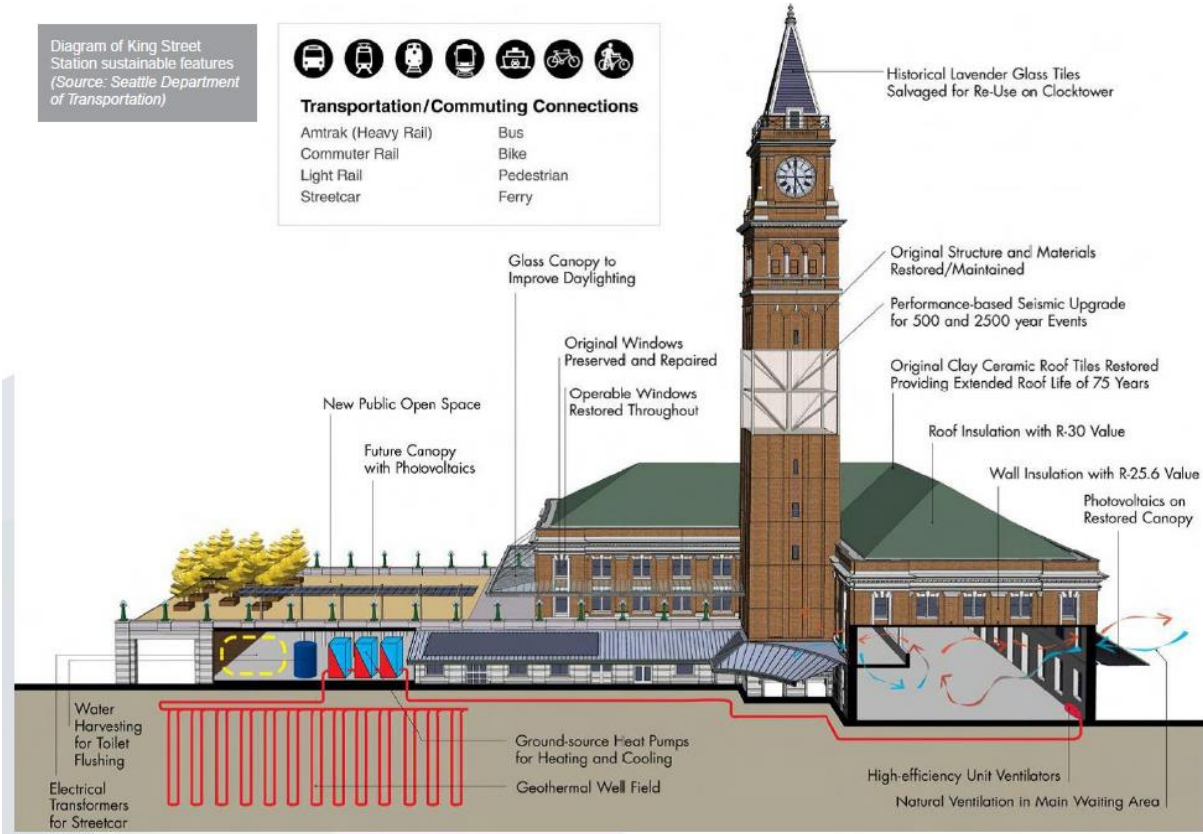


Figure 14: Plan of King Street Station

4.3.2. Reason for consideration

As a primary goal of the project team was to achieve a certain LEED standard in this construction project, the sustainable aspect played an important role. As mentioned in chapter 2, LEED standards ensure, that certain aspects regarding materials used or efficiency are met according to their requirements.

Another reason for choosing this case study was the availability of additional material. EPA provided several assisting documents about King Street Station, which determined the project management methodology, the stakeholder management as well as the vision of this program.

4.4. Interview with an expert on sustainability and project management

The interview was conducted with an expert on sustainability, who is a leading figure in the field of sustainability and project management. Before he turned into academic teaching and writing, he worked several years as a consultant and operational project manager for various companies until 2002.

At the moment, he is working at 14 different universities as an independent academic. Besides his academic career, he does consultancy work as well as trainings for different kinds of companies. His major focus is about sustainability, the change of thinking, the education of this topic as well as helping companies integrate sustainability within their organization.

The reason for choosing him as an interview partner was his knowledge in both areas, sustainability and project management. Not only does he apply his knowledge in his role as consultant in different kind of companies and industries, he conducts a lot of research about this topic, publishes several articles and reports in renowned journals and wrote several books about this topic. His experience in this field is very large and he due to that fact, his answers should be able to aid the discussion about this topic in chapter 7.

4.5. Conclusion

During this research, many projects were reviewed regarding their efforts to integrate sustainability within their project management lifecycle. Two case studies were chosen due to their ambition to integrate sustainability with their projects but also incorporating this during their project execution. Both are from the same industry; one was performed in the United Kingdom and one in the United States of America. Two different standards to evaluate the sustainability of a construction project were used, BREEAM and LEED.

To get a deeper insight into this topic, an interview was performed with an expert on sustainability. He provided the researcher with many useful information and helped him understand this topic better and connect sustainability and project management.

In chapter 5, the results of the case studies and the interview will be presented in a short form.

5. Results of case studies / Interview

5.1. Introduction

In this chapter, the case studies and interview results will be reviewed. As academic case studies are limited and not all companies provided the necessary data, some aspects of sustainability within the project management processes are only limited. According to the information from the interview, empirical good case studies about sustainability in project management are hard to find as this topic is rather new.

The researcher used the two case studies presented in chapter 4, because they provided more information about the project and also some aspects of the project management processes. The interview results prove, that sustainability gets more attention from organizations but there is still much research to do.

The results will be briefly summarized and presented, in chapter 6 an analysis of the case studies and the interview will be performed.

5.2. Outcome case study IKEA Greenwich

The data collected for this project was from various sources, as there was none available, which provided all the information needed to get a holistic picture of this construction project. The IKEA Greenwich store is an outstanding project, which not only includes the TBL factors of sustainability (economic, environmental and social), but also integrated sustainability within in their project management approach. The chapters 5.2.1.-5.2.3. will explain the different parts of this project and how sustainability was integrated.

5.2.1. Sustainable factors – Environmental, economic and social factors

According to the report published by BREEAM on their website (BREEAM 2019), several sustainable features were used to achieve a BREEAM rating of 90.4%, which no other store in the UK achieved so far. The features are:

- Solar panels installed on the roof
- Use of rain water to reduce water consumption
- Evaporative cooling units to reduce energy consumption
- Ground source heating to cool and heat
- A green roof which provides space for wildlife and humans
- Sustainable transport to get to the store e.g. public transport station or electric cycle facilities

These are the major sustainable features of the Greenwich store, which will reduce energy and water consumption as well as reduction of greenhouse gases. The construction itself is highly sustainable which would satisfy the environmental aspect of the TBL. During the execution phase of the construction project, IKEA managed the project according to BREEAM

standards. Therefore, it received 42 out of 50 points for its project management. This means that the project team implemented sustainability factors into the project's objectives.

As IKEA wants to achieve sustainability in a holistic view, economic and social factors play an important role.

Economic thinking is deeply enrooted in most companies and organizations mindset (Kamal and Jeongho 2019). According to Geisdoerfer, Vladimirova and Evans (2018), growth, profit and return on investment are the thriving forces behind our economic thinking, but economic development must take environmental and social factors into account.

The third aspect of the TBL is the social consideration. The new Greenwich store provided 500 jobs to the local community, increased the standard of living and provided a place to come together as a community. IKEA is very keen on providing equal opportunities to all potential employees, which is also lived by their vision of equality (Anon. 2019).

5.2.2. The intersection of the economic, environmental and social factors

The intersecting three circles have three areas, where economic, environmental and social factors are combined. According to Purvis, Mao and Robinson (2018) these intersections represent the Social-economic, Environmental-economic and Social-Environmental aspects.

5.2.2.1. *Social-economic*

IKEA's values are driven by equality, sustainable thinking, diversity and leading by example (IKEA 2019e). It is their mission to have strong business ethics, care for the planet and the people and look after their employees.

According to IKEA's values (IKEA 2019d; IKEA 2019e), the Greenwich store offers a lot of benefits to its employees. Not only does it pay the Living Wage of London, which is 10.20 pounds an hour, it offers its employees to take shared parental leave, several discounts and also a retirement plan (IKEA 2019c). This employer also has a strong business ethics, which allows no discrimination, gender equality and it insists on fair-trade products for their stores.

5.2.2.2. *Environmental-economic*

Stakeholders are interested in the performance of the company as this defines the benefits they will receive (Bahadorestani, Naderpajouh and Sadiq 2020). It could be challenging for an organization to implement sustainable aspects, as this would on the short-term lead to investments, which decreases the profit of the company. According to Martens and Carvalho (2016), economic development is not possible without protecting the environment. IKEA is an excellent example for this aspect as they lead by example. Not only did the Greenwich store achieve 90.4% BREEAM rating, it continuously tries to improve their efforts to save the environment.

The case study presented several facts, which are related to the environmental economic intersection (Anon. 2019; BREEAM 2019; ENVISION, 2019; IKEA 2019a):

- Energy efficiency: Only LED light is installed at the store, which decreases the consumption and the solar panels installed on 75% of the roof power the entire store. A ground source heating was installed to heat the store, which is very efficient as it satisfies 88% of the stores demand.
- Water saving: Two rainwater harvesting tanks were installed and this water is used in the store, which decreases the water needed from outside by 50%.
- Transportation: IKEA installed several cyclist facilities for its customers and employees. The location selected for the store was strategically well planned, as the underground station is nearby but also the North Greenwich pier.

Environmental economic aspects play a huge role at IKEA, not only in its strategic thinking but also in its operational business (e.g. reduce waste and recycle).

5.2.2.3. *Social-environmental*

IKEA is well aware of its social and environmental responsibilities (IKEA 2019d). Their low prices are not achieved by exploiting their employees, suppliers or the environment. Appropriate working conditions and environmental responsibility are not only valid for IKEA, but also for its suppliers. Child labour is strictly forbidden and will not be tolerated by IKEA. Several initiatives are introduced to reduce IKEAs impact on the environment and to assist the local community. Children are our future and IKEA supports as an active partner several social projects. The Greenwich store offers a special service to its customers, it introduced the learning lab. This department assists customers to refurbish their old furniture with used materials from the IKEA fabrics to restyle it and bring it back to life. Additionally, the installation of a green roof supports customers, who want to know more about the environment, possibilities to improve it and also a space to talk to like-minded people.

The program LAGOM is IKEAs initiative to educate people and make changes to their behaviour and to only take the right amount ('Lagom är bast' means 'the right amount is best'; IKEA 2019c). IKEA Greenwich cooperates with three local schools to start educating children, so they learn how to take only what they need.

IKEA Greenwich supports several local communities and people to live in harmony and a sustainable way, they lead by example with their values and principles.

5.3. Outcome case study King Street Station

The main source for the results was the case study, provided by the United States Environmental Protection Agency. This project was not a completely new construction of the station, the existing station was renovated and modernised to be fit for purpose. The challenge during this project was not only to refurbish the old station but also to integrate sustainable features to the construction.

According to EPAs case study (2011), the project team faced several challenges during the planning and execution phase, which had to be solved to finish this project. As the original construction was poorly maintained and outdated, the challenge was to improve the buildings

safety, durability and longevity. The old structure should be optimized and because of the early communication between all relevant project team members, the challenges were recognized and the scope was clearly defined, so everyone knew what to do.

The project team had to work closely together to achieve the LEED platinum standard, which is the highest possible grade to achieve. The chapters 5.3.1.-5.3.3. will explain the different parts of this project and how sustainability was integrated.

5.3.1. Sustainable factors – Environmental, economic and social factors

According to the case study, published by the EPA (2011), sustainability played a major role in this project but also the conservation of the old constructions' characteristics. Integrating sustainable features had a high priority and therefore, the team implemented following features (EPA 2011; EPA n.d.):

- Photovoltaics installed to use solar energy
- Restore of old windows and structure
- Better roof and wall insulation
- Ground-source heat pumps installed for heating and cooling
- Partly glass roof to increase daylight
- Installation of natural ventilation to reduce energy consumption

These implemented features cover the environmental aspect of sustainability (Rasouli and Kumarasuriyar 2016). The reduction of energy and the efficient use of sustainable energy sources was of high priority. The light system was changed to a LED based system, keeping the old style and structure of the lamps (EPA 2011). The energy consumption dropped from 118 kBTU per year to 38 kBTU per year, which means an energy reduction by 68% (EPA 2011). Environmental protection played an important role during this project, but also social and economic factors.

As space in the city of Seattle was getting scarce, the King Street Station project team created space for businesses and offices on the second and third floor so these spaces could be rented to local businesses, which would have an upcoming location and would help the station financially (EPA 2019). As the city is the owner of King Street station, the economy of the city will grow which leads to higher profits due to more travellers and customers.

The restauration of King Street Station would also be beneficial for the local community, as the project created a plaza outside the station, where local people could meet and enjoy the facilities provided by the station (EPA 2011). As the old King Street Station was a landmark in Seattle, the restauration would revitalize the communities' attitude towards it and support the future development around the station (EPA 2019).

5.3.2. Sustainability during project execution

The project team wanted to achieve at least LEED Silver level (EPA 2011). After completing the project and evaluation of the data, King Street Station received the highest possible stage,

platinum with a score of 83 out of 110 (USGBC 2019). The LEED standard analysis different areas of construction and also focusses on the project management approach.

5.4. Main findings of interview

5.4.1. General information

The interview was conducted with an expert of sustainability, who gave insights into sustainability and project management as well as different aspects of project planning and execution. Future challenges and possibilities were identified and evaluated.

As an academic teaching at several universities in Europe, he and a team of professionals wanted to launch a project management master course, which should challenge the students and make them see project management not as a generic process. This was the trigger for his work on sustainability in project management. At the beginning only limited knowledge about this area was available in his team, so they started with their studies and research. The opportunity to design and lead a master course was the root of his work in sustainability and project management.

5.4.2. Sustainability and project management

Several authors identified, that in our modern industrialized world, sustainability is a topic of utmost importance, which needs to be addressed and incorporated into organizations business style (Cerne and Jansson 2019; Silvius and de Graaf 2018; Aarseth et al. 2017; Silvius and Schipper 2014a). Due to rapid change to the business and ecological environment, organizations need to find a way to incorporate these changes to their strategic and operative processes to ensure business growth and profitability (Brones, de Carvalho and de Senzi Zancul 2014; Silvius 2012).

5.4.2.1. *Change in the environment and creating the link between sustainability and project management*

According to the information from the conducted interview, a way to handle these changes is through projects, which are used to implement sustainability to the organizations way of doing business. Recent studies showed, that projects accounts for 1/3 of all economic activities in the western society.

Sustainability only got limited attention while conducting projects in different industries, even though academic literature is available to integrate sustainability into project management (Martens and Carvalho 2016; Okland 2015; Silvius and Schipper 2014b). Organizations must not see sustainability as a burden, it adds value to the organisation and having a holistic view of all factors is important to succeed. It is important to connect sustainability and project management because a link between these two topics could boost organizations way of dealing with change and simultaneously ensure long-lasting growth and profit.

Organizations must not see projects as just a task with several deliverables, it must see the long-term impact of the project on the organisations and its processes.

But not only organizations need to change, the society itself needs to embrace change and as organizations are part of the society, adaptation to new situations and circumstances is crucial to be successful on a long-term view.

5.4.2.2. Integration of sustainability in an organization

According to the information from the conducted interview, the biggest difficulty in implementing sustainability into an organization is the ignorance within the company; the organisation does not know how to do it. Due to his consultancy work for several companies, he saw the need to translate the concept of sustainability, especially the factors of the TBL (economic, environmental and social) into an understandable concept, which is implemented into the organizations processes and especially also into project management processes.

The first step is to create an awareness of sustainability within the organisation. Different templates and instruments must be introduced to build a foundation. This step needs attitude and competencies in the areas (sustainability and project management) from the employees and the organization, to be effective and secure the introduction of this topic.

After successfully creating an awareness, the second step needs to be implemented. Within the organization, the defects must be found and removed. This action requires a certain maturity within the organization itself. A holistic perspective considering all aspects of the TBL must be implemented to understand the whole concept and why sustainability is beneficial, not only for the temporary project but also for its afterlife.

5.4.2.3. The project managers role

As the project manager is responsible for the delivery of the project, he or she can influence many aspects of it (Sabini, Muzio, and Alderman 2019; Obradovic, Todorovic and Bushuyev 2018; Silvius and de Graaf 2018; Silvius 2012). Hwang and Ng (2013) cited in Silvius and de Graaf (2018) state, that the role of today's project manager is not only to deliver generic project management but also to manage the project in the most efficient way with integration of sustainability. The content of the project is often defined by the project owner, but the project manager can collaborate with his knowledge and influence the content of the project. As the project owner mostly care about the outcome of the project, the project manager can define the way of working and the principles to deliver the project.

Therefore, it is important, that the project manager understands the concept and the importance of sustainability. According to the information from the conducted interview, project managers who attend corporate trainings find it eye opening and they understand the link between sustainable ambitions and the organizations strategy. As the expert performs trainings for different organizations, he invites not only project managers but also sustainability officers and corporate social responsibility officers of the company to join the trainings. His experience was, that the communication between those professional groups is

limited. If the organization improves the communication between them, the awareness of project management and sustainability would rise within the company.

5.4.2.4. Project management methodologies

Different methodologies are used to deliver projects within an organization, agile and sustainable methodologies become more popular and used in Project Management (Obradovic, Todorovic and Bushuyev 2018; Marcelino-Sádaba, González-Jaen and Pérez-Ezcurdia 2015; della Porta 2014).

Performing a project using agile methodologies e.g. SCRUM, a higher level of uncertainty is involved during the execution (Obradovic, Todorovic and Bushuyev 2018). According to the information from the conducted interview, sustainability can be implemented into agile methodology as the approach with the uncertainty factor fits the idea of sustainable project management. The scope is not clearly defined, changes can occur during the whole project execution phase and many factors can influence the delivery, sustainability has similar characteristics. Iterative development of deliverables is used in the agile methodology to get to the final outcome of the project, this evolving factor is also seen in sustainability (della Porta, 2014).

5.4.2.5. The project owner's role

The project owner describes what he or she wants as outcome of the project. The iron triangle, which consists of quality, time and cost, assists them in their reporting duties to external partners or senior management. According to the information from the conducted interview, experienced project owners rely heavily on this and see project management as an operational task. Project owners should combine the organizations strategic orientation with the operational processes of the project to ensure sustainability within the project and the outcome of it. They should be involved in sustainability decision in projects, he or she must commit towards sustainability ambition of the organization (Zhang et al. 2019). Therefore, the project owners need to be educated as well.

The expert interviewed for this research mentioned, that project managers often attend trainings, which lasts several days, but project owners rarely attend any and if they do, only for a short time period. It would be beneficial for the integration of sustainability, if project owners attend such trainings to get the knowledge about this topic and especially their role in it.

5.4.3. Future challenges and possibilities

Sustainability in project management is a new and evolving topic. More research is being performed in this area which boosts this topic once more. Due to past events, all factors of the TBL, economic, environmental and social, are highly discussed and rise more attention among professionals and academics.

The next challenges in this area is the implementation of a framework and the simplification of tools and techniques, sustainability must be more practical. According to the information from the conducted interview, limitations are not existent; our society needs to address this topic and actively be part in the discussion. As several time mentioned, change is part of our daily life, which could lead to a change in the wording of sustainable project management, but the concept and the principles must be incorporated into organizations and the society.

5.4.4. Conclusion

After reviewing and presenting the data collected for this research, much knowledge was gained. The case studies used for this dissertation are from two different countries and both used different methods to verify their sustainable approach. This fact will be further analysed in chapter 6.

The Interview with an expert on sustainability gave valuable insights, not only in the academic area but also in a professional one. The information provided for this study opened up new possible areas of research and new perspectives in this topic.

In chapter 6, the case studies used in this dissertation will be compared and analysed. The results of the interview will be further explained and inspected.

6. Analysis of case studies / Interview

6.1. Introduction

In this chapter the case studies and the interview will be analysed. Both case studies are from the construction industry, therefore a comparison of them will be performed. The strength and weakness of the case studies will be investigated and similarities and differences explored.

The results of the interview will be evaluated regarding the use of sustainability within project management, the benefits of integrating sustainability, the challenges of it and further development areas.

6.2. Comparison of case study A with case study B

The case studies will be compared regarding their use of sustainability during the project and their output. Case study A, which was IKEA Greenwich, used BREEAM standards to certify their sustainable efforts; case study B, the King Street Station used LEED. The two different standards in sustainable construction projects will be investigated.

6.2.1. Strengths of case studies and projects

One of the major targets for both projects was to achieve high sustainability. Sustainable development is necessary to provide for the society and satisfy the needs (Hwang and Tan, 2012). After careful evaluation of both cases, the result is, that both projects have a deeper understanding and knowledge of sustainability.

IKEA's values represent this fact very clearly, they try to reduce waste, recycle as much as possible, invest in renewable energy sources for their store and also look out for the local communities and their employees (IKEA 2019c). The store in Greenwich is a very good example, how an organization can integrate sustainability, not only on a strategic level but also on an operational one. The TBL is strongly integrated in the way, IKEA works and how it interacts with customers, suppliers, local communities and the environment (IKEA 2019d). Several initiatives are created and run by IKEA, to help the environment, the suppliers and the local people, which can also be associated with sustainability.

The King Street Station incorporated the TBL in a reasonable way, the three pillars were addressed and the economic, environmental and social aspects integrated into the project planning and execution. The LEED score was provided in the case study, which made it easy to understand, how this project got this outstanding score (LEED excellent score). The restoration was well planned and the project team ensured to preserve the old construction as much as possible while implementing new features for a long-term use of the station. The effective and constant communication between the project team and the early engagement of all stakeholders was a key to success, which was described in the case study. Effective communication between the project team members is a basic success factor to deliver a

project, the King Street Station project team achieved this and delivered their project successfully (van der Heijden 2018).

6.2.2. Weakness of case studies and projects

Empirical case studies about sustainability in project management are hardly existent, which was also mentioned by the expert, who was interviewed for this research. It was not possible to get all the relevant information from one source, so the researcher had to use multiple sources to get the needed data to summarize and analyse the case studies.

The information collected for case study A was from BREEAMs website and additionally, other websites had to be used to get the data. As BREEAM uses external companies to assess the project regarding its sustainability, the final report created by the assessor is not publicly available and the rights of this report is owned by the assessor. Therefore, the final marking score card is not available and the project management perspective cannot be analysed due to missing data. Nevertheless, general information about the criteria in the execution phase was available and the general score of the construction phase presented in the case study at the BREEAMs website was very high, which imply a high consideration of sustainability during the project planning and execution phase.

Case study B was created by the EPA, who consulted the project team during planning and execution. After reviewing the available data, the researcher concludes, that this project addressed the TBL factors, but the intersection of the 3 factors was barely taken into account. This fact could be because of missing data and variables, as the researcher had to collect data from several sources and was not able to get a holistic picture of each aspect of the project. Nevertheless, it is important to see sustainability as a discipline, which is not only 3 separate areas but the connection of those.

A general limitation is the lack of empirical data and case studies available. After researching this topic, only limited case studies were found, which was also recognized by the expert, who was interviewed for this research. Much literature is available, especially from the last 10 years, which addresses the sustainability context and connects it with project management. Nevertheless, practical studies are rare and the researcher had to use several sources to get the information needed to evaluate the projects.

6.2.3. Similarities of case studies

Both projects are in the construction industry and both used internationally renowned standards to evaluate their projects and project management approach, King Street station used LEED and IKEA Greenwich used BREEAM.

Both projects planned to achieve high commitment to sustainability, IKEA Greenwich and King Street Station achieved the highest possible rank in the standards they used. IKEA Greenwich achieved the BREEAM outstanding score, which implies high commitment to sustainability in economic, environmental and social aspects (IKEA 2019d). The King Street Station achieved the LEED Platinum score, the highest possible mark in the assessment program of LEED (EPA 2011).

6.2.4. Difference between case studies

IKEA Greenwich used the BREEAM standards, which requires an external examiner who will evaluate the project and mark it according to the marking criteria of BREEAM. In contrast to that, LEED requires the project team to register the project on the site of the organization and they will review it. Not only is the assessment process different, but also the requirements of each standard.

BREEAM and LEED standards are developed in the UK and US; therefore, the influence of the countries is clearly recognisable. Sustainability is the major point in BREEAM and LEED but they differ in many points e.g. points are awarded in LEED scheme for having a sufficient amount of parking spaces whereas BREEAM wants to minimize the number (BSRIA 2009).

The LEED score of the King Street Station was publicly available, the BREEAM report is not. This report is owned by the assessor and the researcher was not able to get it after contacting the assessing company. Therefore, the points for the construction phase could not be analysed for IKEA Greenwich whereas King Street Station delivered all the needed data.

6.3. Analysis of interview

The expert on sustainability in project management discussed several aspects of this topics, focussing on the current status, challenges and the future possibilities and obstacles. As he referred to this as a hot topic, it becomes much attention, not only from the society but also from organizations.

6.3.1. Use of sustainability within project management

Over the last 10 years the link between sustainability and project management was addressed by several authors and many papers were published to highlight this connection (Obradovic, Todorovic and Bushuyev 2018; Silvius et al. 2017; Gareis, Huemann and Martinuzzi 2010). Economic growth and profit play an important role and are the key to success for organizations, but the sustainable concept should be incorporated into this thinking.

The environment in which organizations operate changes, to succeed organizations must adapt and embrace the changing circumstances. Projects are a way to integrate changes into the organization, but they should not just see it as an operational task, which delivers an output. The TBL integration into projects is crucial to deal with changing environments. Not only should organizations review their progress and growth based on profit only, economic, environmental and social factors should be considered to define the growth and prosperity of the organization.

The project itself is short term oriented and creates a change or a product; the organization has to look beyond the delivery. The short-term effects and the long-term effects must be reviewed. The short-term benefit might be that the output of the project delivers a change into the organizations value with little economic benefit but on the long-term, this change

adds much value to the organization. So, it is important to see both perspectives and integrate several factors of the TBL to fully see the value of the change.

6.3.2. Benefits of integrating sustainability within project management

Throughout the literature, several benefits are mentioned, if sustainability is integrated into the project management approach of an organization. The value of the organisation could increase, new opportunities discovered or costs reduced (Kahachi 2017).

According to the information from the conducted interview, organizations and the societies must see the short – and long-term benefits of sustainability. Not only does it help the environment and save resources, which all of human societies would be appreciating, but also improve the social factors in an organisation or society.

If sustainability is integrated into the project management approach, it helps creating a supportive environment and adds a competitive advantage and economic benefit to the organization.

6.3.3. Challenges of integrating sustainability within project management

Sustainability is a hot topic at the moment; due to changing environmental factors but also the awareness of social responsibility, organizations tend to address this topic. First of all, organizations need to integrate sustainability on a strategic level. It is important to educate and train the organization and get their attention and focus at this topic.

If the strategic level includes sustainability, it needs to be included in the operational tasks and activities of the organization. Integrating sustainability into project management is challenging, as the organization may have an idea about sustainability on a strategic level but neglect the operational level at all. The concepts of sustainability must be translated and introduced to the project management processes; the TBL factors must be taught and the practical use of tools and techniques (e.g. sustainable project reporting) must be explained (Silvius et al. 2017; Carvalho and Rabechini Jr. 2017).

Furthermore, it is important to educate the operational level of the organization, not only the strategic. The concept and ideas of sustainability should be transferred to the project team, which must understand the benefits and values sustainability creates in projects. They don't need to become experts in sustainability but need to understand the basic concept and idea behind it.

As already mentioned, sustainability is a booming topic, and organizations and societies are thinking about it and discussing the impact on businesses and societies. Another challenge might be, that the interest of societies and organizations fade away and it becomes less important, but sustainability or similar topics e.g. CSR will always be of importance as it considers the planet, the people who live on the planet and also the profit of organizations.

6.3.4. Further development areas

As this subject is rather new, much more study about this topic is needed to fully understand the concepts, the impact and the values and benefits.

According to the information from the conducted interview, this topic is more academic than practical and this must change. New practical tools and techniques must be introduced to practitioners, so they can use it in their way of working and the expert sees a growing interest, as many organizations and practitioners show more interest in the developments in this area. Empirical data and especially case studies are scarce and it is hard to get access to them; more research in this area would assist the academic side and also assist the development of practical tools.

Development of project team members, especially project managers and project owners, is crucial to evolve this topic. These key roles in a project need to understand their role in the project and their power and influence regarding implementation of sustainability.

A project could be a part of a program or a portfolio, these 3 areas are linked together. The research needs to address the connection between those 3 and how sustainability can be implemented in all dimensions.

Several other areas need to be discovered and research needs to be conducted in those areas but as this topic gets more recognition and interest, further development areas will be investigated and analysed.

6.4. Conclusion

The analysis of the case studies and the interview show, that the construction industry is a pioneer when it comes to sustainability in project management. Several standards and certification programs assure the implementation of sustainability during the project, nevertheless there are differences between these standards which needs to be considered.

The expert on sustainability in project management pointed out several development areas and challenges but also recognized the effort undertaken to integrate this topic in organizations and societies.

In chapter 7, the main ideas of sustainability and project management will be discussed and the major points of the case studies and interview discussed. Furthermore, other topics related to sustainability and Project Management will be discussed and presented.

7. Discussion

7.1. Introduction

In this chapter, the results will be discussed, critically evaluated with the support of the literature and the data collected summarized. Sustainability will be analysed and different aspects of it explored. New possible ideas will be introduced and their need and application discussed. The topic Project Management will be reviewed and the challenges debated. Furthermore, the benefits and challenges of integrating sustainability not only in project management, but also in the organizations strategic view will be discussed. A short summary of the topic sustainability in project management will be provided and the aims and objectives of this research reviewed.

7.2. Sustainability

In chapter 7.2.1. - 7.2.5. the topic sustainability will be discussed, the possibilities and limitations as well as the future outlook. Additionally, a new model to evaluate sustainability and integrate it into projects will be introduced and described.

7.2.1. The Brundtland report – 32 years later

A key statement of sustainability and sustainable development is (World Commission on Environment and Development 1987):

‘Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.’

After going through several papers and books, the common opinion on this is that organizations and societies are compromising the ability of future generations by overusing the current needs. Why does human society consume so much more than they need? Thomas Robert Malthus predicted 300 years ago, that human population would increase too fast, which would harm the growth and wealth of the current society (Eccles 2013).

7.2.1.1. *Human population – sustainability possible?*

According to the UN, human population was 2.6 billion in 1950, in 2019 we already reached 7.7 billion and the number is rising. Figure 15 shows the number in 2100, which will be approximately 11.2 billion people.

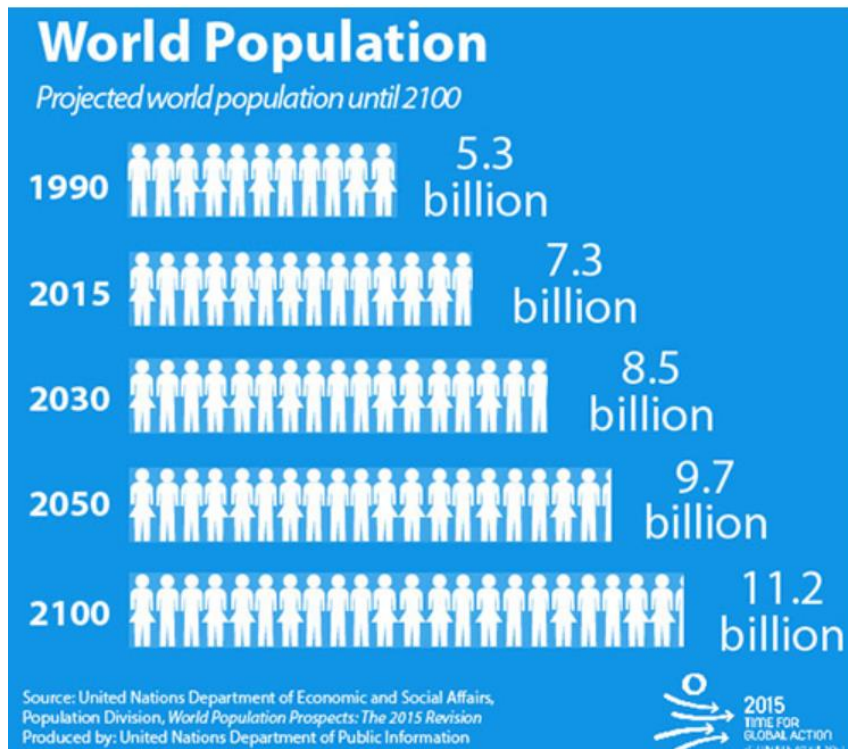


Figure 15: World population growth (United Nations n.d.)

As shown in figure 15, the number of human beings is increasing, but the resources we have are limited. According to the theory of Malthus, human population needs to be controlled to keep the wealth of human beings. Marx and Engels disagreed with Malthus, they argued that Malthus concept justifies social injustice and neglects technological possibilities (Dresner 2008).

A growing population needs more resources to maintain their lifestyle and their wealth, hence organizations need to produce more to satisfy the needs of the society. Increasing demand leads to increasing supply but there is a limitation to every organization. As economic growth is essential to survive and prosper, organizations are tempted to reduce their costs by using methods which saves money but are not sustainable e.g. outsourcing to a country, where the labour conditions are bad.

In 2013, a factory in Bangladesh collapsed due to poorly construction and over 1000 people died (Faigle and Pauly 2014). In this factory, textile products were made for the western markets. The employees worked for poor wages and terrible working condition, which has no sustainable value. Is economic growth more important than social wellbeing?

7.2.1.2. Organizations and societal influence

According to Dyllick and Hockerts (2002) cited in Silvius and Schipper (2014b) 'the balance between economic growth and social wellbeing has been around as a political and managerial challenge for over 150 years'.

It is important, that societies and organizations see the value of sustainability, not as an additional burden which is put on them but as an opportunity and benefit. The attitude

towards sustainability must change and be implemented into the organizations and societies values, which will have short- and long-term benefits. Environmental protection and sustainability are often used as synonyms, human beings do not differ between these two terms. It is very important to understand the difference, as environmental protection focuses on protection and preventing specific threats but sustainability is proactive, has a holistic view and is short- and long-term oriented. It is important to protect our environment but societies and organizations should focus on both, short- and long-term aspects.

According to the information from the conducted interview, short-term economic growth should not be on the expense of the long-term aspects. Operational actions must be harmonized with strategic perspectives and it is important to integrate sustainability into the strategy of organizations but also the society, so the next generation has the same possibilities as the current one.

7.2.1.3. Technological improvement

Technology is advancing rapidly and is used in almost every aspect of human's personal and professional life. Marx and Engels believed in technological advancement, Malthus did not. After evaluating the data collected during this dissertation, Marx and Engels were partly right with their statement.

Technological inventions assist organizations to become more efficient and productive, optimize their processes and also helps their ambition towards sustainability. According to Portney (2015), technology makes the continuous expansion of earth's capacity possible. New ways of working and preserving the natural resources are introduced and used by organizations to minimize their footprints.

But technology has its limitations, it can assist us with integrating sustainability in societies and organizations, but societies and organizations have to change their attitude and not solely rely on technology as saviour.

7.2.2. UN conferences and their power

Several publications and measures were introduced to get the attention on sustainability e.g. the club of Rome published its 'The limits of growth' to create awareness of the limited resources available and what a constant exploitation would mean to the world's economy and wealth. The Brundtland conference was one major event, where sustainability was addressed on a global level. The growth of economies and companies should be performed in a sustainable way, sustainable development was put into the spot light.

Many other conferences followed, where several topics in sustainability e.g. greenhouse gas emissions or human rights were addressed and discussed among the member states of the UN. The Kyoto protocol was introduced to reduce the greenhouse emissions worldwide, many countries signed this agreement with the goal to reduce the greenhouse gas emission by 5% until 2012. After that period an extension should encourage countries to reduce the emission further, but only 38 countries approved the extension. Many countries made some efforts to

reduce their emission and work to a more sustainable way of conducting business, but the majority is not serious enough in their efforts.

The emission certificate trade in the EU is criticised by many environmental organisations, but is welcomed by the industry, as it basically gives no incentive for companies to invest in eco-friendly production equipment because they have a certain free amount of emitting greenhouse gases. The EU distributes a certain number of free certificates to companies in Europe, which allows them to produce a certain amount of greenhouse gases. On top of that, companies can buy a certain number of additional certificates from a market, which can be used to produce more but also emitting more greenhouse gases. If a company does not need as many certificates it can sell those to a company, which needs them.

This is an excellent example why on a short-term view without integrating sustainability into their business processes and values, leads to gain in one pillar but leads to a loss in the other ones.

In a short-term view, a company A wants to grow and make profit. The investments into new technologies or production equipment is not done as it would decrease the profit of the company on a short term. This company relies on its old equipment which emits more greenhouse gases. The profit on a short term would increase, while the other two pillars decrease.

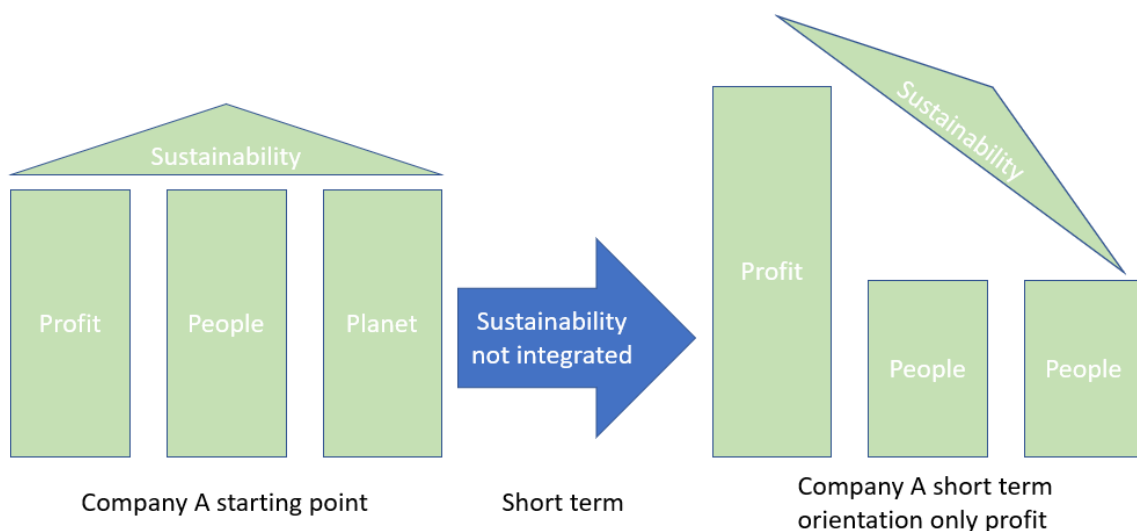


Figure 16: Short term effects on company neglecting sustainability

On the long run, this company will not be successful as sustainability plays a big role in our time and customers and the society is looking to be more active about this topic. Many companies and organizations recognize the need of sustainability in their business and also want their suppliers or partners companies to integrate sustainability within their business. BlackRock, the largest asset manager in the world, announced that they only help companies which not only think about profit but also what the companies do for the society (Thaler 2018). Many other examples can be found and most big companies integrated sustainability within their business processes and want their partners to act in a similar way.

If a company resists to integrate sustainability in their processes and values, this could lead to a decrease in profits as the benefit of integrating sustainability is not realized and societies and customers will not support such a business practice.

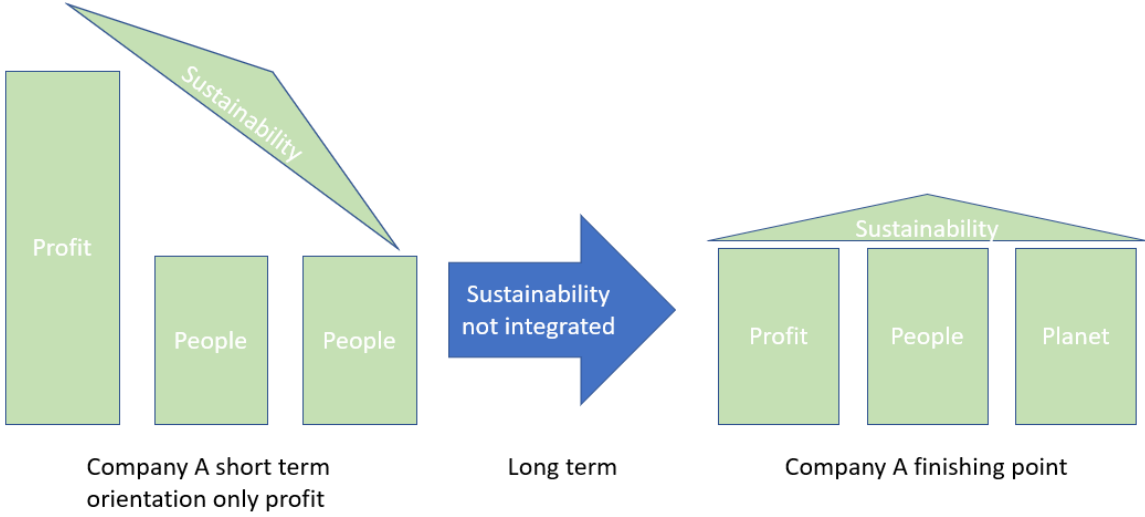


Figure 17: Long term effects on company neglecting sustainability

7.2.3. The Triple Bottom Line

The triple bottom line introduced by John Elkington in 1994, shows 3 pillars of sustainability, economic, environmental and social. Companies and organizations use this model to evaluate their actions and ambition towards sustainability. Often the three pillars are also called the 3 Ps; profit (economic pillar), planet (environmental pillar), people (social pillar). These terms are used interchangeably in the literature.

7.2.4. Adding a new pillar

After carefully reviewing the literature, the TBL still has his value, but in a context, which is more oriented in the private sector. The TBL includes all relevant factors of sustainability, which must be addressed by companies. A fourth pillar, which could be included into the organizations and societies way of working could be the political pillar which is proposed by the author.

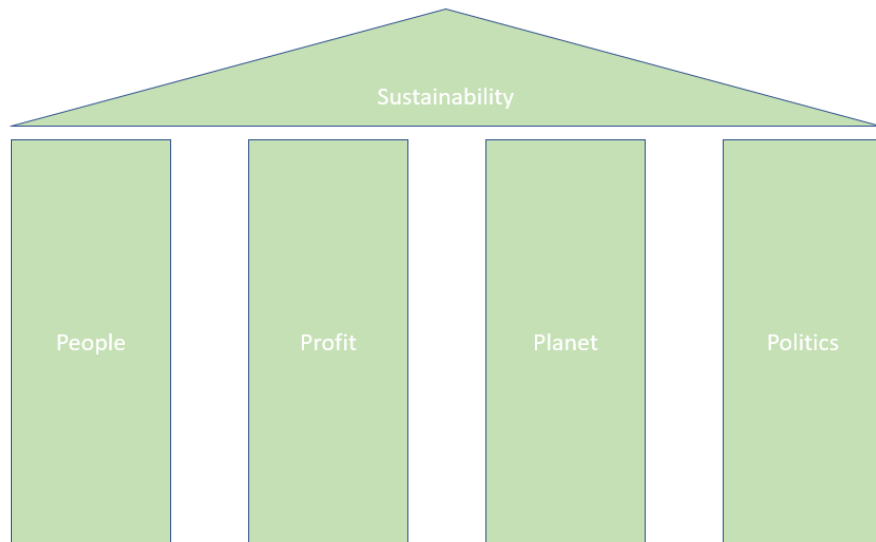


Figure 18: Four pillars of sustainability (with political pillar)

Throughout the literature, a certain political influence is recognised, which lays pressure on companies and especially organisation and societies. This political pressure could be so big, that sustainability is neglected and threatened as a burden. The political pillar could address political anonymity, that organisations and societies must not give into such attempts and act independently. It is important that sustainability is not controlled by politics or influential parties as it would undermine the sense of it. Sustainability should be free from any outside influence and should focus on its pillars to achieve benefits in each of them.

As the world is evolving and new technologies and factors play an important role for organizations, this model will have to adapt to new circumstances, which are not yet known. The Unknown unknowns play an important role for the future as mankind is still not aware of all things which could affect organizations and societies.

7.2.5. Sustainability – what is the future?

‘Our future as a species depends on our ability to grapple with the complexities that arise in interactions between social and environmental systems’ (Norgaard and Baer 2005 cited in Jacques 2015).

This statement points out the future of sustainability, as we only have limited resources and the human population is growing, we need to find ways to preserve the wealth we have and practice responsible economic growth. We need to develop in a way, that future generations have the same possibilities as we have. Technology is evolving quickly and helps us with implementing sustainability but the societal and organizational mindset needs to change as only then, sustainability has the chance to thrive and help our society to grow in a healthy way.

7.3. Project Management

Projects are necessary for organizational change, which is necessary to be competitive on the long run. Many organizations and companies perform projects, but some of them see projects just as a temporary activity to deliver a set objective. This thinking neglects not only sustainability during the project management approach, but also the meaning of the output.

Project management should not only be seen as a task or several deliverables and work packages, it should be seen from a holistic point of view. Projects thrive change in the organization; as projects are most of the time short-term oriented and temporary organizations are created, the long-term aspect could be neglected. Nevertheless, the change, which is created by the project on a short-term will lead to an effect on the long-term for the organization.

7.3.1. What are the challenges of implementing sustainability in project management

Projects and project management are apart from the conventional organisation, it is not integrated into the operational functions of the company. Therefore, it could happen, that the project management organisation neglects the organizations values.

First of all, the organization needs to change and implement sustainability into their business processes and values. Only if the strategic perspective is focussed on sustainability, operational processes can implement it. Throughout the literature, a missing knowhow is mentioned, the organizations do not know how to handle this topic. It is clear that most organizations see the need and the importance of sustainable business practices, but the challenge for them is to integrate sustainability into their business. It would benefit the organizations and its employees, if a certain level of knowledge would be built up. It is important to educate all relevant people in the organization to get this idea and the benefits across and make it clear to them. It requires that resources are used to educate the people properly and develop a knowledge base. If the organizations view on sustainability has changed and it has an idea, what steps need to be taken to implement it, the first step is done.

Another challenge which was mentioned in the literature is the craving for growth. As an organization deals with many stakeholders, not all of them will have the same opinion on sustainability and also other crucial topics. For some stakeholders the value of their shares is the most important thing, if this value will decrease because of reorientation, this could lead to conflict. It is the duty of the organization but also the project management organization, to effectively communicate with the stakeholders and educate them showing the benefits of a reorientation towards sustainability. The organization needs to be consistent with their effort towards sustainability and must not give in to stakeholder's pressure.

7.3.2. Difficulties implementing sustainability

Implementing sustainability, as a first step into an organization and then into the project management processes of that company, requires attitude and endurance. Organizational resistance is commonly known and documented, when changes are introduced to the

organizations way of working or its values. This resistance will lead to difficulties while introducing this change to the organizations and to overcome this challenge and to onboard the employees much education and information is needed.

It is not a small change introduced to the organization, integrating sustainability is a huge undertaking (Baumgartner and Rauter 2017). It will take time to integrate sustainability and it also requires additional resources of the company. Therefore, it is important to show the benefits of this topic and to get the attention of every one of the organizations towards this topic. Another challenge will be the constant focus at this topic; sustainability is an evolving topic and that is why the organization needs to be reviewing the developments of this topic constantly, which also needs time and resources.

Despite all the challenges of implementing sustainability into the organization's way of working, the long-term benefits outweigh those, which will be discussed in chapter 7.4.2.

7.3.3. Project Management methodologies fit for use

As sustainability gets more awareness, the project management methodologies must address this topic and integrate it within their processes. PRiSM is a methodology, which focuses at the total lifecycle of a project, not only certain parts. Strategic views and integrating several sustainable factors play a vital role in this methodology. PRiSM can be incorporated into most project management methodologies, but is more of a generic model.

Agile methods such as SCRUM are getting more attention and many projects use this kind of iterative project delivery to satisfy their customers and be able to react to changes. The Green Project Management Association mentions, that PRiSM could be integrated into most project management methodologies, but is it the best way to integrate sustainability in project management methodologies?

After reviewing the literature, many methodologies already address this topic. The Green Project Management organizations developed a sustainable framework for PRINCE2 and Agile methodologies, the SP2 (Sustainable PRINCE2) and SAPM (Sustainable Agile Project Management) (Green Project Management 2019). This is the right step as they are more focussed on integrating sustainable features into the project management methodology. Nevertheless, the project managers as well as the project sponsors should participate in trainings to gain knowledge and see the bigger picture of sustainability to fully understand the concept behind it and in what way it benefits the planning and execution of the project.

It is also important to provide project managers a practical framework with tools, techniques and templates, which they can apply during their project. This framework should include all relevant factors of sustainability, which should be addressed during a project. PRiSM is the first framework, which explicitly considers sustainability, but as the interview results also made clear, it is important to implement more practical ways to help the practitioners use it for their projects.

7.3.4. The stakeholder's role

Every project has certain stakeholders, they can be internal or external to the organization. They can have interest and power concerning one project, which is typically shown in an interest/power grid (see figure 19).

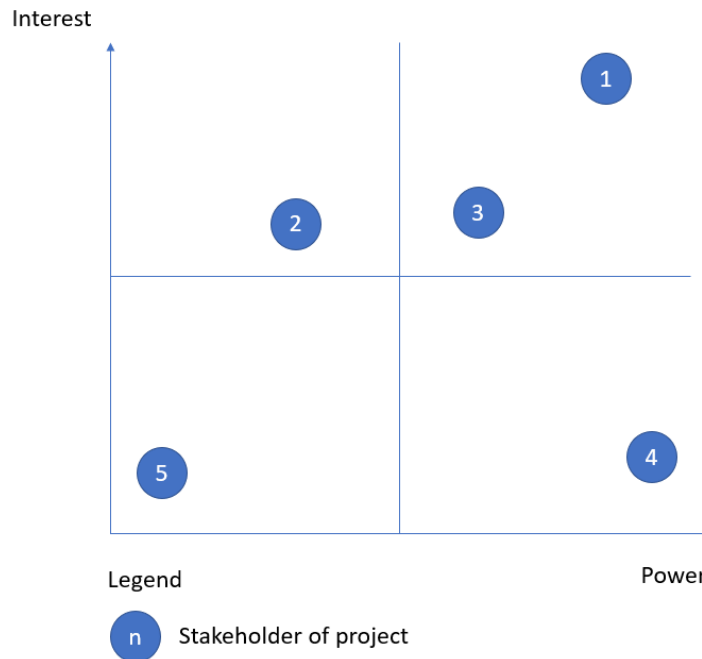


Figure 19: Stakeholder Interest/Power Grid

Stakeholders have interest in a project, the development and any other information about it, but they also can influence the project, if they have high power. Stakeholders are also classified by their attitude towards the project, they can either have a positive, neutral or negative attitude towards the project. If a stakeholder has high power and a negative attitude towards the project, he/she will be seen as a risk to the project.

Sustainability is broadening the areas of project management, new topics and areas are introduced into the project management processes. One of these topics is the broadening of the stakeholders. As the economic, environmental and social factors are integrated into the project management processes, a wider group of stakeholders must be addressed.

In some projects, the project team will face stakeholders, who have high power but a negative attitude towards the project and that is the reason why they are declared as risks. The project team should not see the risk but embrace the chances and see the stakeholders as a source of information and suggestions to create a more valuable and worthwhile project.

7.3.5. Construction Industry

The construction industry is almost entirely working with projects as each construction is unique and differs a little bit from a former one. Each project uses a lot of natural and human resources and that is why sustainability plays such a big role in this industry.

BREEAM and LEED are two standards, which focus at sustainability of construction projects. LEED is the leading standard in the construction industry, it dominates almost every market worldwide except the United Kingdom, where BREEAM is market leader. After reviewing current reports, the situation changes, LEED is getting more attention and projects in the United Kingdom which puts pressure on BREEAM.

There are some differences between those two standards, one of them is the certification process. If the project team wants a LEED certification, it must register the project at the USGBC and define the standard they want to achieve. The project team needs to fulfil certain requirements and submit all necessary data to the USGBC and they will review it and assess the consideration of sustainability in their projects. In contrast to that, BREEAM uses external assessor who will work with the project team and approve the standards of the project and rate it according to BREEAMs classification.

Several other differences exist between those two standards and the developing countries influence is perceptible, nevertheless these two frameworks provide a guideline for the construction industry to take sustainability into consideration and work in an environmental and social responsibly way.

The two case studies, which were presented and analysed in chapter 4-6 used LEED and BREEAM to certify their consideration of sustainability. BREEAM and LEED consider sustainability during the whole project lifecycle. The consideration of an appropriate site, the stakeholder engagement, communication during the project and several other aspects of Project Management are evaluated in those standards.

During the planning stage in both companies, the focus was to deliver a project, which adds value and benefits to the organisation/city in a sustainable way. The TBL was taken into consideration during the planning stage which shows a certain maturity of the organization regarding sustainability.

The literature shows, that the construction industry is highly focussed at sustainability and constantly tries to improve their standards. Other industries especially the IT industry also try considering sustainability and using sustainable methodologies such as PRiSM to deliver their projects and this is the right way.

7.4. Sustainability in project management

As mentioned throughout the literature, constant change is part of organizations and societies way of working. Several factors can trigger the change process, implementing change is through projects. Projects are part of the organization; it is not integrated into operational business.

Sustainability starts at the top of the organization or society. The strategic and long-term goals must be defined and economic, environmental and social factors included. The mindset must change and the importance of sustainable development rather than only economic development must be recognized.

7.4.1. Obstacles of implementing sustainability

Implementing sustainability into the project management approach of an organization is not an easy undertaking. As this topic is rather new and organizations start to think about it several obstacles need to be overcome to successfully implement sustainability:

- Resistance to change: It could be difficult to implement changes, depending on the organizations and societies mindset. The need for change is not recognized and sustainability factors not clear. To overcome this obstacle, organizations and societies need to see the value of the change and the value of sustainability.
- Lack of knowledge: Throughout the literature, a lack of knowledge was diagnosed regarding sustainability and how to integrate it into project management processes. It is important to educate and teach organizations and societies about this topic and help them understand the way of working and how to integrate it to the business processes. The profession Project Management must develop and adapt its way of working and its tools to new circumstances and integrate long term values such as sustainability
- Financial and political hurdle: Some organizations and societies are confronted with political and financial fear of implementing sustainability. This fear must be removed and replaced by knowledge about the topic to fully understand the value of sustainability in projects.
- Lack of leadership and management: Project managers and project owners must see the value of sustainability through training and use this knowledge during the project. Lead by example is a good way to show the organization the benefits of it and get them excited about the new way of working.

There are several other obstacles to overcome and it also depends on the region, the industry and the willingness to change. Many different approaches can be used to implement sustainability but the first step for a successful implement is the removal of obstacles and the change of the mindset.

7.4.2. Benefits of integrating sustainability into the project management processes

Despite the obstacles organizations and societies have to overcome, the value and benefits which is added are outweighing the difficulties. It is important that shareholders and stakeholders understand the value and benefit of the project. As sustainability is getting more attention, shareholders and stakeholders not only want to see the financial value of the project, they also want to see the long-term benefits of their investments. Sustainability in projects should create income not only capital.

There is a dependence between organizations and societies. Organizations create value through projects, these projects are the result of a changing environment. Societies want to

become more sustainable as the natural resources are limited and only assist a certain level of growth. Therefore, integrating sustainability not only into the society, but also into the organization follows the principle of shared values, both parties benefit from it.

Focussing on sustainability, not only in projects but as an organization, will create future benefits. The benefits could be:

- Reputation of organization increases
- Competitive advantage against competitors
- Reduction of emission, waste, ...
- Increase adaption time to new changes
- Attract more potential high skilled employees

Several other benefits are resulting when sustainability is integrated into the organization. The economic factors could lead to a higher return-on-investment and long-term viability. Environmental aspects could be the reduction of pollution, use of renewable energy sources or biodiversity. Humans are the most important resource an organization owns; therefore, it is important to focus at the social factors of sustainability. This could lead to higher commitment and involvement of employees, lower labour turnover rate or better social integration of employees.

7.4.3. A new approach to formulate objectives to become sustainable

Objectives in a project should be formulated SMART:

- Specific
- Measurable
- Achievable
- Realistic
- Timebound

Rather than just formulating the objectives in this way, the project team could decide to integrate the sustainable factors into this concept. The researcher would suggest the SMARTTEES approach, which will add the economic, environmental and social factors to the objectives.

Economic factors could include the monetary benefits or the expected growth of the organizations. Environmental factors could be the saving of natural resources or the reduction of pollution. Social factors could talk about equal numbers of female and male workers or that the supplier has to work according to health and safety regulations.

Integrating these factors into your objectives will increase the organizations reputation and also the commitment of employees, suppliers and the community towards the organization. Another way to integrate sustainability into the project management process is to create frameworks, which address this topic and can be used in any organization.

7.4.4. APM and PMI fit for sustainability

The IPMA and the PMI have developed their own standards, which are used worldwide. The IPMA and PMI address sustainability and integrate it into their standards. According to the information from the conducted interview, the PMI does not address this topic as much as IPMA.

After reviewing the sixth edition of the PMBOK, sustainability is hardly addressed in the standard. The expert mentioned this too but it would be beneficial, if the PMI would address sustainability stronger in the next edition of the PMBOK, which would boost the importance of it in their standards.

On the other hand, the ICB Version 4.0 developed by the IPMA, addresses various aspects of sustainability and incorporates it into their standards. It talks about sustainability of the organization, the project sustainability and also mentions social and environmental sustainability.

According to the Green Project Management Organizations website, they are recognized by the IPMA, but the PMI is not cooperating at the moment with the GPM, even though both organizations have their headquarters in the United States of America. This is an interesting fact and could answer the question, why PMI is slower in integrating sustainability than the IPMA. This would require research about the organizations and their connections and could be done as future topic.

The IPMA strongly integrates sustainability into their standards which help project managers to focus on that and integrate it into their projects. The PMI is introducing this topic and is actively publishing new reports and papers on their website.

Nevertheless, more work needs to be done to introduce practical tools for project managers, which appeal to more dimensions of sustainability.

7.5. Aims and Objectives of this research

The aim of this research was to identify the use of sustainability in projects. Sustainability is getting more attention but is considered to be a long-term oriented goal. Projects on the other hand are short-term oriented, but they implement changes into an organization which have a long-term perspective. It would be beneficial, if sustainability could be integrated into project management processes, as it would help the organization achieve their sustainable goals.

Throughout this project, several aspects of sustainability were identified and also the possibilities, how to integrate it into the project management processes. The researcher tried to discover the link between sustainability and project management and how to integrate it in projects. The literature revealed, that certain obstacles and challenges have to be mastered, to fully integrate sustainability and receive the value of it.

In figure 20, the chapters are shown, in which each objective was addressed or discussed. The researcher tried to address all objectives and discuss them in this research but there were limitations to it as described in chapter 8.2.

Objective	Chapter addressed/discussed
1	2.3.6.
2	2.3.7.2./6.3.3./7.4.1.
3	5.4.2./6.3.1./7.4.
4	2.3.7.
5	2.3.1./2.3.2./7.3.
6	2.3.4.
7	3.4.
8	2.3.6./7.2.
9	4./5./6.
10	2.3.7./7.4.
11	6.3./7.4.
12	2.3.6.3./7.2.3./7.2.4.
13	2.3.6./5.4./7.2./7.3./7.4.

Figure 20: Objective and chapter mapping

The focus of this project was to point out the importance of sustainability, not only for societies, but also for organizations, which deliver projects. Change to organizations and societies is implemented through projects and economic, environmental and social aspects should be integrated in the way the change is delivered.

7.6. Conclusion

After collecting and analysing data for this study, many aspects of this topic were identified. As this topic is a hot topic at the moment, organizations should focus on their ambition to understand this topic as a whole and keep UpToDate with new possible developments. A more practical understanding of sustainability in project management must be introduced and the existing tools and techniques adapted to be fit for use.

8. Conclusion

8.1. Introduction

In this chapter, the main findings will be summarized shortly and the objectives of the research repeated and analysed to identify, if they were answered in this dissertation. Furthermore, limitations of this study will be elaborated and recommendations presented. Further areas of research will be proposed in chapter 8.5, which can be performed by future researchers.

8.2. Aims and objectives of the research

The aim of this research was to discover the link between sustainability and project management and evaluate the importance of sustainability in project management processes.

The objectives of the research were the following:

1. Understand the concept of sustainability

In chapter 2.3.6., a literature review was performed to understand the topic sustainability. As this topic has a wide range, it was not possible to cover all aspects of it, but the most relevant aspects in relation to project management were reviewed and described. The key principles were analysed and described to get a basic understanding of this topic.

2. Identify reasons why sustainability is not taken into account in project management processes

In chapter 2.3.7.2., 6.3.3. and 7.4.1. the obstacles and challenges implementing sustainability in project management were investigated and analysed. The reasons why organizations have problems integrating sustainability into their project management approach was highlighted; it was clearly visible that organizations and societies try to integrate sustainability into their way of working, but they have to overcome several obstacles and challenges to successfully integrate it.

3. Discover the link between Project Management and Sustainability

After conducting the literature review, a missing link was recognized by some authors, but in the last 10 years, much research was performed to close this gap and create a link between sustainability and project management. In chapter 5.4.2 and 6.3.1. and 7.4. the creation of the link is identified and analysed. The connection of sustainability and project management is necessary for organizations to deliver value in the short- and long-term.

4. Examine the definition about sustainability within different project management associations in order to identify the differences

The APMs and PMIs definition of sustainability was described in chapter 2.3.7. Both organizations recognise the TBL factors in their definition (Economic, environmental and social) as well as the importance of integrating the stakeholders in this process. The APM focusses more on the Brundtland report statement, whereas PMI focusses more on the organizations view on sustainability and the effects.

5. Review the topic project management

The topic Project Management is investigated and reviewed in chapters 2.3.1, 2.3.2, and 7.3. A basic understanding of the terminology related to Project Management is provided and the main Project Management processes described. The importance of projects in our society was examined and clarified.

6. Research about agile and sustainable project management methodologies

Agile project management methodologies and PRISM methodology was reviewed in chapter 2.3.4. After conducting the literature review, these two methodologies provide much possibilities to address sustainability within them. In appendix A, the expert describes the benefits of using sustainability in the project management approach of an organization.

7. Perform a systematic literature review to compare different research methods

In chapter 3 different research methods and areas are presented and examined. The philosophy behind research was analysed and the different approaches how to conduct a research presented. Furthermore, ethics in research is described in chapter 3.4. and the importance of it reviewed. After considering all possibilities to perform the research, the most appropriate one for this dissertation is presented and justified.

8. Analyse the different aspects/areas of sustainability

This dissertation focuses on sustainability in project management, therefore only relevant aspects of sustainability are analysed and discussed in chapter 2.3.6 and 7.2. This objective was only partly met, as sustainability consists of several parts and not all of them were investigated in detail as this would expand the scope which was not defined for this project.

9. Compare two projects of the construction industry

Two case studies were found from the construction industry, which were presented in chapter 4 – 6. The results of both case studies are reviewed in chapter 5 and the analysis of them is conducted in chapter 6. The comparison of those two projects is performed in chapter 6. As

the researcher was not able to access all the needed data, the comparison was only possible partly.

10. Assess the impact of sustainability for project management processes

This objective is discussed in chapter 2.3.7. and 7.4., the impact of integrating sustainability into the project management processes is highlighted. As this research is quite new and only limited empirical data is available, the impact of sustainability in projects could only be presented from an academic point of view.

11. Summarise the benefits and obstacles of sustainable project management processes

The benefits and obstacles of integrating sustainability into the project management processes is presented in chapter 6.3. and 7.4. There are several obstacles which have to be overcome to gain the benefits of the integration of sustainability.

12. Suggest an addition to the TBL

The TBL was introduced to organizations to have another way of measuring their value and their performance instead of only looking at the profit. In chapter 2.3.6.3. the TBL is analysed and in chapter 7.2.3. and 7.2.4. an adaption of the TBL is proposed to address sustainability within the organization in a better way.

13. Prove the importance of sustainability in project management

In chapter 2.3.6., 5.4. and 7.2.-7.4. the importance of sustainability in project management is shown from an academic point of view. The positive impact is also presented and what organizations need to do to change their mindset. Nevertheless, the practical aspect of sustainability in project management was not completely shown, as besides from the construction industry, there is little data existent about this topic from real-life projects in other industries.

8.3. Limitations

During this research, several limitations to the topic occurred. First of all, as this topic is evolving and getting more interest, only limited empirical data was available. Apart from the construction industry, no other industry provided information about their integration of sustainability in their projects. Many organizations advertise it on their website, that it considers sustainability and presenting the measures they do, but publicly available information about sustainability in their project management process was not discovered.

Another limitation is the lack of knowledge in this field as shown in chapter 6. The project managers have only limited knowledge which was also identified by the expert, who took part in the conducted interview for this research. It was difficult to find an expert in sustainability

with project management knowledge to interview. The APM was not able to provide the right contact at that time as well as the PMI. The PMA Austria was able to provide the details, which was very helpful for this research.

As this topic is more an academic one rather than a practical, as shown in chapter 5,6 and 7, it was easy to collect information about this topic, but very hard to find the application of sustainability in a project management process of a company.

According to the information from the conducted interview, the topic itself has no limitations. More research and especially practical tools and frameworks are needed to implement sustainability in project management and get the full value of this in the organizations way of implementing change.

8.4. Recommendations

Sustainability is a topic, which strikes organizations and societies worldwide. The way humans act and work today will define the future possibilities of next generations. Therefore, it is not only important to think about profit and increasing the value of the business, humans and the environment have a huge impact on the way we should work too. Neglecting this and only go after profits will maybe help the organization in the short-time, but will definitely lead to failing in the long-term.

Organizations need to realise the need of sustainable products and processes. This thinking must be integrated into their values, mindset and the way of working. This change requires a lot of attitude and passion, but it is necessary to implement it into the organization to have a long-term chance to be successful. This thinking needs to be added on a strategic and operational thinking.

Knowledge and education are important to understand the concepts and aspects of sustainability. Therefore, organisations should educate and train their employees to develop their knowledge and also see the value of it. It is important, that not only project managers are trained, also project owners and key players in a project should receive training in sustainability to make the most out of it.

Projects are the drivers of change in an organization. Even though they have a certain timeframe, the impact of the project will outlive it. It is important that project teams recognize this and create their project objectives with this thought; the objectives should integrate economic, environmental and social factors to get the most value out of it, the term sustainable objectives would be a new way of formulating objectives. A strong focus on benefits management will help the organization to have an overview of their objectives and how far they have been accomplished.

Stakeholder involvement is necessary and a good way to get new perspectives into the project. If one of them has been classified as a risk, the organization should try to make some extra effort to understand his view and also broaden their view. Every stakeholder has certain expectations and they should be aligned with the sustainable objectives.

8.5. Further work

This topic is quite new, the last 10 years more research was conducted in this area. Possible new research areas could be the analysis of industries apart from construction. The IT industry is also a big one, which is working mostly within projects and it would be interesting if and how they integrate sustainability within their project management approach.

Another area for further research would be the review of the implementation of practical tools and techniques. The development of them would be beneficial for practitioners and future researchers could investigate those tools or try to develop them.

Agile project management methodologies are often used, not only in software development projects, but also during projects, where the scope is not clearly defined. Future researchers could try to develop and recommend an implementation strategy of sustainability in agile methodologies e.g. SCRUM.

Sustainability and projects play an important role for organizations and societies. These topics will definitely evolve and new areas of research will be uncovered. It is important to focus at this topic and make the most value out of it, not only for our current generation but also for the future ones.

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Appendix A

Interview questions

1. Tell me about yourself?
2. Have you experienced one or more projects where sustainability played a role?
3. Do you see a particular industry, where sustainability is lived through the project management process?
4. Does the iron triangle still have its value or does it have to change to address sustainability? If yes how?
5. After reading through literature I noticed, that some authors see a missing link between PM and sustainability but this link is tackled. What is your opinion on that and what is from your point of view the future of sustainable Project Management?
6. What are the obstacles organizations face while implementing sustainability into projects?
7. What role does corporate social responsibility play?
8. How can an organization try to implement sustainability in their projects, which steps are needed to be taken?
9. Which sustainable principles are challenging to implement in the project?
10. Stakeholder have a crucial role in projects, do they have the power to embed sustainability within the project life cycle? How can they force this topic to be taken serious from organizations?
11. After reading through the literature I noticed, that several PM methodologies try to implement sustainability within their processes, do you think this will be expanded to most of the commonly used methodologies or should just some have this aspect?
12. Agile methodologies are becoming very popular, do you think sustainability can also be implemented into these kinds of methodologies?
13. Which methodology covers the topic sustainability in a holistic view, which one incorporates it the best at the moment?
14. What role does the project manager play regarding sustainability in projects?
15. Do you think that more organizations should send their project managers to trainings with focus on sustainability or is it unnecessary as this topic is not relevant for projects?
16. In your book 'Sustainability in project management' you recognize, that sustainability is about both short-term and long-term orientation. Could you elaborate on this as the nature of projects is more short-term.

17. After reviewing your case study about the project from Finalist IT group in Beijing you and your colleague classified this project as a good example for sustainable project management. Could you tell more about the project and why you choose it for your study and why you consider it to be a good example.
18. What are the future challenges and limitations to this topic?
19. Do you have any final thoughts you want to share with us?

Interview transcript

I: Interviewer

E: Expert

I: First question, basically tell me about yourself, what are you doing what is your profession?

E: I'm an independent academic working at different universities; the numbers change a little bit from year-to-year but at the moment probably 13-14 something like that. Quite a number of them in Holland, I think four in Holland, five in Austria because I also live in Austria partly in Austria, partly in Holland and for the rest one in the UK, one in Sweden, one in Germany, Spain, France etc. And next to that, it's 85% off my time, 15% is little bit of company Consultancy and more Company training.

I: From your experience, did you manage to get into a project where sustainability played a role; did you manage or consult such a project?

E: The last thing, that was not the trigger, that was the result of our focus on sustainability in project management. I did operational project management as a consultant and a project manager, but that was before I joined the academics and the university before 2002. I started at HU in Holland at the end of 2002. I am still doing some company trainings but not operative project management. I get in touch and do sometimes consultancy work on projects and we also help organizations in integrating sustainability in a specific project or in general project management. But that's more a result of my work on sustainability in project management. I did not trigger that work; the trigger actually was different. The trigger was that we wanted to start a master program in project management here in Utrecht. I initiated that program, we were sitting together with the developer's group and thinking about what to put in the master, what the curriculum be and then we got the idea that it should be more than the standards, it should be more than generic project management process. We felt, that the masters should challenge a little bit conventional knowledge and should also add something to the profession, have a little bit of a message. That's how we started talking about sustainability in project management, that was 2008. It took off from there, because nobody really had a clue what that could mean. We started doing small studies, talks and discussing about conceptional work and that's how the whole ball got to roll.

I: I read through the literature and noticed, that some authors see a missing link between project management and sustainability but this link is tackled in the last few years. What is

your opinion on that and what is from your point of view the future of sustainable project management?

E: Well, that link depends on where you come from and how you are looking. It has little bit to do with your perspective on project management. So, if you look at a project just as doing a task and making a deliverable, yes, then it is kind of what a deliverable does and the change that the deliverable creates in the organisational society is kind of far away. That is a task perspective on projects in project management. If you want to see the link with sustainability you have to look at an organizational change perspective. It is clear, that organizations need to change towards sustainability, there is lots of literature on that, projects play a role in organizational change so there is your link. You might also have to take it a little bit more on society, society needs to change and organizations play a role in societal change, there is also a link. That's all coming from a point, why we do projects. From the project management world itself, it depends on how you look at the world of projects. If you have more the organizational perspective, there is clear link because we need to add value to our host organizations or clients. But if you just look at project management as delivering a deliverable, the link is not so clear. If you ask me what is the future of project management, it is clearly the organizational perspective and also even a societal perspective coming from the recent studies, that projects account for about a third of economic activity in western societies. So, if you are active in a third of economic activity, you ignore your societal influence, that perspective is also there. I think you see the standards moving. If practices are influenced by standards and I think that is influenced by standards, perhaps more than academic work, they are moving. IPMA clearly discusses sustainability in their competence standards, but even PMI, who is rather I would say conservative in the development of their standards, I mean they are not talking about sustainability much, but they are moving away from their traditional task perspective to a little bit wider orientation of the projects. I see some movement there and I think that this will only continue.

I: Do you think CSR plays a huge role in the future of sustainable project management?

E: Yes, but let's say those terms, sustainability, sustainable development and CSR come together. The transition towards a sustainable enterprise, whatever that sustainable enterprise might be, but you think all relevant companies in the world taking, the one a bit more serious than the other of course, steps towards sustainability, taking steps to integrate sustainability into their business practices, whatever we call it CSR, sustainable development or sustainability. The terminology differs a little bit but it basically boils down to the same point. They are not literally the same points but for example if you look at the ISO 26000 on social responsibility or CSR it clearly says, that a social responsibility of an organization is how it contributes to its sustainable development. So that kind boils down to the same point we need to change the practices the processes the assets and the products, whatever we do in our organization. Whatever that is more triggered from an environmental system thinking perspective which is underlying sustainability movement, or whatever it is more an ethical perspective that is more related to CSR, it will relate to the same level of organizational change.

I: Which challenges are organizations facing when they try to implement sustainability in their projects, what obstacles do they have to overcome to implement this into their projects?

E: Well first of all, they don't have a clue how to do that. So, let's say translating ambitions and also translating concepts of sustainability most of all let's say TBL into their application of project management, that is I would say the first thing. So that's a little bit more instrumental, practical is how can we do that how can we do for example, a sustainability impact analysis of the project and how can we analyse the sustainability aspects. There is a competence issue there, project management might think that they need to become sustainability experts, how can we really assess the impact of what we do in projects. So, I would say that there are two levels, one is a kind of awareness level that we say, we help with certain instruments and templates etc., well you at least think about sustainability in project management and that is a very generic level. That is the first thing, it needs perhaps a little bit attitude, it needs certainly competences and it probably needs instruments, more practical tools for project management. Once we start considering sustainable aspects in projects, we run into the second issue and that is that, I would call it a defect of an organization. Now we really have to go into defect finding, so we were talking to an organization the other day here and they said ok, we are kind of doing it now, we are integrating sustainability targets in our project assignments and we want to report on that but now how can we really get a grip on it, how can we really measure, how can we really know what our footprint is for example. So, it also requires to take that step the organization has a certain maturity how it treats the topic of sustainability in general.

I: I read some chapters in your book 'Sustainable Project Management' and I came across the sustainable principles. Which one do you think is the most challenging to implement in the project?

E: I would probably say that holistic perspective, so considering the TBL and considering all of the perspectives and really getting a grip on that. I cannot really isolate them, perhaps is also related to the value chain and the life cycle because for a project being very temporary oriented, it is not easy to understand the effects and the impact in the use phase and whatever happens after that. That is from a project management perspective that is quite far away. And it is not directly the responsibility of the project manager, so that is not to use your orientation, I think really making it concrete, making it measurable and making it assessable, like I said 2 levels; one is the considering but than is the content, the real thing and the last thing is really difficult.

I: Talking about the project manager, what role does he/she play regarding sustainability in projects?

E: Very central role, I think of course you can say the content of the project is given by a project owner and that is definitely the case although it would not mean that the project manager has no influence on that, especially how also the views of a wider group of stakeholders is reflected in that context of the project, so I think there is definitely an influence of the project manager on the content and the project objectives. For the rest there is a huge effort and influence of the project manager on the process of delivering or developing the project, because project owner does not really care about that. They care about the what, not necessarily about the how. So, on the how there is a crucial role of the project manager and on the what there is an influence.

I: Do you think that more organizations should send their project managers to trainings to focus on sustainability?

E: Yes definitely, absolutely. I think what we always notice when we do trainings is that once the project managers, first of all it is an eye opener for the project managers to understand that link between sustainability ambition and the strategy of the organization and their role in that, that is kind of an eye opener. For example, when we do trainings, we also invite the sustainability officer of the organization or the CSR officer to also explain a little bit about the sustainability policy of the organization and it is interesting to observe, that these two groups project managers and sustainability officers they do not know each other. They never meet, for the project manager it is interesting to hear about what the organizations working on in terms of sustainability and for the sustainability officers it is often quite an eye opener to see, hold on but if I want to put something into practice because the tent to be oriented towards the board, what should we do and then put it into practice. We need the change capacity of the organization we run into the project managers. So that is an interesting awareness, that is the first thing and the second thing we get back that once they hear more examples, ideas and perspectives on how they can look at things and what they can do in their projects how it might change the stakeholder analysis, the risk analysis, how they handle that in the project, how they can do an impact analysis, that definitely needs knowledge and competences.

I: Stakeholders have a crucial role in projects, do they have the power to embed sustainability within the project life cycle and how can they force this topic to be taken serious by the organization?

E: Well, I mean stakeholders is a very wide group so it is difficult to say something in general terms.

I: Let us talk about the key stakeholders, they have high power and impact on the project.

E: Well, if they have high power it is very clear that they have a certain influence. I think the stakeholder topic, it is an interesting topic that you see in the sustainability CSR world very central in CSR thinking is the engagement also with stakeholders and it is also a crucial topic in project management. Although PMI was relatively late with really addressing that but ok; but the thing in project management we want to understand the world of stakeholders and it is not always about their formal power. We tend to highlight the notion that is not necessarily about the power, it is about how can we make projects more valuable and how can we make projects better. We refer to stakeholder theory and the engagement with stakeholders taken into account the interest of a wider group of stakeholders creates a better and more valuable project. So, there is one thing that is a content thing. But it would require and this is more of a process thing, that we have a more open attitude towards the interest of our stakeholders and open engagement and that is an attitude thing. In project management we tend to look at certain stakeholders, not all stakeholders, but certain, we tend to look at them as risks to the project but we need to try to see them as source for ideas and value, that is a different approach. With that we need different analysis techniques and different ways of working with stakeholders but also different engagement methods and ways of understanding their interest. We should probably than also go beyond a very two-dimensional power interest grid that also has his value as it is compact and gives a nice overview but we probably should open up to a wider group of stakeholders and also do the analysis in a different way.

I: There are certain PM Methodologies and agile is becoming popular, do you think that sustainability can also be implemented into these kinds of methodologies?

E: I think so. I mean agile is an extreme view of that or let's say certain agile methodologies like SCRUM that kind of not really talk about projects and project managers and etc, but the reality in many organizations, not all organisations but many organizations is that they are still embedded in a project so it is an approach used in a project. I think the benefit of agile it recognizes that in reality there is more uncertainty in projects and it finds a way to handle that uncertainty. Now that fits the idea of sustainable project management, there is also more uncertainty because we are opening up the scope you could say. We are looking at a wider set of perspectives we are looking at a wider and further timeline that influences also a wider group of stakeholders. It increases the level of uncertainty in projects and agile seems to be more suitable to handle that uncertainty. So yes, it would definitely benefit, although we have to take care because there are also reasons why sometimes does not fit. It does not mean that we cannot use certain techniques that are used in agile like visualization and Kanban board and stand up meetings, but for me the essence of the agile approach is the iterative development of the deliverable. That make sense in an uncertain situation with uncertain conditions where this makes a lot of sense however, it might not always be possible if the deliverable has a certain technical consistency and not every deliverable can be developed in an iterative way. So that limitation is still there but apart from that limitation I think Agile has benefits because it handles uncertainty in a different way.

I: In your book 'Sustainability in project management' you recognize, that sustainability is about both short-term and long-term orientation. Could you elaborate on this as the nature of projects is more short-term.

E: Well I guess it goes down to the Brundtland definition, that talks about current generations and future generations. The essence there is the equality of the short-term and the long-term. Yes, we can have a comfortable life and do things on a short term but it should not come at the expense of the long term and that is the issue. It is not that it is about the long term it is also about the short term but not at the expense of the long term. So, we need to balance those two perspectives, the long term and the short term. That is where this comes from and that means that of course in project management where we are yes temporary organizations and short term oriented or shorter term oriented but within those actions we do in the short term in projects of course we realize changes that have a longer term effect so working on the short term and being responsible for activities on the short term but thereby considering also the long-term.

I: After reviewing your case study about the project from Finalist IT group in Beijing you and your colleague classified this project as a good example for sustainable project management. Could you tell more about the project and why you choose it for your study and why you consider it to be a good example.

E: This project was quite a time ago but sorry I cannot give you details about this project. The problem we have with sustainable project management and if you ask me if we have good cases I could not give you a yes on that. We did not have really empirical material on that, we have cases which illustrates some points we make, so that might work. But I couldn't give you a project where I say that is exactly what I mean. We did not always know what we were looking for as this is a developing topic so we have done in the early years of looking at sustainability in project management we basically try to give meaning to those, basically make the translation to the concept of sustainability in project management. There were first things you need to consider, variables and perspectives and sometimes principles. We wrote

different articles how it would influence different processes; we had a couple of articles how it would influence project management processes in total. Later we had more articles that focussed on specific process like the business case or the risk management process or recently the stakeholder engagement process. So, it took a couple of things like that and by doing that we tried to move a little bit away from the conceptual thinking that we say it should have influence on that processor area and make it more practical, so into the development and design of relative simple tooling type of stuff. We also start on impact assessment; we created a maturity model that I think is a nice model and we have to keep working on cases for that. I would not call it empirical research because it is not studying what they did in a project but rather what they used as a tool to look at projects. It does not mean in the reality of project management they use a tool like that. The more recent work was on what we call a human factor, sometimes it was competences, the underline and the believe of the project manager. What would trigger, what would stimulate a project manager to consider that, so we tried to dance around different topics there where it became a little bit clearer for us where we are going and at the end to influence the behaviour of project managers and that has to do with their believes, their competences and what is also available in tooling and standards and also handbooks on project management. So, the first part was more conceptual, we try to make it more practical and sometimes empirical. Studying the attitudes of project management, you can do that empirically and that is what we did. Studying good practice of projects, which consider sustainability, but we still have troubles finding those good projects. It is definitely on our radar, actually there are two things on our radar for the future. One is to really study the practices, lets says we are now more or less 10 years on this topic, what is it now, that organizations really do. That is an idea we are thinking about but my situation is that I have to find research capacity and research capacity are students. The second research program we are trying to develop that is partly more conceptual is actually more, I mean we have looked at sustainability in project management as such but there are publications in portfolio management and I think there is one publication of sustainability in program management and we now want to connect those layers starting with sustainability in business strategies and ambitions of the organization. What would that mean to sustainability in project management, program management and portfolio management so kind of create a multi-level framework of that. We are not there yet but that is an idea that we are working on. That might be a little bit more conceptual.

I: What are the future challenges and limitations to this topic?

E: I don't really see limitations; I mean the study will have limitations but the topic has no limitations. Challenges of course there are always challenges; to be frank at the moment this topic is a hot topic, it is an interesting topic. Sustainability has a clear interest and that also boosts the topic sustainability in project management. Perhaps, the topic is a little bit more academic although we do experience quite some companies and practitioners interested in whatever content we put out so they are interested in the topic. I guess a challenge or risk might be in the future that societal interest for sustainability fades away. I am not sure because I never want to follow the fashion, but I can imagine at a certain level that people become sustainability tired and the topic might not be as hot anymore. Personally, it would not make much difference but this could happen. Probably the next word is already waiting there and we might than go into responsible project management. That seems to be at the moment a new and fresher term. I mean sustainability still covers it and we are definitely not

at the end. Sometimes people tell me, that you already worked 10 years on the topic and that you should move on but I don't think we are there.

I: Does the iron triangle still have its value or does it have to change to address sustainability? If yes how?

E: Does it still have value, that is a good question. I mean it is not my favourite triangle let's put it like that. I do recognize in practice many projects especially if you are the project owner you contract your project in a kind and it might be to an external or internal partner than of course the iron triangle represents interesting controlling variables of the controlling of the project. But however, everyone knows now, that there is more than that. Nevertheless, it seems to be difficult to get rid of the iron triangle and probably we should not try to get rid of that but we have to be careful because too much or too strong focus on the iron triangle really puts project management in this tactical level task light. It is tactical and task oriented and that wouldn't fit the more organizations change perspective and societal change perspective that is also there. It could be that an experienced project owner says well that is all fine and I still have this perspective but I don't want the project manager to worry about it. Well that could be the case, but I would say in the future project managers might not be the issue, the project owner might be the more difficult group to put on the right track. And that is a little bit strange because you would assume that they are closer to the strategy of the organization but we don't always see that. Also, for them there is a big gap between the strategy of a company and what they do in their role as project owner in projects. Unfortunately, project managers we can develop and send them to trainings and do stuff but the project owner is a very hard group to address or to develop. It is a very difficult one, all researches have the problem if they want to study project owners, their behaviour and their beliefs and in companies if we do company trainings it is almost impossible to get to project owners. We are happy if we get them for a training of two hours to explain them a couple of things and what their role, whereas with project managers we do a training which last one or even two weeks.

I: Do you have any final thoughts you want to share with us?

E: First of all, we need to develop this topic and I think there is quite some work to be done. Like I said we need some more human oriented thing and instrumental thing; we still need to make it more practical and I think sustainability will gain more attention if PMI addresses it more strongly. That is a little bit a tricky one but I really hope that they will do it in the next version of the PMBOK because that would really help. It is interesting to observe, if we look at the research of the topic sustainability in project management, that the US is basically completely absent. South Africa is there, in Asia is work being done, in Europe there is a lot of work being done but US nothing or just small incidents. That is interesting to observe and also strange. So, I hope that also the US will join but it might be that we need PMI to put more emphasis on that, that would help. So that is one thing but we need to do a lot of stuff. So yes, stay on the topic and that's it.

I: Thank you so much, I got a good insight about this topic, got new information. Thank you so much for your time and this interview.

E: You are welcome! Good luck.



Certificate of Ethical Approval

Applicant:

Martin Padickakudy

Project Title:

An evaluation of the importance of sustainability in project management processes

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Medium Risk

Date of approval:

03 October 2019

Project Reference Number:

P93225

An evaluation regarding the importance of sustainability in project management processes

PARTICIPANT INFORMATION SHEET

You are being invited to take part in research on Sustainability in Project Management. Martin Padickakudy, Student at Coventry University is leading this research. Before you decide to take part, it is important you understand why the research is being conducted and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study?

The purpose of the study is to analyse and evaluate sustainability in project management. Throughout several journals, the missing link between project management and sustainability is pointed out. The authors of these articles are arguing, that project management processes are neglecting the sustainable topic. The interview with an expert in the field of sustainability with a project management knowledge should give more insights into this topic and strengthen the arguments of this paper.

Why have I been chosen to take part?

You are invited to participate in this study because you work for an organization, which performs projects on regular basis and has an established project management methodology.

What are the benefits of taking part?

By sharing your experiences with us, you will be helping Martin Padickakudy and Coventry University to better understand the connection between sustainability and project management and how this topic can be better implemented within the project management processes.

Are there any risks associated with taking part?

This study has been reviewed and approved through Coventry University's formal research ethics procedure. There are no significant risks associated with participation.

Do I have to take part?

No – it is entirely up to you. If you do decide to take part, please keep this Information Sheet and complete the Informed Consent Form to show that you understand your rights in relation to the research, and that you are happy to participate. Please note down your participant number (which is on the Consent Form) and provide this to the lead researcher if you seek to withdraw from the study at a later date. You are free to withdraw your information from the project data set at any time until the data are destroyed on 19 March 2020. You should note that your data may be used in the production of formal research outputs (e.g. journal articles, conference papers, theses and reports) prior to this date and so you are advised to contact the university at the earliest opportunity should you wish to withdraw from the study. To withdraw, please contact the lead researcher (contact details are provided below). Please also contact the Research Support Office (cex212@coventry.ac.uk / +44(0)24 7765 658015) so that your request can be dealt with promptly in the event of the lead researcher's absence. You do not need to give a reason. A decision to withdraw, or not to take part, will not affect you in any way.

What will happen if I decide to take part?

You will be asked a number of questions regarding sustainability in your project management processes. The questionnaire will take place in a safe environment at a time that is convenient to you. Ideally, we would like to audio record your responses (and will require your consent for this), so the location should be in a fairly quiet area. The interview should take around 20 minutes to complete.

Data Protection and Confidentiality

Your data will be processed in accordance with the General Data Protection Regulation 2016 (GDPR) and the Data Protection Act 2018. All information collected about you will be kept strictly confidential. Unless they are fully anonymised in our records, your data will be referred to by a unique participant number rather than by name. If you consent to being audio recorded, all recordings will be destroyed once they have been transcribed. Your data will only be viewed by the researcher/research team. All electronic data will be stored on a password-protected computer file on Coventry University OneDrive. All paper records will be stored in a locked filing cabinet. Your consent information will be kept separately from your responses in order to minimise risk in the event of a data breach. The lead researcher will take responsibility for data destruction and all collected data will be destroyed on or before 20. March 2020.

Data Protection Rights

Coventry University is a Data Controller for the information you provide. You have the right to access information held about you. Your right of access can be exercised in accordance with the General Data Protection Regulation and the Data Protection Act 2018. You also have other rights including rights of correction, erasure, objection, and data portability. For more details, including the right to lodge a complaint with the Information Commissioner's Office, please visit www.ico.org.uk. Questions, comments and requests about your personal data can also be sent to the University Data Protection Officer - enquiry.ipu@coventry.ac.uk

What will happen with the results of this study?

The results of this study may be summarised in published articles, reports and presentations. Quotes or key findings will always be made anonymous in any formal outputs unless we have your prior and explicit written permission to attribute them to you by name.

Making a Complaint

If you are unhappy with any aspect of this research, please first contact the lead researcher, Martin Padickakudy, XXXXXXXXXXXX .

In your letter please provide information about the research project, specify the name of the researcher and detail the nature of your complaint.

Informed Consent Form

Participant
No.

INFORMED CONSENT FORM:

An evaluation regarding the importance of sustainability in project management processes

You are invited to take part in this research study for the purpose of collecting data on research on Sustainability in Project Management.

Before you decide to take part, you must read the accompanying Participant Information Sheet.

Please do not hesitate to ask questions if anything is unclear or if you would like more information about any aspect of this research. It is important that you feel able to take the necessary time to decide whether or not you wish to take part.

If you are happy to participate, please confirm your consent by circling YES against each of the below statements and then signing and dating the form as participant.

1	I confirm that I have read and understood the <u>Participant Information Sheet</u> for the above study and have had the opportunity to ask questions	YES	NO
2	I understand my participation is voluntary and that I am free to withdraw my data, without giving a reason, by contacting the lead researcher and the Research Support Office <u>at any time</u> until the date specified in the Participant Information Sheet	YES	NO
3	I have noted down my participant number (top left of this Consent Form) which may be required by the lead researcher if I wish to withdraw from the study	YES	NO
4	I understand that all the information I provide will be held securely and treated confidentially	YES	NO
5	I am happy for the information I provide to be used (anonymously) in academic papers and other formal research outputs	YES	NO
6	I am happy for the interview to be <u>audio recorded</u>	YES	NO
7	I agree to take part in the above study	YES	NO

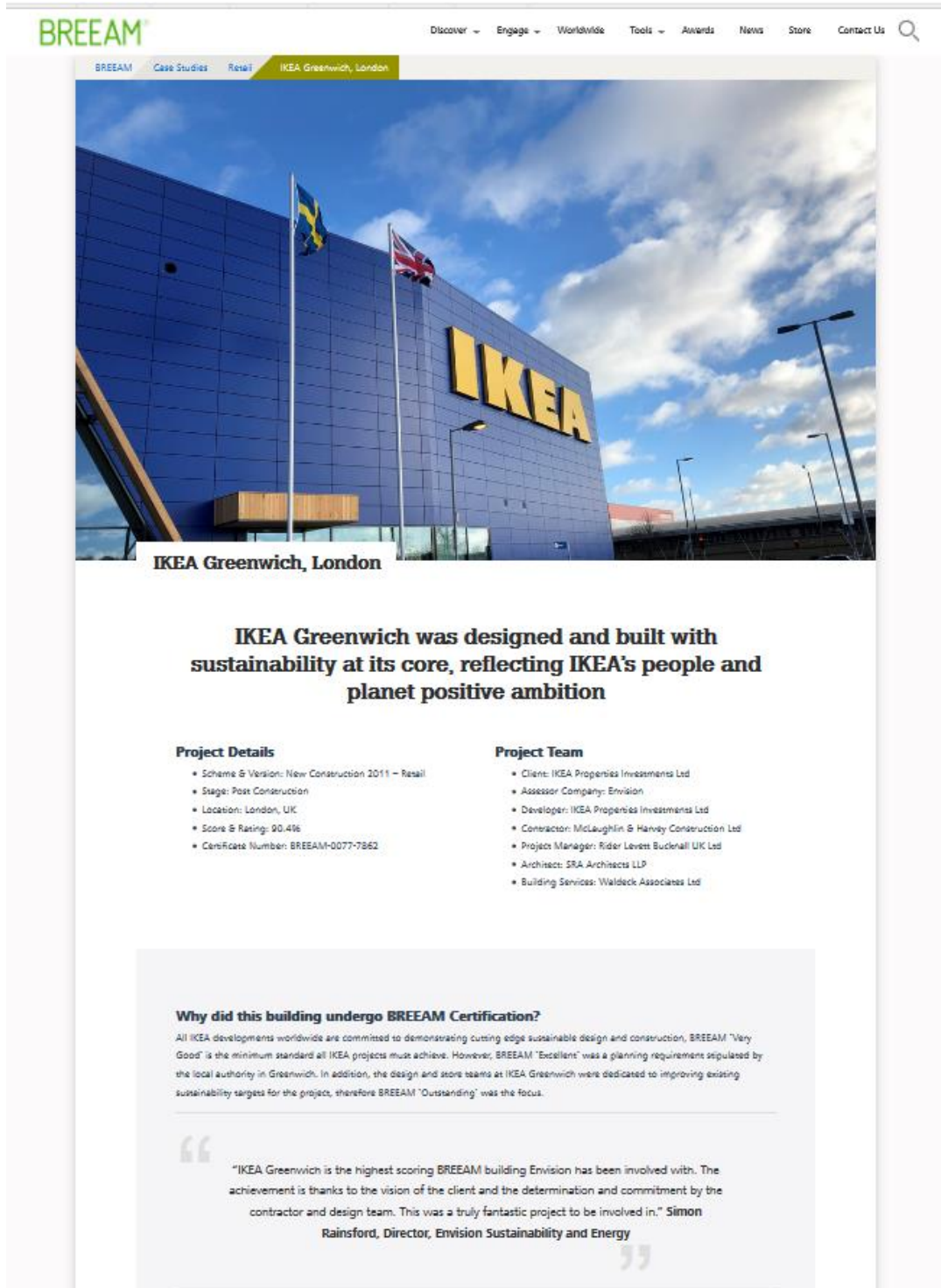
Thank you for your participation in this study. Your help is very much appreciated.

Participant's Name	Date	Signature
Researcher	Date	Signature

Appendix B


IKEA Greenwich case study

This case study is only available online and can be found at: <https://www.breem.com/case-studies/retail/ikea-greenwich/>.



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BREEAM Case Studies Retail **IKEA Greenwich, London**



IKEA Greenwich, London

IKEA Greenwich was designed and built with sustainability at its core, reflecting IKEA's people and planet positive ambition

Project Details

- Scheme & Version: New Construction 2011 – Retail
- Stage: Post Construction
- Location: London, UK
- Score & Rating: 90.496
- Certificate Number: BREEAM-0077-7862

Project Team

- Client: IKEA Properties Investments Ltd
- Assessor Company: Envision
- Developer: IKEA Properties Investments Ltd
- Contractor: McLaughlin & Harvey Construction Ltd
- Project Manager: Rider Levett Bucknall UK Ltd
- Architect: SRA Architects LLP
- Building Services: Waldeck Associates Ltd

Why did this building undergo BREEAM Certification?

All IKEA developments worldwide are committed to demonstrating cutting edge sustainable design and construction, BREEAM "Very Good" is the minimum standard all IKEA projects must achieve. However, BREEAM "Excellent" was a planning requirement stipulated by the local authority in Greenwich. In addition, the design and score teams at IKEA Greenwich were dedicated to improving existing sustainability targets for the project, therefore BREEAM "Outstanding" was the focus.

“IKEA Greenwich is the highest scoring BREEAM building Envision has been involved with. The achievement is thanks to the vision of the client and the determination and commitment by the contractor and design team. This was a truly fantastic project to be involved in.” **Simon Rainsford, Director, Envision Sustainability and Energy**



land revitalization

Region 5 Land Revitalization Technical Assistance Project

GREEN BUILDING AND HISTORIC PRESERVATION CASE STUDIES FOR MOLINE MULTI-MODAL STATION PROJECT (1 OF 5)

US EPA ARCHIVE DOCUMENT

EPA provided technical assistance support to the City of Moline, Illinois in the areas of green building and historic preservation for the Moline Multi-Modal Station Project. This assistance was intended to strengthen the HUD-DOT-EPA Partnership for Sustainable Communities by providing the City of Moline access to technical resources and expertise. EPA's technical assistance activities focused on the development of five case studies on the renovation of existing/historic structures to meet Leadership in Energy and Environmental Design (LEED) standards for multi-modal transportation projects, where possible. These five case studies were presented at the Moline Developer Workshop held on October 18, 2011. This is the first case study in the series.

KING STREET STATION CASE STUDY SEATTLE, WASHINGTON

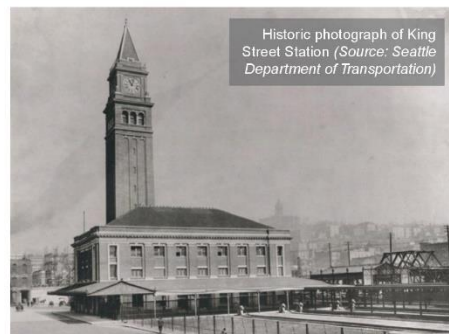
Project Summary

The City of Seattle purchased King Street Station, a brick and granite three-story building with a 12-story clock tower, from the Burlington Northern Santa Fe Railway Company in 2008. Under city ownership, King Street Station is undergoing a \$50 million phased renovation to achieve the following goals:

- Restore the building's historic character and grandeur;
- Upgrade station facilities to meet present and future needs of rail and bus users;
- Enhance passenger safety and security;
- Promote sustainable design with a Leadership in Energy and Environmental Design (LEED) Silver building certification; and
- Support efforts to transform the station into a modern transit hub.

Historic Features

Activities aimed at preserving the site's historic designation include rehabilitation of: the iconic 12-story clock tower, original 35-foot-high ornamental plaster ceilings and walls, terrazzo and mosaic tile floors, and operable windows. True to the building's original look, the white marble wainscoting, decorative sconces and glass globe chandeliers that were removed during modernization of the station in the 1950s will be replicated and/or replaced where possible.



Historic photograph of King Street Station (Source: Seattle Department of Transportation)

Project Description

Elements: Transit, Historic, Green

Size of Community Served:

- Seattle population = 608,660
- 2.7 million passengers in 2007: Served by Amtrak trains, Thruway Motorcoach, and Sounder commuter rail

Current Owner: City of Seattle

Square Footage of New, Renovated, Adaptive Reuse: 88,500 (building and clock tower)

Original Construction Date: 1906

Historic Designation: National Register of Historic Places (1973)

Project Completion Date: Spring 2013

Construction and Project Costs: \$50 million

LEED or Other Green Certification: Targeted LEED NC Silver – expected to achieve Platinum

Visit the EPA Brownfields Web site at: www.epa.gov/brownfields

A major part of the historic rehabilitation involves restoring the 105-year-old original Douglas-fir windows and returning them to an operable condition (many windows have been painted, nailed or caulked shut). The design team, together with an historic preservation consultant, took a detailed survey of the building's 26 different window types, defining characteristics and condition to determine whether to repair or replace the existing windows.

Green Features

A number of sustainable strategies and systems are envisioned to increase building performance including installing natural ventilation, replacing all mechanical systems with a ground-source heat pump, and using energy- and water-efficient lights and fixtures. Computer energy models predict that the building can perform 56.4% better than ASHRAE 2007, a common energy goal, and meet benchmarks of the Architecture 2030 Challenge, which sets targets to reduce energy consumption in new and existing buildings.

Challenges and Solutions

Seismic and Structural Upgrades

The rehabilitation includes significant seismic and structural updates to improve the building's safety, durability and longevity. All of these updates comply with the city's sustainable building standards and the Secretary of the Interior's Standards and Guidelines for Historic Preservation. The building was poorly maintained and allowed to deteriorate over the last century; the rehabilitation will bring King Street Station up to modern codes while retaining its historic character. The project is one of the first to comply with the City of Seattle's new code for Seismic Rehabilitation of Existing Buildings (ASCE 41), which allows for a project-specific, site-specific response to structural upgrades in lieu of standard, code-defined responses.

The planned design takes advantage of this code flexibility, coupled with the building's location in a liquefaction zone (i.e., an area where the strength and stiffness of soil is reduced by earthquake shaking or other rapid loading) and unreinforced masonry perimeter walls, to supplement rather than replace the station's existing structural system (which has performed remarkably well in several significant seismic events).

The vast majority of the added structural support elements required careful insertion behind existing historic finishes. With only three inches between the historic finishes and the wall to insert the system,

standard reinforcement approaches were not possible; a combination of anchors, wide flange sections, and horizontal steel plates were inserted into existing walls around the entire perimeter of the station's three main floors. Additionally, a combination of steel helical piles and grade beams were added along with a structural collar to the outside of the building to reinforce the foundation while preserving the historic terrazzo floors in the public areas.

Improve Energy Performance

After determining that the antiquated equipment used to heat the station was extremely inefficient (cooling was nonexistent), the design team conducted a cost-benefit analysis to determine the most effective and minimally invasive mechanical system to meet both energy performance goals and the project budget.

A ground-source heat pump system was selected; however, initial funding only allowed for 37 geothermal wells (which would provide only enough for the building's public heating and cooling needs). The design team took advantage of the structural work on an adjacent area known as the Jackson Street Plaza to install these 37 wells under the building, in a system that allowed additional wells to be added when funding became available. Since then, the Seattle Department of Transportation (SDOT) received a grant from the Federal Transit Administration (FTA) for additional geothermal wells (a total of 68 have been installed) which are anticipated to meet all of the building's heating and cooling requirements. Space has also been allocated for a future boiler and fluid cooler, in the event that occupant loads greatly exceed those anticipated.



The total projected energy savings associated with the mechanical and geothermal upgrade translates into a reduction of 206 metric tons of carbon dioxide (CO₂) per year, an extraordinary improvement over pre-retrofit operation on a per square foot basis. The pre-retrofit active area (13,383 square feet) was using 118 KBTU/ square foot/year. When renovations are finished, the complete active area (totaling 64,334 square foot) will have an energy use intensity (EUI) of 38 KBTU/ square foot/year. This translates to a 68% reduction in energy use in a space more than four times its original size. Additionally, energy models predict the overall building to perform 56% better than ASHRAE 2007 and to meet the benchmarks of the Architecture 2030 Challenge.

Restore Natural Ventilation

The interior environment of the station will feature restored and enhanced natural ventilation capabilities that provide high indoor air quality and comfortable temperatures. Because the station was originally designed to be naturally ventilated and restoration of the historic windows is part of the project scope, the design team explored local climate conditions to retain the use of natural ventilation (consistent with historical performance) where possible to improve energy efficiency and serve as a model for other buildings.

Onsite air quality testing was conducted around the station, particularly around selected waiting room windows, to monitor the collective effect of pollutants from trains, roads, loading docks and other vehicular traffic. These tests showed that the outside air quality meets ASHRAE Std. 62.1 requirements. This finding will allow the design team to pursue a naturally ventilated scheme that will create a comfortable and healthy indoor environment.

Local climate research and analysis conducted with local wind data, cloud cover data, and typical meteorological year (TMY3) data helped determine anticipated conditions. Thermal comfort levels were established for different areas of the building based on accepted temperature ranges, also taking into account outdoor temperatures and area functions to ensure occupant comfort. As waiting areas have a wider thermal acceptance range due to their function as “temporary” space, natural ventilation will be limited to these areas (representing 23% of the occupied portion of the building). Mechanical cooling will only be provided in these areas when the outside temperatures rise above 80°F.

To effectively implement this strategy, the historic window actuators in the public waiting areas will be restored and electronically controlled by an automated system to meet ventilation and cooling requirements monitored by CO₂ sensors and thermostats. Actuators are required due to the public nature of the spaces that limit personal control as well as the physical location of the windows, which are generally inaccessible due to height.

Phased and Long-Term Planning

This project demonstrates that logical and prudent strategies for phased development projects can restore historic facilities while accommodating additions and improvements. Early collaboration among project team members—including the architect, contractor, green building consultant, historic consultant, engineers, owner, owner’s representative and building tenant—allowed the team to outline long-term goals and embed them in the scope of work from the project’s outset. This clear, early direction allows work to be phased in order to capitalize on funding as it becomes available, and accommodate future development, technologies and modes of transit.

The creation of a long-term “Urban Vision” to complement the station’s rehabilitation outlined additional, future enhancements to the facility, adjacent neighborhoods and open space to further benefit the community and inspire additional, area-wide improvements.

Partnerships and Funding Strategies

Restoration of King Street Station is being funded by contributions from city, state and federal governments as well as nonprofit organizations. The voter-approved Bridging the Gap initiative—a nine-year, \$365 million levy for transportation maintenance and improvements—provides \$10 million to the project; an additional \$40 million comes from the FTA (including TIGGER II funding), Federal Railroad Administration, the Washington State Department of Transportation (WSDOT), the Washington State Historical Society, and two non-governmental organizations (South Downtown Foundation and 4Culture). In addition, WSDOT and Amtrak purchased new exterior awnings and restored the building’s entryway foyer and waiting area restrooms at a cost of \$4 million.

Leveraging Private Investment

Catalyzed through focused investment in the historic transit station, private development interests recognize the opportunity to build on the momentum created by the renovation effort. As a result, current and future investment adjacent to the station will create millions

of square feet of adaptive reuse and new commercial development. The King Street Station project highlights the potential for financing area-wide redevelopment through a combination of public and private resources.

Leasable Tenant

The renovation offers mixed-use leasable office space on the building's second and third floors. Eventually, this space will be used by commercial tenants to create revenue and enhance the station's appeal to commuters and the community. These tenant spaces will be upgraded to meet current code and prepared to a "core and shell" state, in order to accommodate specific tenant needs as spaces are leased. Tenants must share a commitment to preservation, stewardship of the natural environment, and a desire to promote dense, transit-oriented urban development. In accordance, the design team is helping to develop tenant guidelines outlining proper and environmentally responsible actions for office space lessees.



Project Effect on Neighborhood

The project makes environmentally and fiscally conscious improvements to increase and improve the use of King Street Station and create an active, vibrant commercial and transit hub.

Through this project, the following, planned improvements will enhance the urban fabric of the neighborhood:

- Re-establish historic development patterns to focus on pedestrian and transit friendly neighborhoods
- Repair, restore, clean or replace (as needed) the brick facade and terra cotta detail to improve the building's face to the community
- Install new overhead canopies to provide weather protection and create inviting building entries
- Remove existing parking in front of the building to create a new pedestrian plaza space that accommodates outdoor community activities and events
- Install architectural lighting to highlight the building's historic features
- Encourage future tenant use of the second floor to further activate the adjacent Jackson Street Plaza, a public meeting area
- Include a new passenger drop-off /pick-up location and turnaround on King Street to help manage vehicular traffic and improve pedestrian access
- Reopen the Jackson Plaza entrance and install a new elevator to improve station access and Americans with Disabilities Act compliance
- Widen and repave existing walkways, and reopen the grand staircase which connects the Jackson Plaza and the lower station entrance to enhance pedestrian access
- Install new lighting, furniture, natural landscaping and signage to welcome travelers and visitors
- Incorporate materials that acknowledge the historic nature of the station and surrounding neighborhood

Positioned at the nexus of two historic neighborhoods (Pioneer Square and the International District), and in proximity to two professional sports stadiums (Safeco Field and CenturyLink Field), the King Street Station project is seen as a catalyst for public and private redevelopment area-wide. Related projects include an envisioned, 500,000-square-foot mixed-use and residential community on the adjacent "North Lot"; as well as more than 3 million square feet of commercial

development using the air rights over the station's tracks (which are currently being explored by interested parties).

Sources for Additional Information

For more information on this restoration project, please see the King Street Station website: <http://www.seattle.gov/transportation/kingstreet.htm>.

Project Contact

For more information on the King Street Station restoration, please contact:

Trevina Wang

King Street Station Program Manager
 Seattle Department of Transportation
 (206) 684-3072
trevina.wang@seattle.gov

Project Team

- Architects** – ZGF Architects, LLP
- GCCM** – Sellen Construction
- Owner's Representative** – Shiels Oblatz Johnsen, Inc.
- SMEP Engineer** – ARUP
- Historic Consultant** – Artifacts, Inc.
- LEED Certification** – Green Building Services, Inc.
- Cost Estimating** – Davis Langdon
- Geotechnical Engineer** – Hart Crowers, Inc.
- Civil Engineer** – KPFF Consulting Engineers, Inc.
- Acoustic** – Sparling
- Commissioning Agent** – Keithly Barber Associates

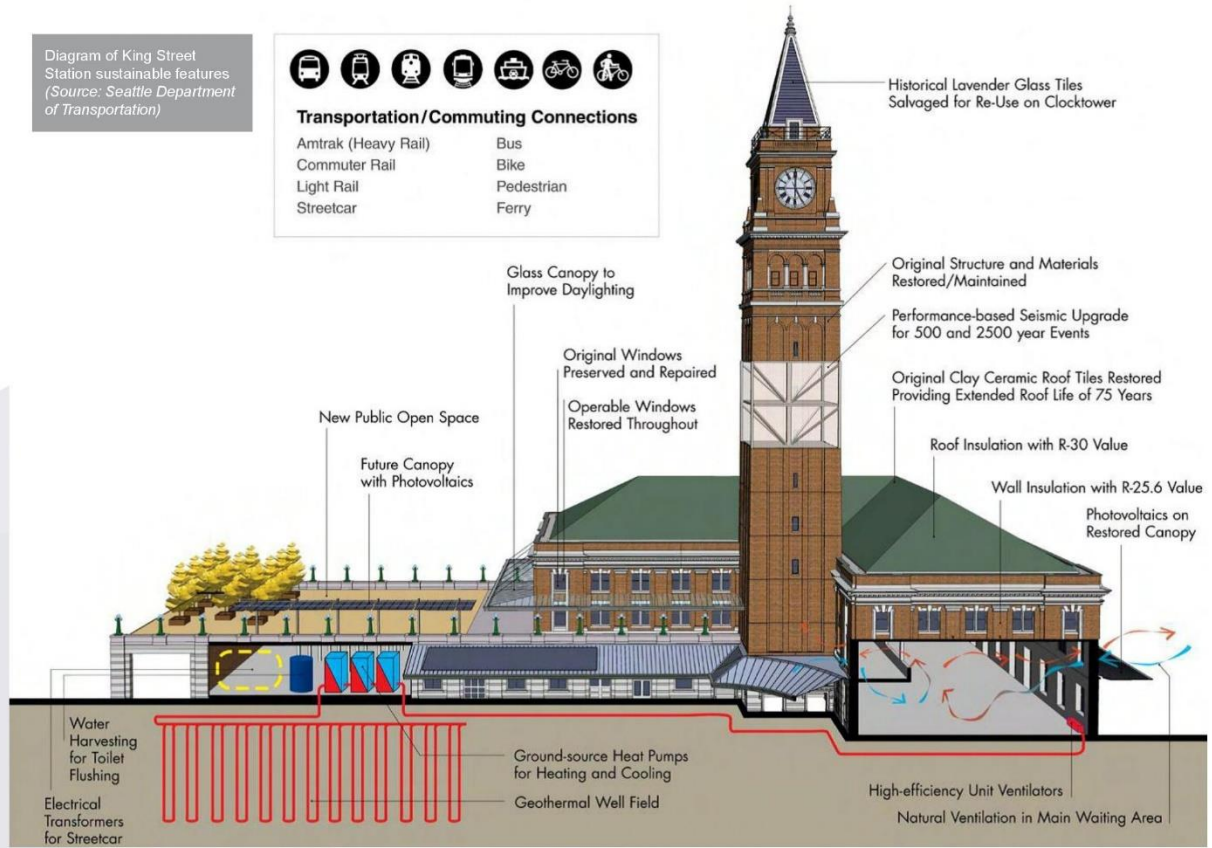


Diagram of King Street Station sustainable features (Source: Seattle Department of Transportation)

Transportation/Commuting Connections

Amtrak (Heavy Rail)	Bus
Commuter Rail	Bike
Light Rail	Pedestrian
Streetcar	Ferry

**King Street Station
LEED 2009 for Core and Shell Scorecard**

9/14/2011

US EPA ARCHIVE DOCUMENT

Available	Yes	Maybe	No			Primary Responsible Party	Status	
SUSTAINABLE SITES								
0	Y			SSp1	C	Construction Activity Pollution Prevention	KPFF Open	
1	1			SSc1	D	Site Selection	GBS Anticipated	
5	5			SSc2	D	Development Density and Community Connectivity	GBS Anticipated	
1	1			SSc3	D	Brownfield Redevelopment	GBS Anticipated	
6	6			SSc4.1	D	Alternative Transportation - Public Transportation Access	GBS Anticipated	
2			2	SSc4.2	D	Alternative Transportation - Bicycle Storage and Changing Rooms	GBS Anticipated	
3	3			SSc4.3	D	Alternative Transportation - Low-E and Fuel-E Vehicles	GBS Open	
2	2			SSc4.4	D	Alternative Transportation - Parking Capacity	GBS Anticipated	
1			1	SSc5.1	C	Site Development - Protect or Restore Habitat	- Closed	
1			1	SSc5.2	D	Site Development - Maximize Open Space	- Closed	
1			1	SSc6.1	D	Stormwater Design - Quantity Control	- Closed	
1			1	SSc6.2	D	Stormwater Design - Quality Control	- Closed	
1	1			SSc7.1	C	Heat Island Effect - Nonroof	GBS Documented	
1			1	SSc7.2	D	Heat Island Effect - Roof	- Closed	
1			1	SSc8	D	Light Pollution Reduction	- Closed	
1	1			SSc9	D		GBS Anticipated	
28	20		8	Total Points for Sustainable Sites				
WATER EFFICIENCY								
0	Y			WEp1	D	Water Use Reduction	GBS Anticipated	
2			2	WEC1.1	D	Water-Efficient Landscaping, 50% Reduction	- Closed	
2			2	WEC1.2	D	Water-Efficient Landscaping, No Potable Water Use or Irrigation	- Closed	
2			2	WEC2	D	Innovative Wastewater Technologies	- Closed	
2	2			WEC3.1	D	Water Use Reduction, 30% Reduction	GBS Anticipated	
1	1			WEC3.2	D	Water Use Reduction, 35% Reduction	GBS Anticipated	
1			1	WEC3.3	D	Water Use Reduction, 40% Reduction	- Closed	
10	3		3	4	Total Points for Water Efficiency			
ENERGY & ATMOSPHERE								
0	Y			EAP1	C	Fundamental Commissioning of Building Energy Systems	KBA Open	
0	Y			EAP2	D	Minimum Energy Performance	ARUP Pending	
0	Y			EAP3	D	Fundamental Refrigerant Management	GBS Anticipated	
21	21			EAc1.1	D	Optimize Energy Performance, 8% (3 points) - 44% (21 points)	ARUP Pending	
4	4			EAc2	D	On-Site Renewable Energy, 1%		
2	2			EAc3	C	Enhanced Commissioning	ZGF Open	
2	2			EAc4	D	Enhanced Refrigerant Management	ARUP Anticipated	
3	3			EAc5.1	C	Measurement and Verification - Base Building	ARUP Anticipated	
3			3	EAc5.2	C	Measurement and Verification - Tenant Submetering	GBS Open	
2	2			EAc6	C	Green Power	GBS Open	
37	34		3	Total Points for Energy & Atmosphere				

King Street Station LEED 2009 for Core and Shell Scorecard

9/14/2011

Available	Yes	Maybe	No			Primary Responsible Party	Status	
MATERIALS & RESOURCES								
0	Y			MRp1	D	Storage and Collection of Recyclables	GBS Anticipated	
1	1			MRc1.1	C	Building Reuse - Maintain Existing W, F, R 25%	GBS Documented	
1	1			MRc1.2	C	Building Reuse - Maintain Existing W, F, R 33%	GBS Documented	
1	1			MRc1.3	C	Building Reuse - Maintain Existing W, F, R 42%	GBS Documented	
1	1			MRc1.4	C	Building Reuse - Maintain Existing W, F, R 50%	GBS Documented	
1	1			MRc1.5	C	Building Reuse - Maintain Existing W, F, R 75%	GBS Documented	
1	1			MRc2.1	C	Construction Waste Management, 50%	Sellen Open	
1	1			MRc2.2	C	Construction Waste Management, 75%	Sellen Open	
1	1		1	MRc3	C	Materials Reuse, 5%	- Closed	
1	1			MRc4.1	C	Recycled Content, 10%	Sellen Open	
1	1			MRc4.2	C	Recycled Content, 20%	Sellen Open	
1	1			MRc5.1	C	Regional Materials, 10%	Sellen Open	
1	1			MRc5.2	C	Regional Materials, 20%	Sellen Open	
1	1			MRc6	C	Certified Wood	Sellen Open	
13	12		1	Total Points for Materials & Resources				
INDOOR ENVIRONMENTAL QUALITY								
0	Y			IEOp1	D	Minimum Indoor Air Quality Performance	ARUP Anticipated	
0	Y			IEOp2	D	Environmental Tobacco Smoke (ETS) Control	GBS Anticipated	
1	1			IEOc1	D	Outdoor Air Delivery Monitoring	ARUP Anticipated	
1	1		1	IEOc2	D	Increased Ventilation	- Closed	
1	1			IEOc3	C	Construction Indoor Air Quality Management Plan - During Construction	Sellen Open	
1	1			IEOc4.1	C	Low Emitting Materials - Adhesives and Sealants	Sellen Open	
1	1			IEOc4.2	C	Low Emitting Materials - Paints and Coatings	Sellen Open	
1	1			IEOc4.3	C	Low Emitting Materials - Flooring Systems	Sellen Open	
1	1			IEOc4.4	C	Low Emitting Materials - Comp Wood and Agrifiber Products	Sellen Open	
1	1		1	IEOc5	D	Indoor Chemical and Pollutant Source Control	- Closed	
1	1		1	IEOc6	D	Controllability of Systems - Thermal Comfort	- Closed	
1	1		1	IEOc7	D	Thermal Comfort - Design	ARUP Closed	
1	1		1	IEOc8.1	D	Daylight and Views - Daylight	- Closed	
1	1		1	IEOc8.2	D	Daylight and Views - Views	GBS Documented	
12	7		5	Total Points for Indoor Environmental Quality				
INNOVATION IN DESIGN								
1	1			IDc1.1	D	Green Housekeeping	SDOT Open	
1	1			IDc1.2	D	Green Building Education	SDOT Open	
1	1			IDc1.3		Exemplary Performance SSc4.1	GBS Anticipated	
1	1			IDc1.4		Exterior Building and Hardscape Management Plan	GBS Anticipated	
1	1			IDc1.5		Exemplary Performance MRc2 or Green Power (70%)	GBS Open	
1	1			IDc2	C	LEED® Accredited Professional	GBS Open	
6	6			Total Points for Innovation & Design				
REGIONAL PRIORITY								
1	1			RPc1.1		SSc3	- Anticipated	
1	1			RPc1.2		SSc4.2	- Anticipated	
1	1			RPc1.3		SSc4.4	- Anticipated	
1	1			RPc1.4		EAct (44%)	- Anticipated	
4	4			Total Points for Regional Priority				
110	86	6	18	Total Points Attempting			Platinum	
Total Points Possible								
Certified: 40-49, Silver: 50-59, Gold: 60-79, Platinum: 80+								

Credit Status

- Open** Credit is under analysis or integration of requirements is still in process.
- Closed** Credit is determined to be not applicable, not feasible, or is otherwise not being considered.
- Documented** Completed LEED Submittal Templates and supporting documentation have been uploaded to LEED Online.
- Anticipated** GBCI has reviewed credit documentation and approved it.