ADAPTING THE CONSTRUCTION INDUSTRY TO NEW GLOBAL SUSTAINABLE DEMANDS

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For the authors, the cover expresses the wish of taking local measures to globally required ambitions.

"You cannot get through a single day without having an impact on the world around you. What you do makes a difference, and you have to decide what kind of difference you want to make."

Jane Goodall

"Every single social and global issue of our day is a business opportunity in disguise."

Peter F. Drucker



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Synopsis:

This master thesis project takes a focus on the United Nations 17 Sustainable Development Goals developed in 2015, a continuation of the Millennium Development Goals. The SDGs defines the challenges on poverty, inequality, climate, environmental degradation, prosperity, peace and justice.

Through research, the holistic view of the three dimensions of sustainability is presented: environmental, social and economic. These three dimensions provides the framework for sustainable development and shapes solutions to global growing demands.

The analysis explores the power relations between actors within the construction industry and tools to help understand the incentives of investing in sustainable development and how companies can align their core business with the SDGs and adapting a continuous changing industry.

To understand how the construction industry itself can adapt the new global sustainable demands, through the actions of the companies, there are four aspects of importance: education, new business models, certification and recognition. With a new emerging market for sustainable solutions, provides the drive for actions. Through actions the behaviours of actors can change, thereby adapting the construction industry.

The content of the report is freely available, but publication (with source reference) may only take place in agreement with the authors.



This master's thesis project was written by two students from the master program in Management in the Building Industry between the 3rd of February and 10th of June 2020.

The subject builds around sustainable development with a focus on the Danish construction industry and its relation to the United Nations Sustainability Development Goals. Particular attention is given to the way business in the industry can be adapted to this global sustainable demands.

Special recognition goes for those who have taken the time to participate being interviewed, contributing with their experience. Our thanks goes to family and friends for encouragement and assistance, and a thanks to Søren Munch Lindhard, who was the supervisor from the University, giving the motivational orientation.

Daniel Pedro Pais

Frederik Laurits Pedersen

Readers guide

This research project is divided into four parts, as depicted in Figure 1.

The first part includes the introduction where the topic Sustainability is presented with a holistic view in the construction industry, as also the United Nations Sustainable Development Goals. The intention is to allow the reader to become familiar with the topics explored. Then, based on the information previously presented, is formulated the initial problem and the main research question and the sub-questions. The methodology is also included in the first part explaining the research design and the methods that guide the research.

Following, the second part is providing the theoretical background and the data collected based on the literature review and interviews on which an analysis is made.

The third part consists of the discussion of the results and where the research questions are analysed and answered. It is used the different data collected through the methods and the information presented in the second part. Then the conclusion is drawn where all the information is synthesised in a comprehensive way. A reflection and some perspectives are presented in the further studies chapter.

Lastly, the fourth part contains the bibliography with all the references used where the Harvard referencing style (Author-Date System) is used.

Tables, figures and other graphs are numbered with the section in which they appear, followed by the sequential number within that section.

Part I	Introduction Methodology
Part II	Literature Review Analysis
Part III	Discussion Conclusion Further Studies
Part IV	Bibliography
	Appendix

Figure 1. Document structure



Dansk

Dette projekt indeholder en analyse af hvordan virksomheder i bygge industrien kan vedtage bæredygtige løsninger, baseret på De Forenende Nationers 17 verdensmål, hvormed de kan blive anerkendt som førende inde for bæredygtig udvikling. SDG'erne er udviklet i 2015, som en fortsættelse af dets forgængere FN's Millenniumerklæring, og tager fat på udfordringerne vedrørende fattigdom, ulighed, klima, miljøforringelse, velstand, fred og retfærdighed. Der søges en balance mellem de tre bæredygtigheds dimensioner: miljømæssigt, socialt og økonomisk. Disse tre dimensioner danner rammen for bæredygtig udvikling og former løsninger til det globale voksende behov.

En kvalitativ undersøgelse er udført for at lede efter svar på undersøgelsesspørgsmål, der stammer fra den indledende problemformulering. Det viste at Danmark, sammen med de andre medlemmer af FN, har opnået en aftale og vil prøve at opfylde den. Selvom at målet stadig er langt fra opnået, implementeres der kontinuerligt foranstaltninger, såsom den nue bæredygtighedsklasse, afledt af GBC-DKs DNGB certificeringssystem samt efterspørgsel fra byggebranchens aktører. Projektet analysere på magtforholdene mellem aktørerne idag og i et fremtidigt scenarie. Der er udført en SWOT-analyse, med det formål at forstå incitamentet for virksomhederne til at investere i SDG'erne. Dertil er en analytisk undersøgelse udført på SDG Compass, som har til hensigt at hjælpe virksomheder med at tilpasse deres strategi med SDG'erne.

Resultaterne afslørede at der eksistere en incitament for forandring, baseret på alle dimensionerne af bæredygtighed, da det sidste årti har bæredygtig udvikling være i fokus, og den indsigt SDG'erne giver, stimulere behovet for tilpasse sig den bæredygtig udvikling. Nogle virksomheder inde for byggebranchen har ikke været i stand til at tilpasse deres strategier med den bæredygtig udvikling på grund af et ikke-eksisterende fælles udgangspunkt, der kan hjælpe med at konventere bæredygtighed til en konkurrencedygtig fordel. Derfor fremlægges et forslag, hvor aktørerne kan handle, understøttet af incitamenten, ift. at ændre adfærden. Målet er at en række virksomheder bliver førende inde for bæredygtighed løsninger ift. at udvikle sig og forblive konkurrencedygtige.

English

This project consists of the analysis of how companies from the construction industry can adopt sustainable solutions framed by the United Nations 17 Sustainable Development Goals to be recognised leaders in sustainable development. The SDGs developed in 2015 are the continuation of their predecessors the Millennium Development Goals and are addressing now the challenges on poverty, inequality, climate, environmental degradation, prosperity, peace and justice. A balance is sought between the three dimensions of sustainability: environmental, social and economic. These three dimensions provide the framework for sustainable development and shapes solutions to global growing demands.

Qualitative research is developed to look for answers to the research questions derived from the initial problem statement. It revealed that Denmark alongside with the other members of the UN, have an agreement and is pursuing to achieve it, being one of the best countries. However, since the goal is still far from being achieved, measures are continually being implemented like the new sustainability class derived from the DGNB certification system from GBC-DK, and the willingness of the industry actors. The project analyses the power relations between the actors in the present and in a future scenario. A SWOT analysis is conducted to understand the incentive for companies to invest in the SDGs. Also, an analytical approach to the SDG Compass, that intends to help companies aligning the strategy with the SDGs.

The findings revealed that exist a drive for change based on all dimensions of sustainability, since the last decade sustainable development has been in focus and the insight provided by the SDGs stimulates the need to pursue sustainable development. Some companies within the construction industry have not been able to align their strategies with sustainable development due to a nonexistent common baseline and operational experience, that could help to convert sustainability into a competitive advantage. Therefore, a proposal is presented were actors take actions supported by drivers in order to change behaviours. The objective is that some companies become recognised as leaders in sustainable development to progress and stay competitive.

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CHAPTER

1

Introduction

This project takes a general view on sustainability in the construction industry and focuses on Denmark in particular, which is the case in hand. Therefor the general discussion and more especially the literature review will capture Denmark, and most of the analysis will be based on SDGs in general.

Climate change is one of the most important current topics worldwide. Not only due to the importance of the harmful consequences for the environment, if nothing is done to reverse the situation, but also because of the harmful impact on the economy. On the positive side, this is about the opportunities that what sustainable development offers. What is important to take into account, is what changes can be brought to the business and the impact in the short- and long-term. These changes must be operated in advance by companies. According to:

Climate change is often portrayed as one of the most important and truly global material issues, with the potential to destruct entire nations (...) With most, if not all, industries likely to be impacted by climate change, albeit to varying degrees, companies face the need to design appropriate strategies to tackle the challenge.

Leleux and der Kaaij (2018)

If there were any doubts, for the first time in the history of mankind, in 2019, the planet was declared in a climate emergency situation.

Concerning the construction industry, there has been a lot of pressure on its impact on the environment. Not only about the dramatic change needed to reduce dependency on fossil energy and materials, products, services and techniques responsible for greenhouse gases emissions, but also on the waste produced by these same techniques that are unsuitable for today's ambitions. Statistics have shown that the construction industry is responsible for very significant damage to the environment (World Green Building Council, 2019). What has been known for a long time and based on data from the Danish Transport, Construction and Housing Agency, show that construction and housing today contribute 40% of the total energy consumption, 10% of the material consumption and 35% of the total waste in Denmark comes from the construction industry (Byggeri, 2017).

The construction industry is known by its conservative attribute and is facing the international pressure as one of the biggest consumer of energy and natural resources along with contributing the most with waste and greenhouse gases (Mossin et al., 2018). On the other hand, given its responsibility the construction industry has a great ability to contribute significantly to reverse the problem, through integrating sustainable solutions and changing attitudes and behaviours thereby contributing to the achievement of the SDGs.

But not only is sustainability related to the environment, two other dimensions go hand in hand, namely social and economic. The lack of respect for the environment can jeopardise life on earth thereby creating an imbalance, amplified further by failing to account for the need to give opportunities to the different societies. It is still necessary that businesses are directed and encouraged for a balance between resources and societies. It will be necessary to identify whether it will be through the incorporation of new or already experienced sustainable solutions and/or changing attitudes and behaviours:

The construction sector is capable of making a significant contribution to these objectives, particularly considering the vast amount of material and energy resources required to produce and maintain the built environment, not to mention the sum of emissions and waste generated throughout the entire use-cycle of physical structures. Considering the global extent of urbanisation today and taking into account the pace at which the planet is being further urbanised, it is even more imperative that whatever is built must perform sustainable on all registers – environmentally, economically, and socially.

LafargeHolcim Foundation (2019)

1.1 Sustainability

The concept of sustainability can both vary in meaning and scope. The first time sustainability, considering the balance between human and environment, was recognised as a serious topic was in 1972 at the United Nations conference on the Human Environment held in Stockholm (United Nations, 2020d). The conference was held due to increasing international recognition of the environmental issues created by the economic growth and technical development, and in order to solve these, a global coordinated action was needed. The conference also revealed the differences between the countries and the challenges with a coordinated action plan across a international level. The countries with developed industries wanted a focus on solving a set of global environmental issues. In contrast, the underdeveloped countries wanted a focus on developing their countries with international agreements and investments, to eliminate poverty and hunger. Despite the obvious differences in which issues were most important to solve, the result of the conference was an increasing focus and attention towards issues regarding environment and development (Nations, 1972). The conference was the UN's first major summit on international environmental issues, and this was the beginning of the development of international environmental politics.

In the following decade, the increasing attention towards sustainability resulted in a Worldcommission consisting of 21 recognised international individuals and was named the Brundtland Commission. The reason for the creation of this commission was due to the increasing doubt towards the assumption that development and environment were incompatible. That a future with the basis of a sustainable usage of the natural resources was a possibility. This commission wrote and published the report "Our Common Future" in 1987 in collaboration between the UN and ActionAid (2020), which is a non-governmental organisation that works with human rights, charity and environment issues. The report, in short, details the impoverishment that occurred with regards to the quality of life and nature and concluded that the development was both unsustainable and unacceptable. The Commission aim was to make a change to the international agenda towards sustainable development, to which the report defined what sustainable development should be:

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs

United Nations (2020e)

The definition laid the groundwork for a united effort to work sustainable. The recommendations and definition the report described regarding sustainable development, made it possible to create a united effort regarding both economic and environmental growth. Factors that all countries could agree upon, but the broad definition made it possible for different interpretations (Bæredygtig Udvikling, 2020).

1.1.1 The Holistic View

The concept of a holistic approach to the building process, involves the consideration of materials, methods, design and techniques, needed for construction and renovations. Starting with the design and construction levels. The definition as stated by Bygherreforeningen (2013) entail three dimensions:

- Social Sustainability
- Environmental Sustainability
- Economic Sustainability

Social sustainability contains the social dimension of planning, construction, renovation and operation of a building. The dimension consists of different elements such as social and urban quality, diversity, functional qualities, psychological qualities, comfortable qualities (acoustic, thermal, daylight) and mental health such as welfare, accessibility, spiritual & cultural qualities and architectural quality. Many of these elements consist of non-quantitative values, such as human aspects, aesthetics, social conditions, and other qualitative aspects. This affects the different process, e.g. a "classic" design affects the inner and outer interior that, in turn, affects the health and social aspect of the building. Evaluation of such aspects is often based on user surveys and welfare indicators that support the quantitative and objective data. Other aspects such as indoor climate and be quantified through simulation, monitoring and measurement. Danish architectural aims for attractive landscapes and urban environment, that sustain the Danish culture. This entails ensuring accessible and democratic environments, with a basis in the Danish the political system and social ethics as well as user and resident involvement (Bygherreforeningen, 2013).

Ethics surrounds the environment of the lifestyles that humans are pursuing along with the understanding of how to access each others actions trough confirmation and criticism. This ethical approach is based on a common worldview, that the human race is to continue, thereby making our societies responsible for living sustainably without jeopardising future generations. Ethics dictates the actions needed to ensure a balanced lifestyle with nature without compromising future generations (United Nations, 2020e).

Social sustainability is an inevitable part of sustainable development. That a fair share of the available resource to sustain decent living standards is distributed evenly among the generations. That the gap between rich and poor is more balanced both in the individual society and the different societies on Earth. This understanding was shared by the World-commission and the Brundtland report stated the following:

The physical sustainability cannot be ensured without the development policy taking into account, for example, changes in access to resources and the distribution of advantages and disadvantages.

United Nations (2020e)

Environmental sustainability in the construction industry revolves around the physical conditions and the link between planning, construction, renovation and operation. The aspects consist of different elements such as climate, materials, biodiversity, the expenditure of land, energy, waste disposal conditions, physical health and indoor environmental conditions. Environmental sustainability can be quantified through certification systems to compare measurements and capacities of a building. The climatic conditions in Denmark are a challenge, with regards to the construction and renovation of buildings. In the last few decades, the Danish building regulations have prioritised environmental agendas such as indoor climate, indoor energy and optimisation of daylight quality. That resulted in the energy-conscious construction industry along with a predominantly attitude towards incorporating durability and traditional materials (Bygherreforeningen, 2013).

With the excessive spending of the natural resources, it has become clear that with a sustainable approach, there needs to be a change in how those resources are viewed. That nature is vulnerable to human intervention, and the resulting damage can have an irreversible effect on natural ecosystems, thereby jeopardising the innate ability to sustain the current standard of living (United Nations, 2020e).

Economic Sustainability contains the economic aspects in planning, construction, renovation and operation in regards to financial conditions. This is achieved through a focused effort in the different building processes such as longevity, total value, total economy legislation, interest rates, ownership conditions, management and operational optimisation. Economic sustainability can be quantified and analysed in various aspect in relation to the concept, such as lifetime cost, organisation, governance, environmental management, quality management, ROI and operational Management (Edwards, 2003).

In general, there exist attention to the consumption of resources, since the traditional Danish building culture is not extravagant. The ability to create simplistic buildings through limited means are characteristic in the Danish building industry. Economic sustainability has always been a basic parameter in the Danish building industry, to which the usage of relatively limited resources that are available in a sensible and unified process. In order to secure the economic sustainability in the Danish industry, attention towards long-term investments and solutions of good quality with a focus on flexibility, resource awareness and robustness in the planning, construction, renovation and demolition phases (Bygherreforeningen, 2013).

The potential measurable quantitative targets can be, for example, ecological flexibility, capacity or carbon footprint. These concepts are used by economics experts and describe them as:

.. the amount of natural resources (air, water, soil, minerals, energy sources, natural areas, plants and animals, etc.) that can be used per year, without preventing future generations from accessing the same amount and quality.

Danish Economy (2020)

The essential understanding is that from an economic viewpoint, it is necessary to quantify the different types of natural resources. The currently used unit for this is money. By determine money as the chosen unit as measurement, it is possible to price the environment by calculation a price value from all environmental sources that societies consume, preserves or degrades and afterwards determine the distribution between people and societies (Sustainable Development, 2020).

Therefore in order to be sustainable in the Danish construction industry, there has to be a focus on all three susceptibilities. The common mistake is that the concept of sustainable development often is used wrongly e.g. focusing unilaterally on only one or two of the sustainability dimensions mentioned. This can result in *greenwashing*, where projects or processes are deliberate or subconsciously portrayed as being sustainable, but in truth are not (Lyon and Montgomery, 2015). With the lack of attention to each dimension, there will be no long-term value, in broad terms, for the benefit of societies.

1.2 United Nations 17 Sustainable Development Goals

The Brundtland report stated that by expanding the understanding of "sustainability" towards "sustainable development", meant not only that mankind should aim to satisfy its current needs without compromising the needs of future generations, but also an idea of increased quality of life and societal progress (Nations, 1972). By agreement from all the UN countries, this understanding is the foundation of the United Nations 17 Sustainable Development Goals set in 2015. (United Nations, 2020a).

The Sustainable Development Goals (SDGs) have their origins in the United Nations Conference on Sustainable Development in Rio de Janeiro in 2012. The aim was to create universal goals to meet the world's issues with environmental, political and economic challenges that were urgently endangering the planet and the worlds different societies. The SDGs replaced the Millennium Development Goals initiative, which dated back to 2000 and was a global effort to tackle poverty. The Millennium Development Goals created measurable and universal-agreed objectives in order to resolve poverty, hunger, deadly diseases and lack of education among children and others. Until 2015 the Millennium Development Goals (MDGs) had progressed in several important areas such as reducing poverty, access to clean water and sanitation, reduce child mortality and improve maternal health. The MDGs created a global movement towards free primary education, intending to induce a change in countries to invest in their future generations. Most notable the MDGs had a significant impact in combating HIV/AIDS, malaria and tuberculosis (United Nations Development Programme, 2020).

The SDGs are a set of 17 goals with 169 targets that form the core of the 2030 Agenda. They are intended on continuing the progression of the MDGs accomplishment. The UNs effort to put forward a plan with 17 sustainable goals to be fulfilled by 2030 is aimed to stimulate actions of critical importance for humanity and the planet itself. The plan was adopted by all the UNs state members and is, in short, a universal action plan. The Goals define the challenges societies need to address to achieve that better and more sustainable future for all. They focus on the global problems societies face together, including those related to poverty, inequality, climate, environmental degradation, prosperity, peace and justice. The Goals are deeply interconnected, and to leave no one behind, the world must move significantly towards achieving each Goal by 2030 (Mossin et al., 2018). The 17 goals can be viewed in Figure 1.1. Each goal has a subset of goals which collectively adds 169 targets (United Nations Development Programme, 2020).



Figure 1.1. The 17 Sustainability goals, the United Nations are pursuing (United Nations, 2020b).

The difference between the MDGs and the SDGs is that the latter are more comprehensive, intending to address the root cause of poverty and the need for development in general. The momentum created by the MDGs is sought to be amplified with the SDGs by covering more ground in the sense of addressing inequalities, economic growth, job security, human settlements ecosystems, oceans, sustainable consumption, energy, industrialisation, production and lastly peace & justice. The level of ambition is raised regarding the implementation possibilities and focuses, e.g. the mobilisation of financial resources, building capacity, technology development, data and institutions (United Nations, 2020a).

The UN has estimated that in order to achieve the SDGs, an annual investment required across industry sectors is set to \$5-7 trillion. The current investment levels are far below than what is needed. With over \$200 trillion in financial assets, the required finances are available, but most of the capital is not being funnelled towards sustainable development at the necessary scale or speed. The UN has estimated, that by achieving the SDGs could potentially create a \$12 trillion

market along with the creation of 380 million new jobs in 2030 (United Nations, 2020c).

The progression of achieving the SDGs by 2030 will be monitored all the way. At a global level, each SDG along with the 169 targets will all be monitored through global indicators set by the Inter Agency and Expert Group. The method and how to monitor were agreed upon by the UN Statistical Commission in 2016, and the Economic and Social Council and the General Assembly would afterwards adopt these indicators. Along, each member state will develop their national indicators as well as monitor the progression of each goal. The progression will be made public each year in an annual report prepared by the Secretary-General (United Nations, 2020a).

The Goals define the challenges societies need to address to achieve that better and more sustainable future for all. They focus on the global problems societies face together, including those related to poverty, inequality, climate, environmental degradation, prosperity, peace and justice. The Goals are deeply interconnected, and to leave no one behind, the world must move significantly towards achieving each Goal by 2030. (Mossin, et al., 2018).

1.3 Problem statement and research question

The outline of the problem arises from the recognition that a change needs to be undertaken in the way societies has been impacting the environment. The usage of natural resources, the production and disposal of waste and the continuous production of greenhouse gases emission. This negligent behaviour in the use of resources has contributed to the promotion of social inequalities as it also does not take into account of a fair distribution of wealth in order to sustain decent living standards between generations. The focus of interest is the construction industry, recognising its development status in Denmark, and what can and should be done to pursue a balanced development. Furthermore, it is still necessary for an industry-wide change to become permanent, preventing it from being ephemeral or considered as *greenwashing*, thus fulfilling the UN Sustainable Development Goals.

Altogether, allows the formulation of the following research question:

How can companies from the construction industry become leaders in sustainable development, by adopting a primary focus on the UN sustainable development goals?

In order to fully answer the research question, the following two sub-questions are formulated as:

Sub-question 1:

How can the UN Sustainable Development Goals be used to encourage companies and actors to understand the process and the full extent of sustainability needs, as a permanent mindset?

Sub-question 2:

How can the adoption of a strategy based on the UN Sustainable Development Goals be used as a driver to implement the necessary changes in the construction industry and contribute to these same goals?

CHAPTER

2 Methodology

This chapter presents the methodology adopted to conduct the research since this project is seeking a reliable answer, to offer a discussion and an answer to the initial problem. The methods used and how they were applied are described.

2.1 Research Design

This project is intending to look for answers to research questions and consequently answering the initial problem. Thus, it is necessary to establish a research design. This research must obey a rigour and a structure, that serves as a guide to its development. It must exist from the first broad assumptions, to the detail that allows to establish a structured analysis of the information collected (Creswell, 2014). The research presented in this project is based on the collection of qualitative data from the literature review, the documents analysis and the interviews.

Firstly, it was considered necessary to gather comprehensive knowledge about the problem that is intended to be explored, namely problems related to sustainability. As it is of interest to the area under study, this problem fits in the construction industry and later more specifically in Denmark, thereby allowing to synthesise the problem by formulating the initial problem.

To structure the knowledge collection, the main question is elaborated and two sub-questions that will allow the first to be operationalised. Based on the principle that the problem exists, all of this can be understood as a three-step approach:

- I It is intended to understand what is known about the problem.
- II It is expected to find flaws or opportunities to structure an answer.
- III Finally, to conclude how a given solution could take place to change the current course.

It can be said that a line of qualitative exploratory research was followed. It is this characteristic, that allows the preparation of a frame of questions but at the same time has the flexibility to explore the themes - more detail about the interviews in subsection 2.2.2.

As mentioned, after the initial problem statement, the research question was first created, interrogating what is ultimately intended to be found in the research. Then, the two sub-questions that allow directing the collection of information and help to answer the research question. Below in Table 2.1, the research design layout is presented for an overview of the problem, the questions, objectives and applied methods.

Identification of the initial problem				
A change needs to be undertaken in the way societies has been impacting the environment contributing to the promotion of social inequalities. Is then necessary to recognising the development status of the construction industry in Denmark, and what can and should be done to pursue a balanced development. The needed change needs to become permanent, preventing it from being considered as \textit{greenwashing}. In the end, fulfilling the UN Sustainable Development Goals.				
Research Question				
How can companies from the construction industry become leaders in Sustainable development, by adopting a primary focus on the UN Sustainable Development Goals?				
Sub-Question 1				
How can the UN Sustainable Development Goals be used to encourage companies and actors to understand the process and the full extent of sustainability needs, as a permanent mindset?				
Aim: Understanding the UN sustainable development goals and their integration in the industry.	Method: Literature review and Interviews: identification and characterisation of the actors within the construction industry.			
Sub-	Question 2			
How can the adoption of a strategy based on the UN Sustainable Development Goals be used as a driver to implement the necessary changes in the construction industryand contribute to these same goals?				
Aim: Understands the possibilities of adopting the SDGs into a business and if the SDG Compass can be used to formulate a viable businessstrategy.	Method: Literature review and Interviews: SWOT analysis and analytic approach to the SDG Compass.			
Linking the information gather and the findings of the analysis to the research guestion and				
the problem				

Conclusion

Table 2.1. Research design layout.

2.1.1 Delimitation

As stated in the identification of the initial problem, the issue stems from the recognition, that changes must be implemented in the way humanity has used natural resources as well as in consequence contributed to the promotion of social inequalities. This situation can be confirmed by the call for action by all United Nations countries expressed by the agreement in terms of the Agenda 2030 and the Sustainable Development Goals. The SDGs are additionally so comprehensive in terms of social, economic and environmental areas, that it is necessary to position this project only on issues related to the construction industry and in Denmark. The framework provided by the SDGs is however used as a guide to explore how companies in the construction industry are contributing or can adapt to the changing business environment. Since building certification systems have been in existence in the last three decades, as support to the industry as an aid to the green transition, this research focuses on the DGNB certification given by the Green Building Council. Not because others are less appropriate, but is the one that is

most compatible with Danish laws, regulations and values, regarding sustainability. Therefore DGNB building certification is explored in this research.

2.1.2 Limitations

To start with, it is not possible to fail to mention in this project the extraordinary situation that humanity is experiencing and which coincided with the period of development of this project. For the first time in the modern era, humanity is facing a global pandemic caused by a virus this repercussion. It is an infectious disease caused by a coronavirus (severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) globally and commonly known as COVID-19. Consequently, Denmark was no exception in facing the disease and when the first case was confirmed on February 27, the contagion network was formed, followed by the progressive taking of drastic measures by the authorities, with implications from the early days of March 2020. Therefore, by limiting the use of public facilities, which prevented access to the University and all its facilities such as the library. Also, it had an immediate effect and for what matters in carrying out this project, an extraordinary limitation in human proximity and contact.

Somehow this work could not be immune to the effects described. Thus, the investigation was forced to adopt alternatives that would allow its realisation, which influenced the research design and the methods adopted, as can be read in this chapter. It was difficult to establish contact with relevant potential participants due to reasons out of control from the researchers, due to current situation. In addition, emphasis had to be placed on digital media, not only for communication but also for the interaction of all participants in this project, those who carried it out and those who participated in it. Also, in the choice and selection of pieces of literature that were mainly dependent on the existence in digital support, which, these days, is not a problem. The sources were carefully chosen according to their scientific credibility and recognition. The privilege was given to those found in Aalborg University's digital library database, google scholar, among others in which AAU has sharing agreements like *Elsevier's ScienceDirect* or *Emerald Publishing*, to name just a few.

It is faced a dependency on digital and computer media in contrast to the diminished human interaction. Since no decision was taken to the contrary, as a result of this situation, the time available for conducting the research remained the same. Perhaps it was not possible, in all aspects, to avoid the psychological effect caused by this situation and this project was influenced by these circumstances.

2.2 Methods

Methods come into play to put research design into practice. Firstly, special care was taken in the choice of methods in view of the setback resulting from the restrictions currently imposed, explained in section 2.1.2, and which would be possible to use.

Since the purpose of this report is to collect and present data from various sources, perform an analysis of the information collected to seek an answer to the initial problem, mainly qualitative methods are used. Literature review and document analysis are used as secondary data

and interviews as primary data. Choices are also based on how data will be integrated and interpreted. Qualitative research is a means of exploring and understanding what individuals or groups attribute to a problem, literature review, documents analysis and interviews were chosen (Creswell, 2014).

As described by Given (2008), qualitative research typically involves working with humans, such as face-to-face interviews, on-site observations and written communications, is important to find a way to understand how to access the intended participants in the interviews. It was initially thought to have an approach for contact with professionals starting by participating in fairs of companies from the sector, as well as attending seminars related to the issue. This approach would have made possible to assess the level of knowledge on the subject from both the practical and academic aspects. It would be done through conversational interviews. The intention would be to choose among the points of view collected from those who would participate in a set of a more structured interview. Since it was not possible for the reasons explained in section 2.1.2, it was decided to choose the participants in the interviews by their curriculum and area of expertise. Details can be seen in Table 2.2. Diversity was sought to allowed for different points of view. The following is an explanation of the approach taken for each method.

2.2.1 Literature Review and Document Analysis

As a starting point for the research, a literature review is carried out. This approach is intended to demonstrate, how the subject under study is related to others previously made and the level of knowledge. The knowledge gathered comes mostly from scientific publications that contribute to the connection with what is being researched (Creswell, 2014). The selection is made among the available documents, published or not, looking for information, ideas, data and written evidence that allow bringing an informed perspective on the topic and in this way build the research as well as the opinions held therein (Flick, 2009).

Five or six relevant words in the field of sustainability and sustainable development goals are then chosen to do the research and sometimes resort to phrases that express concepts. From the obtained entries, the documentation that reveals having a more relevant scientific acceptance is filtered, either by the number of citations or by the importance and recognition of the authors - individuals or organisations. This can be books, journals, reports, statistics or institutional documents. The criteria for selecting the sources are therefore determined. Still, in the selected literature, other sources are found that reveal interest and on which importance is given to bring to the research.

Here the most relevant pieces used are highlighted:

 Hvidbog om bæredygtighed i byggeriet (White Paper on Sustainability in Construction) A study made in 2013 by Bygherrerforeningen (Denmark Landlords Association - is the interest organisation for professional landlords) in collaboration with Viegand Maagøe, InnoBYG and the Grundejernes Investeringsfond (Landowners Investment Fund). This study attempts to give an overall evaluation of the current status of sustainability in the construction industry, explaining what sustainability is, the general barriers, the certification systems and other essential concepts related to the topic like for instance life cycle assessment.

- Bygningers indlejrede energi og miljøpåvirkninger (Embedded energy and environmental impacts of buildings). This report provides an assessment of environmental impacts and resource consumption as a result of building materials manufacturing, transport, disposal and recycling. It is built on a study comparing the life cycle assessment of the building materials to conclude about the importance of the legislation.
- Bæredygtigt byggeri Afprøvning af certificeringsordninger til måling af bæredygtighed i byggeri (Sustainable construction - Testing of certification schemes for measuring sustainability in construction) A study comparing four different certifications systems, in relation to the international standards and principles, covering most of the three dimensions of sustainability.
- SDG Compass The guide for business action on the SDGs: A description of how companies can formulate a strategy to implement the SDGs into the business core, through an understanding of the business potential and to identify impacts (positive, negative), defining KPIs and setting goals, and lastly to integrate it into the business and how to continuous evaluate on the progression.

2.2.2 Interviews and transcriptions

In this project, interviews are the main component of data collection, and as such considered being the primary data. The guidelines for structuring and conducting the interviews as well as their transcriptions are directly inspired by (Kvale, 2007). Interviews in this qualitative research, offer the opportunity to enter the world of the interviewees and seek a personal perspective, by describing their activities, experiences, and opinions in their own words (Kvale, 2007). Also, to choose what to pursue and then build the knowledge to progress towards the analysis.

The interviews are semi-structured, meaning that a structure and a guide have been previously elaborated and can be consulted in Appendix A. The formulation of questions however depends on the way the answers are given by the interviewee, and the content revealed, having some freedom to formulate different ones. Therefore, it can be said that they are conducted as conversational interviews (Lavrakas, 2008). As explained in Subsection 2.1.2, the circumstances did not premise the first step of the approach in the selection of respondents. This way the interviewees are sought to reveal issues of interest to the investigation in an attempt to enrich the researched information. Although free to pursue the interest shown in these responses, it is the role of the interviewer to keep the interview on track looking for the answer to previously formulated questions, which are common to all interviews (Kvale, 2007). Despite one can criticise the naive and simplistic nature of this format, it is believed that such exchanges can be more authentic being the responsibility of the person interviewing to avoid influencing or manipulating the responses in favour of the research interest (Given, 2008). This situation was taken into consideration.

Contrary to initially designed, the interviews had to be carried out by digital communication, as the development period of the project coincided with the beginning of the COVID-19 pandemic, already mentioned. This public health situation severely limited close contact between people, so it was necessary to overcome this limitation with the indicated alternative. It was not possible to avoid the lack of observation of body behaviour, lost by replacing physical presence with digital means of interview. In addition, due to the reasons already explained about the pandemic, it was

difficult to get an affirmative answer to the invitations to participate.

The interviewees are selected due to their education in the field and also work experience. It is also important to choose according to the relevance of the role they have in the construction industry. Diversity is important as it provides some scope in terms of perspective. A description of the profile is presented in each interview transcription as also in Table 2.2. Yet, the interest of this research is based on the practical experience acquired by the researchers, namely during the internship of the previous semester, the selection of respondents is based on the following criteria:

- Academic experience; training not less than a higher degree.
- Practical experience in companies in the construction industry.
- Representative of state bodies.
- Public or private organisations influencing decisions related to sustainability.

Details from the interviewees and the temporal sequence progression of the interviews can be seen in Table 2.2. More detail can be ascertained in Subsection 4.2.1.

Name / Date	Area of expertise / Entity	Content	Method
Morten Vinde 23/03-2020	Environmental management and sustainable science (Netværk for Bæredygtig Erhvervsudvikling Norddanmark).	Perspective from an organisation that connects education with companies and helps sustainable business development.	Microsoft Teams
Anne Gade 02/04-2020	Architectural design. Researcher with focus on the UN goals in construction (University College North Jutland).	The perspective and role of the education in sustainable building design and sustainability.	Microsoft Teams
Peter Boltau 02/04-2020	CEO, aiming to have the most sustainable construction site (TL BYG A/S, Aalborg).	As a contractor, it is the end or the line and has less influence on early design decisions.	Microsoft Teams
Lau Raffnsøe 22/04-2020	Specialised in building energy and climate. Technical Director, Green Building Councill Denmark, DK-GBC.	Deep knowledge in the area of DGNB construction certification.	Microsoft Teams

Table 2.2. Table of interviewees.

The answers given in the interview expresses personal opinions and not necessarily the opinion of the organisations to which the interviewees belong.

After the process of gathering a comprehensive knowledge about the problem intended to be explored, namely problems related to sustainability, it was possible to build a framework of questions that would serve as a guide during the interview. It is from the generation of the initial problem, the research question, and the sub-questions that the questions included in the framework are designed. It is intended that each question contributes to the respondent elaborating on it with interviewees knowledge. Given the conversational characteristic of the interview, it is possible to explore other themes that were being revealed. It will later in Chapter 4 be verified, how the answers to each question contributed to the findings. This framework

can be found in Appendix A and contains the steps and formalities directly inspired by (Kvale, 2007). The interviews were accordingly divided into three parts and can be identified in the referred framework. First part concerns the respondent's contextualisation about the scope of the work, who the interviewers are and why this interview is being conducted. The second part is the development of the interview itself, and the third part is debriefing. In this last part, in addition to the acknowledgement, the possibility to follow-up on issues that may still arise is left open. Although the interviewees are Danish, the interviews were conducted in English as it is the language of the master's degree and everyone agreed with this form. Therefore the transcripts correspond to what was said by the interviewees. It was perceived that this linguistic difference may have caused some difficulty in expression or misunderstanding in some messages that tried to be observed carefully during the analysis.

Subsequently to the first interview, ideas continued to emerge on how and with whom to advance with them. At the same time, they contributed to directing research in the literature because themes were emerging, for which sufficient knowledge had not yet been obtained. Care was taken to ensure that this collection of information did not influence the following interviews too much. As mentioned, there was some flexibility in its management, but the aim would be to start from the same level and then build the knowledge to progress.

The transcripts try to be as faithful as possible to what was said by the interviewees using the audio recordings. Yet, during the research its possible to return the topic and remember or confirm ideas taken from the interviews. Means of digital computer software are used, and the necessary manual adjustments are made without altering the meaning of the message. However, aware that much of the non-verbal language resulting from social interaction is lost. As mentioned by Kvale (2007), in the transcripts it is not possible to accurately show the tone of voice, the body or facial expressions that complement the message. Nevertheless, the audio files were archived as a complement.

CHAPTER

3

Literature review

This chapter aim to explore the literature and knowledge available about sustainable development. To begin this chapter, the project explores the current status of the development in Denmark and the challenges that persist, after several years of development as well as the encouragement of the SDGs. Secondly, the Danish legislation is explored with the aim to understand the development of incorporating sustainability into the legislation related to the Danish construction industry in order to promote a sustainable agenda. Thirdly, a look into the certification systems to understand the reasoning and priorities prompted by the sustainable development and efforts to contribute positively to the SDGs. Fourthly, following the incentive to pursue and invest in sustainable development along with a look on the progression to achieve the SDGs. Lastly, this chapter will explore a management tool developed in cooperation with the UN, to encourage private companies and organisations to adopt the SDGs into their strategies in the effort to contribute to the achievement of the SDGs.

3.1 The sustainable development in the construction industry in Denmark

With the concept of sustainable construction, the prerequisite for both renovation and new construction project, is to think holistic along with close cooperation with all relevant parties in the building phases. The concept is not without challenges. Sustainable development is complex and challenging to put into concrete solutions, demands and priorities. Along with this fact, there exists a varying level of knowledge and experience on sustainability within the construction industry, that often are interpreted individually.

This presents a wide range of dilemmas and challenges that are preventing the green transition in the building industry. A significant barrier is that if a given sustainable construction or renovation project is deemed unmanageable, then it is typically considered to be costly, thereby challenging the balance of tight building budgets. Bygherreforeningen (2013) have produced a white paper in 2013 about the current status of the green transition in Denmark, based on a large survey consisting of landlords, consultants and construction companies with between 90-125 different companies in the Danish construction industry.

The survey concluded that the biggest limitations for a green transition in the Danish construction industry, are shown below::

- 1. Lack of common understanding and Clear terminology.
- 2. Organisation structure and habit-forced thinking.
- 3. Lack of economic tools to frame risk, value, finance and overall economy among others.
- 4. Framework conditions for methods used in the construction industry.
- 5. Lack of data, knowledge and experience.

1. The lack of common understanding and a clear terminology, entails the very definition of what sustainable development is. The survey conducted by Bygherreforeningen (2013), revealed there is a a gap of understanding between the landlords and consultants on one side and the construction companies on the other side. The former understands that sustainable development is a holistic and integrated building design. The latter understands sustainable development as a focus on the quality of materials, energy optimised construction and any sustainable solutions within the budget, e.g. passive housing or CO2 neutral construction. In short there was a tendency for understanding sustainable development as purely technical and quantifiable mechanics, and as a holistic approach with measurable performance, a focus on the social values and overall economic aspects. This gap in understanding, challenges the possibilities for requirements specifications in building programs, in order to implement sustainable development in construction and renovation.

2. Organisational structure and habit-forced thinking is limiting the cooperation process towards a sustainable progression in construction and renovation. The typical and traditional way of dividing the workforce into hierarchies and different craftsmanship's is setting boundaries on the sustainable progression throughout all the building phases. This attitude exist because known solutions are deemed economic for the construction or renovation, compared to a innovative holistic approach in the building processes. e.g. new organisations structures that can not quantify in detail the needed work hours for completion due to a lack of experience. e.g. integrated design, that forces the different craftsmanship's to expand their cooperation structure, then already known structures like contractual relations that normally exist. Coinciding this fact, the construction industry implicates a number of different participants, as well as having a high degree of complexity and overall financial impact in society. Sustainable development and innovation can then force unnecessary changes, due to the construction industry's wide significance in society. When taking into consideration the different actors within an enterprise, the motivation and incentive also challenges the sustainable progression:

Landlords incentive can affect barriers, opportunities and in the end motivation for pursuing the sustainable development, when decision-makers are typically rewarded for short-term investments. If the landlord is unclear of the overall objective and goal of the project, then it becomes challenging to both create a sustainable design and solutions.

The end-user usually is not part of the initial phases, which can affect the decision towards building sustainable. The end-user can differentiate between tenants, employees among others, that in turn affects the sustainable degree in order to comply with building regulations. e.g. in the private industry of residential buildings the tenants could benefit from a energy-optimisation with a low heating bill, but the landlord could have trouble covering the expenditure of this renovation.

Consultants contract agreements with the landlords often limits the necessary effort in the early phases of a project for a thorough analysis in order to achieve a higher sustainability degree, which in turn limits the holistic perspective.

Construction companies, subcontractors and/or suppliers are responsible to achieve the projects goals. Depending of the tendering process, the level of involvement can vary in the early phases in a project. Therefore it is necessary to implement the expected sustainable development integrated into the different phases. It is advised for a good sustainable development, that in the planning phase to specify and clarify the requirements and objectives needed to achieve it in

the project. Imprecise specification claims can result in a ineffective and needlessly consumption of time, finances and resources.

Facility employees responsible for the daily operation, also have a impact on the sustainable development in a project. The difference between construction and renovation, have an essential impact of achieving the sustainable development objectives. It is therefore important that knowledge is based on the current conditions in e.g. a renovation project. That the operating staff is involved in the early phases in the process, to incorporate the knowledge into the design, planning and construction plans.

3. Lack of economic tools to frame risk, value, finance and overall economy is mentioned by Bygherreforeningen (2013). By lacking economic tools, it becomes a barrier for the sustainable development. e.g. public projects are often handled with a funding structure, which separates the construction cost and operation cost. This setup prevents the inventive for long-term investment in sustainable options e.g. components, solutions and materials. In general this distinction in the funding structure is observed in many individuals private projects. Furthermore in organisations with a central public structure, combined with a decentralised operation e.g. universities, can be prevented to incorporate overall economy solutions, where all the involved parties not gain benefits. Depending on the economy, landlords can be forced to think short-term e.g the lack of liquidity or the focus on cheap and efficient construction. Despite investing in (potential) expensive sustainable development to benefit from a long-term low operations expenses, traditional economic models can give incentive to invest short-term, if the current marked can offer cheap options in e.g. non-sustainable materials or solutions.

An overall view of the economy, could give a strong incentive to pursue sustainable development. The survey conducted by Bygherreforeningen (2013) showed that both landlords and consultants are calling for tools, in order to set targets, design, projecting, that can meet the landlords expectations. A calling for methods to standardise to estimate economic costs and benefits of investing in sustainable development. Such methods do exist, but there is not a consensus on which methods are most accurate and the fact that there is not an overview on how many methods there exist and where to access them (Green Building Council Denmark, 2020d).

4. Framework conditions for methods used in the construction industry is called for. The survey conducted by Bygherreforeningen (2013), showed that the general knowledge of sustainability among the actors in the construction industry was fairly low. What is a general tendency is that the different actors in the construction industry see certification systems as a method to orientate in relations to what sustainable development is and what it comprises of. At the same time, there exist several certification systems, e.g. C2C, BREEAM, LEED and DGNB, despite a general request for standardisation. Agreeing on a specific certification system to use is tough, because often different aspects occur doing projects which can not be evaluated in the given certification system. This has resulted in unique systems created by the larger landlords and consultancy companies creating their own projection methods in order to cooperate with these systems. In theory this is a positive development, as long as there a unified consensus about what is being evaluated. Worst case scenario is that the objectives are not reached due to miscommunication. Therefore can a standardised certification system eliminate any potential confusion and miscommunication in, e.g. tendering process.

5. Lack of data, knowledge and experience is inevitable due to the fact that the sustainable development progression has been both slow. Since there does not exist a lot of experience with new materials or technologies, means taking some risks in relation to the performance of the actors involved in a construction project. e.g. time-consumption, due to a lack of experience with the use of new materials and technologies required to achieve the sustainable development objectives. The lack of practical experience, means that only a few actors achieves experience with sustainable materials, technologies, methods among others, By focusing on pioneering projects creates an experience and knowledge baseline, which can benefit the construction industry as a whole. In the survey conducted by Bygherreforeningen (2013), most were not aware of any forthcoming sustainability requirements in building regulations. Several respondents raised a need for information, education and standards. That the public should create a focus on the sustainable development through public construction projects.

3.1.1 Legislation

The construction industry has long been aware of the necessity for change regarding sustainable development. Multiple research documents and papers have shown that with the development of energy optimisation and the clean energy production, leaves the production of building suppliers and the construction itself as a large part of the climate impact. With the ambitious goal of achieving the SDGs in general by 2030 and the Danish goal of converting to an energy- and transport system based on 100 % renewable energy by 2050, action is needed in this regard (Ingeniøren, 2020).

Since the focus has been on the energy-consumption in buildings, there effort to track this development can be seen in the former and current building regulations. The development of the energy optimisation in buildings, due to the austerity of the Danish energy policy, can be seen in Figure 3.1.



Kilde Energistyrelsen

Figure 3.1. The energy consumption in buildings since 1961 (Aalborg University, 2020).

Coinciding with this energy development, manufacturing, transport, waste disposal and recycling of building materials accounts for an larger part of the total environmental and resources effects of a building. The study by Birgisdóttir and Madsen (2017) conducted calculations on six different cases consisting on single house, apartments and office buildings, that all comply with the building regulations of 2015, the newest regulation at the time of the study. The study compares the energy consumption of the operation with the construction and maintenance over

the buildings lifetime set at 80 years for offices and 120 for houses and apartments, with a calculation method of either simplified, specific or standard. The comparison, seen on Figure 3.2, shows that the construction and maintenance phase consumes more energy to produce materials and so forth, compared to its operation phase.



Figure 3.2. A comparison of six different cases, looking at the embedded energy consumption used in operation and construction in materials and energy used (Birgisdóttir and Madsen, 2017).

Senior researcher at Aalborg University states:

With this basis, there may be considerable potential in introducing a public regulation of new buildings' sustainability in a life cycle perspective.

Birgisdóttir and Madsen (2017)

Birgisdóttir and Madsen (2017) argues that by establishing a common baseline, a method on measuring a buildings sustainability profile is the first step. This can be done through a certification system such as DGNB, that the construction industry have been exploring the past couple of years (Aalborg University, 2020).

Through the life cycle assessment (LCA) lies a question, if the requirements for the buildings resources and environmental impact should be linked with the current energy requirements for buildings energy operation or they should be separate. The advantage with combining these requirements is the focus on the LCA, and the disadvantage is a potential weakening of the requirements for the buildings energy operation. Another element related to LCA is to determine how the prime energy is produced e.g. oil-based or electricity or a combination of several, if any requirements is set for embedded influences. In either case, it is imperative that it is compatible with *Bygningsreglementet* (The Building Directive), since it focuses on operation energy. The study concludes, that a legal requirement should aim to incorporate the LCA in the design phase, where the impact can have a large impact on the construction industry. The knowledge and distribution of LCA is however expected to be conducted as early as possible, where e.g. choice of material is important (Birgisdóttir and Madsen, 2017).

With this understanding the industry came together in 2018 recommended a sustainability class to be incorporated into the building regulations. The intended wish was to create a voluntary sustainability class, based on international standards and principles, that could help promote a sustainable development within the construction industry and the Danish exportation possibilities. A similar effect to the creation of a voluntary low-energy class incorporated into the building regulations years ago. The industry argued that a voluntary sustainability class should be compatible with the DGNB certification, but with a simplistic form, with fewer and simplified documentation requirements and assessment criteria (InnoBYG, 2020).

In January 2020 the Housing Minister, Kaare Dybvad, announced that a sustainability class is being added to the building regulations with the aim to be implemented during the Spring of 2020, seen on Figure 3.3. The new sustainability class begins by being voluntary and consists of nine sustainability requirements. Of these nine, two apply exclusively to housing. This new class has a focus on the construction materials used, construction processes, maintenance, operation and internal climate. It is intended to be a tool for any construction company to apply to any type of building. The implementation will be time-phased, with a period of two years of experience in which the application is voluntary. This period allows it to be tested before it becomes a requirement in the building regulations in 2022.



Figure 3.3. The Housing Ministers plan of execution regarding implementation of the voluntary sustainability class (The Danish Parliament, 2020).

With the implementation of the voluntary sustainability class the focus is now also on embedded energy consumption and the environmental impacts of the building materials, giving the possibility to increase the sustainability development in the construction industry.

3.1.2 Certification systems

To assess a construction or renovation project in terms of its sustainability performance, an assessment tool is needed to rate the project. According to Ebert et al. (2013) a certification system is essential for the sustainable development, to account for the three dimensions of sustainability mentioned in Section 1.1.1. Most certification systems are built around natural standards and legislation and incorporate different building practices and planing methods such as ecological systems, the projects LCA cost and energy efficiency. A certification system gives the possibility to project, estimate and evaluate a project in all the stages. This can create guidelines for completing the sustainability goals set for a project.

There are different certification systems around the world, see Figure 3.4 where countries or international organisations introduced them to assess the level of sustainability performance of a project or construction. Most of these certifications are more ambitious than regulatory standards, requiring stricter requirements in order to stimulate an increase in the quality of projects.



Figure 3.4. The most recognised certification systems in accordance with location worldwide (Birgisdottir and Jensen, 2018).

Among the different certification systems, the most recognised are DGNB, BREEAM, LEED and HQE. Despite these system serve the same purpose of sustainability assessment, they are built differently showing the differences in the construction industry in various ways through business models and philosophies. The certification systems are based on a number of different criteria and factors, where some only explore a specific aspect e.g. energy efficiency or materials (Zimmermann et al., 2019). Some certification systems originates from the 1990s such as BREAAM and more certification systems are being developed over time, to account for new demands and regulations (Pacetti et al., 2012).

The rise of interest in certification systems can be explained that more landlords recognise the increased value it gives to a project and the long-term cost is reducing. And this attention towards sustainability comes from the government and different companies prioritising sustainable

development in construction and renovation projects. This has been proven through LEED-certification in USA and BREEAM-certification in Great Britain (Roaf, 2003).

With the sustainable development progression seen today, Bygherreforeningen (2013) listed the benefits and drawbacks with certification, seen in Table 3.1.

Benefits	Drawbacks	
With development comes standardised	Certification is expensive, both in process	
knowledge and criteria, that can limit	but also time spent on quality assurance	
uncertainty with the tendering process.	and implementing the integrated design.	
Certification gives a boost for	The certification level can be outdated,	
sustainable development in the	when the sustainable development in the	
construction industry.	future improves further.	
Certification can be used as a method	The more criteria that are involved, the	
for the certified process.	less effect it will have in the overall project.	
Certification gives the Landlords clear	Worst-case scenario is the risk of	
overview to pursue specific criteria.	speculation, about the ROI of sustainability.	

Table 3.1. The benefits and drawbacks of certification in the construction industry (Bygherreforeningen, 2013)

In 2010 the Green Building Council Denmark (2020d) along with a certification group where tasked with evaluating the certification system that would be the main tool of choice, when it came to evaluating the sustainable development in Denmark. A report detailing the different factors that would be taken into an account in this decision (Birgisdottir et al., 2010). Such as:

- Creating visibility and debate what sustainable development in construction was.
- Creating visibility and knowledge from the different certification systems.
- Identify the focus areas of the systems, where they have "gaps" and limitations, such as in order to assess the applicability in accordance with Danish legislation and building practices.
- Creating contacts in the construction industry to measure sustainability.

The Green Building Council (GBC-DK) began with an intent to being a cooperative effort, with the aim to create a sustainability assessment platform for the Danish Building Industry for construction and renovation projects. In 2012 the review process was complete and the German certification system DGNB was chosen (Birgisdottir et al., 2010). The reason for choosing this certification systems instead of BREEAM, LEED and HQE was of several reasons.

When comparing the overall handling of the sustainability dimensions: environmental, social and economic mentioned in Subsection 1.1.1, with the individual systems, it shows the extent each systems have. This can be seen in Table 3.2.
	Environmental	Social	Economic	Additional catagories
DGNB	* Environmental	* Social quality.	* Economic	* Functionality.
	quality.		quality.	* Technical.
	* Location quality.			* Process.
	* Energy.	* Health &	* Management.	* Management.
	* Transport.	well-being.		* Innovation.
	* Water.	* Transport.		
DDEEAM	* Materials.			
BREEAM	* Trash / Waste.			
	* Land use &			
	ecology.			
	* Pollution			-
	* Energy & atmosphere.	* Indoor climate		* Innovation.
	* Water efficiency.	quality.		* Regional
LEED	* Materials & resources.			priority.
	* Sustainable building			
	plot.			
HQE	* Effects in the	* Thermal comfort.		* Maintenance.
	local area.	* Acoustic comfort.		
	* Materials &	* Visual comfort.		
	performance.	* Experienced air		
	* Energy.	quality.		
	* Water.	* Healthy rooms.		
	* Trash / Waste.	* Health air quality.		
	•	* Water quality		•

Table 3.2. Overview of how the different certification systems handles the three dimensions of sustainability (Birgisdottir et al., 2010).

The study showed that DGNB covered most of the three dimensions, while BREEAM, LEED and HQE primarily is focused on the environmental dimension. An other important reason for DGNB to be chosen was due to the programs adaptability to standards such as the European CEN/TC 350 series on sustainability of construction works and the ISO/TC 59/SC international standard for sustainability in buildings and civil engineering works among others. The Green Building Council Denmark (2020d) have presently two systems fully functional. The DGNB for Urban Areas and the DGNB for new office buildings, made available respectively in 2014 and 2012. Due to DGNB's high flexibility, the two systems are similar, the only difference is how it accounts for the surrounding area (Green Building Council Denmark, 2020b).

3.1.3 DGNB Certification System in Denmark

The DGNB certification systems origins from Germany and stands for Deutshe Gesellschaft für Nachhaltiges Baun (English: German Society for Sustainable Construction) and was founded in June 2007 (Birgisdottir et al., 2010). The originally goal was to build living environments that were economic, resource efficient and environmental compatible. Since the DGNB is based on the European standards and norms, and its technical core is comparable with a high flexibility then countries can configurate the system to its needs and regulations (Bauer et al., 2010).

A DGNB assessment consist of six categories with 40 sub criteria distributed. The assessment is based on the projects LCA over a 50 year period. The assessment itself is both based on a qualitative and quantitative data such as check-lists e.g. how integrated the planning, and consumption of water and energy (Birgisdottir et al., 2010). Depending on the score of the assessment, the certification can achieve either Bronze, Silver or Gold depending on the total performance index score. However in order to correspond with other systems, the DGNB was updated to silver, gold and platinum. Also a lower tier bronze certification was made to accommodate existing buildings only. If a project was certified "gold" prior 2017, it would be upgraded to platinum (Green Building Council Denmark, 2020b). The different scores needed to achieve these certification scores can be seen in Figure 3.5.



Figure 3.5. The different certification levels achieved through the DGNB certification systems, along with a comparison to the points given by the requirements of BR18 (Birgisdottir and Jensen, 2018).

As the figure shows, the scale comparison between what is currently needed to uphold the BR18 requirements and what the DGNB requirements to achieve silver, gold or platinum. The report conducted by Birgisdottir et al. (2010), shows that the DGNB assessment matrix evaluates each of the three dimensions equally, compared to the other certification systems. Each of the dimensions account for 22,5 % of the overall performance score, therefore allowing room to assess the technical- and process dimension in a construction process. The sixth category mentioned earlier, doesn't have an impact on the score, but evaluates the surrounding area. The technical and process category relates to the holistic view, mentioned in Subsection 1.1.1, regarding the practical aspect of executing a construction project. In Table 3.3, the six categories is shown.

	Group	Criteria	Group Weight
	Life cycle assessment.	LCA: environmental impacts.	
		Environment risk related to	
	0	construction supplies.	
	Global & local	Environmentally friendly	
	environment.	recovery of materials.	
_ · ·		LCA: Prime energy.	
Environment	5	Drinking water consumption	22,5 %
	Resource usage & trash.	and wastewater discharge.	
		Efficient land use.	
	Total economy.	Building-related lifetime costs.	
Economy	Financial insurance.	Flexibility and adaptability.	22,5 %
l i i i		Robustness.	-
		Technical comfort.	
		Indoor environment quality.	-
	llashh sanfart	Acoustic comfort.	-
	Health, comfort	Visual comfort.	-
	& user-triendly.	User-controlled indoor climate.	-
		Quality outdoor areas.	22,5 %
Social		Safety & security.	
	Functionality.	Accessibility.	-
		Public access.	-
		Awareness of cyclists.	-
	A	Ensuring architectural quality.	-
	Aestnetic.	Building integrated art.	-
	Plan utilization.	Plan utilization	-
	Technical execution.	Fire safety.	
		Sound conditions.	-
Tachaical		Quality of climate shield.	
Tecnnical		Adaptability of technical systems.	22,5 %
		Building maintenance and cleanliness.	
		Suitability for removal and recycling.	-
		Quality in the preparation of the project.	
		Integrated design process.	
		Assessment and optimization of	
	Planning.	complexity in planning.	
		Ensuring sustainability aspects related	
		to tender material and order allocation.	
Process		Guidance on maintenance and use	10.0 %
1100833		of the building.	10,0 %
	Execution	Building Site / Construction Process.	
		Quality documentation in the execution.	
		Commissioning.	
		Micro area.	
		The local area and suburban image	
Area	Area	and condition.	00.0%
711Ca	n ca	Traffical connections.	00,0 /0
		Accessibility to facilities in the area.]

Table 3.3. The six categories of the DGNB assessment matrix. Environment, economy, social and technical each accounts for 22,5 %, process accounts for 10,0 % and the local area accounts for 00,0 % (Green Building Council Denmark, 2020c).

The reason the technical dimensions accounts for 22,5 % is that environmental actions can be incorporated in the architectural aspects, to the benefit of the users and general maintenance and operation. The process dimensions accounts for 10,0 %, because sustainability can be integrated from the beginning of the project, in order to achieve a holistic process in the project. Despite it only accounts for 10,0 % it is deemed a essential part of DGNB. Lastly the sixth category is incorporated, because the location can prove useful to the project, but does not account for any %, because a project should not be "punished" for a location that is deemed non-sustainable (Green Building Council Denmark, 2020c).

LCA is a construction concept integrated into that the DGNB system, due to its emphasis on total life-cycle assessment on the energy operation and building supplies usage, along with incorporating all involved life-cycles in a project from beginning to end. Knowing this gives the possibility to "Pre-certification". This entails from the beginning of a project, if any interested parties such as investors, landlords among others, want a silver, gold or platinum certification, then this can be incorporated at the conceptual stage. Being able to pre-certify a building project, gives an oversight and transparency to the processes, and specific targets can be defined (Green Building Council Denmark, 2020a). On Figure 3.6, a comparison between the cost and effort to any changes in a construction project and the ability to influence those changes is shown.



Figure 3.6. Attaining a pre-certification, gives an oversight of the possibilities that the landlord or investors have in reaching their sustainable targets (Green Building Council Denmark, 2020a).

Pre-certification gives to possibility to incorporate the sustainable targets in the early phase. There are several benefits to be mentioned, with respect to planning, construction and marketing. By defining the different sustainability targets and criteria, increases transparency, ensures the process of planned performance targets and funding, improves risk management and lastly, a recognised quality to the project, which in turn increases the attractiveness of the property, thereby generates financial security for the landlords, investors and other relevant parties from the early phases.

3.2 The current status of the green transition

With the agreed upon SDGs in 2015 on a global scale, the market for sustainable solutions is on the rise. The Danish Government believes that Denmark could greatly benefit from this, not only on a more stable and peaceful earth, but as well on economics. Denmark is known for its innovative approach to sustainable matters and with having a focus on the science and expertise on these matters. The Government therefore seeks to engage and encourage Danish business, private and public, to invest in sustainable solutions and to attain knowledge and expertise in sustainability (Dahlberg, 2019).



POTENTIAL NEW DANISH SDG BUSINESS OPPORTUNITIES BY SECTOR (USD, BILLION, 2030)

Figure 3.7. The Potential additional value generated by the SDGs in 2030, if Danish business invest in the SDGs (Dahlberg, 2019).

In Figure 3.7, it is displayed the potential added value, generated by 2030 if Danish business invest in developing solutions and expertise within sustainability. The 17 SDGs, gives a wide range of opportunities related to several business sectors such as Energy, Agriculture and Construction. The latter being the sector with the most business potential. Despite a strong presence within the global market, the Danish exports to Africa, Latin America and Asia (excluding China and India) only accounts for 6 %, despite these regions are expected to be a SDG hotpots and in the future will account for 28 % of the global market (Dahlberg, 2019).

With the understanding that the SDGs is an initiative at a global scale for countries to organise and implement strategies, initiatives and KPIs in order to track its development with the end goal of achieving the SDGs by 2030, the organisation SDG Index makes annually a report to give an overview of the progression from each country reaching their SDGs. On Figure 3.8 the current progression of the SDGs in Denmark in all 17 goals, compared to other committed countries on a global scale (SDG Index, 2020).



Figure 3.8. The Danish progression of SDGs regarding reaching the 2030 goals set by the UN, compared to other countries on a global scale (SDG Index, 2020).

At this point in time, Denmark is ranked number 1 with an index score of 85,2, with a region score of 77,7. The Danish score indicates that Denmark is 85,2 % of the way to the best possible outcome across all the SDGs. The regional scores explains the average score in the region of Northern Europe (United Nations, 2017). Figure 3.8 shows all 17 goals are listed and the current progression is shown regarding if Denmark is keeping the pace to reach each goal by 2030. As can be seen there are a number of goals that are on track, but at least half are showing that challenges remain but overall are improving. Denmark has currently put forward two strategic documents in order to achieve the SDGs by 2030. One document describes the priorities and actions on a national and international context. The other document describes the Danish strategy for humanitarian action and development cooperation (Ministry of Foreign Affairs of Denmark, 2020).

Through the SDGs the UN encourage nations to participate in the betterment of the world. Despite that fact that each participating nation have the opportunity to reach these goals on a individual level, there is also an encouragement for involvement from companies, agencies, academic institutions and civil society organisations worldwide. Through this encouragement the Global Reporting Initiative, the UN Global Compact and World Business Council for Sustainable Development has developed the SDG Compass (GRI, UN Global Compact & WBCSD, 2020).

3.3 SDG Compass

The SDG Compass is a guide, recommended by GRI, UN Global Compact & WBCSD (2020) to support companies and organisations in aligning their strategies with the SDGs, in order to both manage and measure the progression and contribution to their nation effort. The guide is focused on large multinational companies and organisations, but small and medium companies and organisation can use it as inspiration and are encourage to adapt to the extent that they are able to. Its aimed usage is at entity level, but the guide is flexible and can be applied to divisional, regional, product and site level. Figure 3.9 describes a five step program for companies to define their priorities, setting goals, integrate their decisions and lastly report the results and keep communicating. This is a repetitive process. The program allows the individual company or organisation to align their strategy towards a core business strategy that surrounds a sustainable outcome.



Figure 3.9. A five step program for companies to incorporate the SDGs (GRI, UN Global Compact & WBCSD, 2020).

Step 1:

The first step entails an understanding of what the SDGs are and the possibilities they include. Through developing and delivering of solutions that help in the nations progression of achieving the SDGs, companies will discover new growth opportunities. The SDGs can act as a framework for a company or organisation to assist them in defining and mapping their strategy. This process can include a range of benefits such as (GRI, UN Global Compact & WBCSD, 2020).:

• Identifying business opportunities.

- Innovating technology, e.g. energy efficiency and sustainable energy storage.
- Substitution of traditional technology.
- Accommodating new marked needs, e.g. products, materials or services.
- Enhancing the value of corporate sustainability.
 - Sustainability integrated into the value chain.
 - Improving operational efficiency.
 - Stimulate product development and innovation.
 - Government efforts to promote a sustainable approach, can produce benefits or advantages, e.g. tax deduction.
- Strengthening stakeholder relations.
 - Better engagement between customers, employees and other stakeholders.
 - Reduce legal, reputations and other business risks.
- Stabilising societies and markets.
- Capitalisation on a unified understanding and language.

Step 2:

The second step is about limiting the companies focus to a few of the SDGs instead of all 17, because not all 17 SDGs will be equally beneficial or relevant for the companies. A company needs to understand to what extent the company contributes to each, along with the risk and opportunities each SDG represent. Therefore taking a strategic approach, by assessing the current, potential, positive and negative impact in the value chain, that the company has on the SDGs. Thereby clarifying and identifying where the positive impact effects can be scaled up and the negative impacts avoided or reduced. Seen in Figure 3.10, an example of a three-action plan where a company have assessed its value chain for positive and negative impacts, and the likelihood of future ones (GRI, UN Global Compact & WBCSD, 2020).



Figure 3.10. An example on a company identifying the positive- and negative impacts on its value chain (GRI, UN Global Compact & WBCSD, 2020).

With the completion of mapping a company's impacts, it is essential to select the relevant indicators in order to track the progression. In order to fully understand how a company contributes to the SDGs, it is imperative to translate it to the three dimensions of sustainability: social, economic and environmental. The SDG Compass offers different suggestions to what could be relevant. A five-action plan is offered by the SDG Compass, often referred to as The Logical Model, to help understand what data is needed to track. The five-step plan consists of inputs, activities, outputs, outcomes and impacts. Figure 3.11 shows an example of the five-action plan to determine which relevant indicators to choose (GRI, UN Global Compact & WBCSD, 2020).



Figure 3.11. An example of the five-action plan to choose ones relevant indicators, based on inputs, activities, outputs, outcomes and impacts (GRI, UN Global Compact & WBCSD, 2020).

In order for this step to be successful, it is important to select the appropriate indicators for the impact assessment. Initially a combination of indicators that offer a balanced and adequate overview of the performance and impacts of a company, along with a consideration for lagging-(measurement of outcome and impact) and leading indicators (prediction of outcome and impact). Secondly it is important to choose the type of data to track for each indicator, since it is not always possible to track it directly, because, e.g. impacts can occur further down the value chain. Thirdly it is imperative to priorities which SDG to succeed in, with the purpose of identifying which SDG creates the best competitive advantage(s) (GRI, UN Global Compact & WBCSD, 2020).

Step 3:

The third step is about setting goals, and it is a progression of step two. By setting specific and measurable sustainability goals helps growing priorities and drives the performance. Firstly it is important to define the scope of goals and selecting the relevant KPIs. Depending on the chosen priorities, a small number of KPIs is recommended for each priority, that directly address the outcome or impacts of its activities. Secondly, its imperative to define the baseline of which the goals are compared with. A baseline can significantly impact the likelihood of success, to which it is recommended that the reasoning behind the baseline is transparent. To accurately monitor the progression of a goal, it is essential to be aware of any changes that could affect the relevance or consistency of the reported data, such as company mergers or divestment. In Figure 3.12, is shown two approaches to choose the goals from. Through the SDGs, the approach "Outside-in", suggests to look on a global scale and set goals depending on what gaps are being created by the SDGs, regarding the required and current performance level (GRI, UN Global Compact & WBCSD, 2020).



Figure 3.12. Two approaches to set goals, an internal approach and an external approach with the latter focuses on SDGs (GRI, UN Global Compact & WBCSD, 2020).

Thirdly, it is recommended to consider the level of ambition towards achieving the selected goals. With high ambition, goals are likely to create greater impact on the performance. Depending on the level of ambition, the ambition level can have reputational implications where industry leaders create pressure for competitors to follow or be left behind. Ambition is fundamentally linked to a sensible timeframe, because the longer a timeframe is, the lower the accountability becomes. Therefore it is important when setting long-term goals to define short / medium goals to track milestones. Fourthly, communicating the commitments of the SDGs can be an effective communication tool both internally and externally. Doing so can engage employees and business partners along with creating a foundation for constructive cooperation with external stakeholders (GRI, UN Global Compact & WBCSD, 2020).

Step 4:

The fourth step is about integrating sustainability into the core business, along with embedding it across functions. The potential of integrating sustainability in the business is wide, e.g. customer segments, material choice and use, service and product offering, the logistic network and properties of products. To successful integrated sustainability, active leadership is essential. Senior management is key to any organisational change. Two key elements are important for sustainability to be an integrated part of the organisation:

- 1. Shared understanding that the chosen sustainability goals creates value and helps other prioritised goals through clear communication.
- 2. Explaining how the integrated sustainability is being measured and how each function affects this.

Having a dedicated senior management and employees can play an important role, but the or-

ganisation needs to have sustainability embedded into its functions, business strategy, culture and operations. The SDG compass encourages to utilise the potential of partnerships or at least to explore these three options:

- 1. Multi-stakeholder: partnership between government, private sector or civil organisation for development or tackle challenges.
- 2. Sector: Initiatives between industry leaders to combine efforts, e.g. to raise standards and practices in the industry.
- 3. Value chain: To combine skills among others, e.g. for developing new products, knowledge or technologies.

Building effective and productive partnerships require commitment, which can be fostered through shared goals and core competences(GRI, UN Global Compact & WBCSD, 2020).

Step 5:

The fifth step is about reporting and communicating. The practice of disclosing corporate sustainability through annual progress reports are not uncommon, and are expected by the stakeholders. Therefore it is important to report and communicate the sustainable progression in order to understand and meet the expectations of stakeholders.

Sustainability reporting has evolved over the last 20 years, and several key principles are essential, such as:

- 1. Timelessness
- 2. Stakeholder inclusiveness
- 3. Materially
- 4. Completeness
- 5. Clarity
- 6. Accuracy
- 7. Reliability

Principles like these helps give information to the stakeholders to ensure the success of their investment. These principles are even more important with the implementation of SDGs, to give insight on broader sustainability conditions and goals. The SDG Compass suggest that a report have focus on material issues, that reflect the companies environmental-, social- and economic impacts, regardless if they are positive or negative. The material issues are likely to be correlated to the strategy and priorities set in step 2. This gives the opportunity to address these impacts and how to handle them e.g. through core competencies or technologies. It is necessary to evaluate which impacts are important to disclose, due to the influence of the stakeholders and the significance of environmental-, social- and economic impacts. GRI, UN Global Compact & WBCSD (2020) suggest a matrix, to visualise the materially issues compared to the prioritised areas. Figure 3.13 shows an example of this.



Figure 3.13. An example of mapping priorities comparing materiality issues and the influence of stakeholders (GRI, UN Global Compact & WBCSD, 2020).

Several companies already disclose SDG-related information such as employment by gender and decent work. Aligning the companies reporting and communication with SDGs, allows for a discussion on the performance of the KPIs set in step 3 and in a common language among stakeholders. Companies can disclose the reasoning behind the chosen SGDs, the significance of impacts, the correlated indicators and goals, the chosen strategies, practices and initiatives to support the progression (GRI, UN Global Compact & WBCSD, 2020).

4 Analysis

This chapter consist of three subjects aimed to answer the sub-questions listed in Section1.3. First an analysis of the different actors within the construction industry, is performed to understand the different actors relationships of power in the present and in a future scenario. This is done with the results from the interviews, see Appendix B, and the literature review in Chapter 3. Secondly a SWOT analysis is conducted in order to understand the incentive for companies within the construction industry to invest in the SDGs, related to the interviews and literature review. Lastly an analytical approach on the UNs proposed strategy tool, SDG Compass, that helps companies to align their strategy with the SDGs, thereby helping to achieve the 2030 Agenda.

4.1 Interviews

Regarding the interview framework created, that can be found in Appendix A, a set of questions is formulated related to the industry in general and the particular experience from the participants. As seen in Subsection 2.2.2, all experts in the subject are active actors. The purpose is to have a better understanding if the construction industry is already aligned with the SDGs and if it can help to change the status quo of the environmental issue. What is the actors' perception of the need, the opportunity of working with the SDGs and how the companies needs to address these objectives. Furthermore, what can be pointed to change the status quo and contribute to the necessary change. Altogether the information to find is summarised as follows:

- Evaluation of the approach of individual and collective work in promoting changes in the Industry.
- Understand interviewee vision and opinion on the UN's sustainability goals.
- Understand the extent to which the Danish industry and its actors has developed within sustainable objectives.
- Understand what companies have done so far, in order for the construction industry to be more sustainable, namely redirecting the aim towards the SDGs.
- Gather opinions on what will be needed for the industry to achieve the SDGs as a whole and to change the mindset.
- To understand what challenges the adoption of the sustainable goals.
- How the handling of national and international pressure is, based on the fact that the construction industry contributes the most with greenhouse gases emission.

4.2 Actors characterisation

This section of the analysis gives focus on sub-question 1, on how can the SDGs be used to encourage companies and actors to understand the process and the full extent of sustainability needs, as a permanent mindset. To answer this question, the Actors Network Theory will be used to identify the power between the different actors, supported by the findings mainly from the interviews.

4.2.1 Actors network

After conducting the interviews, it was considered pertinent for this project to have an approach that could identify which are the actors in the relationships existing in the industry and which influence the actors has on each other. It was verified in the interviews that the respondents gave answers about the role played by different actors. With this purpose, two approaches can be considered: stakeholder analysis or Actors-Network Theory (ANT). One of the strong reasons for using the ANT instead of stakeholder analysis in this project, is that the first approach is made repeatedly in the construction industry, eventually even when analysing issues related to sustainability. The fact is that there is still a need to make a change, as we still do not feel a profound change in the current paradigm, otherwise the planet were not under a declared climate emergency (Leleux and der Kaaij, 2018). So should an opportunity be given to try another approach to existing studies complementary, in a more social dimension, with ANT making it possible to bring information to the equation, which has not yet been brought up to date. ANT can provide another dimension about the understanding of how each stakeholder/actor is connected and the amount of power applied in the relationships network. It is recognised that ANT has been little used in construction management research, but widely considered for research in the organisational environment and information systems, as stated by Harty (2008). The author also states that this theory is fundamentally concerned with how various people, ideas and things come together in networks, how they remain in place or how they disassociate or are reconstituted.

This concept stems directly and is inspired in Bruno Latour, co-author of ANT, who claims that this theory is suitable for studying processes of change and rupture that involve the interaction of many actors and non-human entities Harty (2008). In this way, it rejects distinctions between humans and non-humans, whether they are technological artefacts or human actors that promote heterogeneous bidirectional interactions. The ANT were developed in the late 1970s to explain scientific activity, avoiding the distinction between social and technical dimensions. It captures in this way the idea that for any actor to act, many others must act as well. It is therefore an action shared with a multitude of people and things (Bencherki, 2017). If ANT was methodologically influenced by the interest in the everyday and practical activities, it was theoretically inspired by semiotics (Bueger and Stockbruegger, 2017). It can therefore be considered that it looks at the relationships between what is material (things) and semiotics (concepts). Before immersing in the analysis of data obtained in the interviews, a presentation of the actors will take place. They are identified not only by existing knowledge from the construction industry but also because they are referred to during the interviews.

For the sake of the information provided in this project, the actors are identified as follows. With (1) are those who participated in the interviews:

- Landlords: public or private, individual or organisation who has the money and the intention to promote a project.
- Architects: those chosen by the landlords or found by a tender process, that makes the design and builds up the documentary project.
- Consultants: those chosen by the landlords or found by a tender process, that makes the design for different disciplines and builds up the correspondent documentary project.
- Construction companies: those chosen by the landlords or found by a tender process, in charge of materialising the project of architects and consultants. (1)
- Suppliers (Materials manufacturing and importing): companies producing or importing the final materials and equipment constituting the buildings or those necessary to support the execution.
- GBC-DK: an independent organisation that trains auditors capable of certifying a construction according to a performance framework (DGNB certification system). Currently a voluntary option for landlords, architects, or consultants. (1)
- Educational institutions (universities and professional schools): in charge of sharing and foster knowledge for people to obtain skills to develop a profession. (1)
- Netværk for Bæredygtig Erhvervsudvikling Norddanmark (Networks for Sustainable Business Development Norddanmark): a public-private network intended to build a bridge between the private business community, the public sector and knowledge institutions. (1) NBE (2020)
- The State: the the institutions of government of the Danish society. A form of human association with the purpose of the establishment of order and security (Encyclopaedia Britannica, 2009).
- The general public: Danish citizens in the society.

As mentioned previously in Subsection 2.2.2, the answers given in the interview expresses personal opinions and not necessarily the opinion of the organisations, to which the interviewees belong. In the sections below, the transcriptions are identified by the author as follows: Morten Vinde (MV); Anne Gade (AG); Peter Boltau (PB); Lau Raffnsøe (LR).

The following is the information found in the interviews that help to characterise each of the actors.

Landlords

About landlords, they are seen as having a social responsibility, which is directly linked to the SDGs as presented in Section 1.2 and which is confirmed by the words of (AG):

"... I think many building owners are, especially the public and housing associations. They are because they have a social responsibility." (AG)

It is up to the landlords as promoters to establish specific requirements. When questioned if the landlords can be those leaders to push for a sustainable agenda, the answer was affirmative. The mechanism is through the tendering process where specified demands can be stated for the bidders, on sustainability, to which a change is already happening. That is verified by (PB) statement:

"Yes, we see more and more of this and hopefully is going in that direction. We see tendering processes now where 50% is the price, and 50% is sustainability combined with how you want to organise the project. So we see more of this." (PB)

With the understanding that the landlords are more focusing their requirements on the sustainability factor, that could indicate that the barriers, mentioned in Section 3.1, are slowing fading. Specific landlords types are mentioned:

"I think the parties that I'm most impressed by is actually some of the pension funds and the social housing organisations in Denmark at least, who have really... both of the parties have been, on this sustainable agenda in a long time, and are really taking a step further in the last couple of years by doing certification and other actions that are working really ambitious with the sustainability agenda" (LR)

As stated by InnoBYG (2020), the industry wants to help push the sustainable development, but despite this Bygherreforeningen (2013) mentioned there is a difference between a public landlord and private landlords also verified by:

"The private sector is not pushing. Public Sector that's pushing because they actually have the possibility of doing it. The private sector is always focusing more on price." (PB)

"(...) because the building owners actually have a demand for certification and for sustainability that it is being implemented in actual projects as an actual building. And some parties we don't see on this agenda, as the state as a building owner, totally absent. We see some of the municipalities and some of the regions... that the public as a driver for sustainable buildings is present but it's not from some central, from the government, from the state level." (LR)

This indicates that since the public landlords are more willing to push the sustainable development agenda, which is logical when the government is setting forth legislation about the voluntary sustainability class and their commitment to the UN about the 2030 Agenda (United Nations, 2020a).

Architects

Regarding the role of architects in this network of relationships, it is clear that when it comes to applying sustainable solutions, they have an important voice. Not only in the choice of materials and solutions but also in advising the landlords. Architects are pressing the issue, requested by the landlords. Their role is nevertheless to advise the landlords about the options that could contribute to increase a long-term value of the project, based on sustainable principles.

"But the building lords does not always have the capacity of knowing this. So that it's at least the job of the consultancy and architects and entrepreneurs for that sake, to raise the question: "Can we do it in another way?"" (MV)

"What I'm, you know, arguing is that what we started out was that it's the building lords that need to create the demand. But I'm not agreeing on that, because that they are having some responsibility of creating that demand. I agree on that. But the demand should also be supported by the value chain of the consultancy firms, entrepreneurs and architects saying we can do this." (MV)

"The consulting firms' engineers and architects also have a future role but a much more personally involved in the agenda so it's a base much on and specific people with who wants to do sustainable buildings but they can only do so with the building owners actually want to... as demands it because they're picking up the tab." (LR)

But one reason why architects are not actively proposing more sustainable solutions may be related to the fact that tenders continue to be very price-driven:

"But the architects, they really would build more sustainable buildings. But again, it's more or less always about the money" (PB)

Consultants

The role of consultants is not very different from that of architects. They are almost always referred to simultaneously and for the same reasons.

"Again, also the engineering companies, they all they have all the solutions, but sometimes they are more focusing on winning the (...) tendering." (PB)

"they have the experience, and they have a tremendous amount of knowledge if you go across. There are some big consultancy firms in Denmark where sometimes, you know, you wonder why they don't give better advice." (MV)

With a economic focus in the tendering process, it is hard to push forward a more sustainable agenda consisting of all three dimensions. This could indicate a lack of economic tools to help explain the economic benefit in investing in sustainable development and possible a lack of understanding and clear terminology, mentioned as two of the main barriers (Bygherreforeningen, 2013).

Construction companies

It seems evident that since construction companies are the end of the line when it comes to project materialisation and with little influence in the decision-making phase, they are more focused on making money than on looking for new solutions. There are however differences, as in the case of the company of one of the respondents, which proposes to make a difference in what is within its reach, namely with the construction sites.

"I can't choose the materials by myself, that's typically the architect and the engineers. So we can choose how the building has to be built and which materials are chosen. We can affect it in the discussions with the architect and the engineers,

but they usually work for the customer. But I have completely hands on the construction site. So that's where I have my focus." (PB)

"But because I don't see that many construction companies actually see this as an opportunity." (PB)

"Then you have all the subcontractors. You need to get close to them. Because some of them it might be a small company with 10 guys, and they don't work with sustainable solutions. They just have to make money." (PB)

"If you start with the contractors, I think they don't, they don't... they all also focusing more on money than on sustainable solutions." (PB)

As mentioned by Bygherreforeningen (2013) in Section 3.1, a main barrier is habit-forced thinking and the organisational structure. That the construction industry have a conservative mindset, would limit their viewpoint and thereby would not regard the sustainable development as a potential to increase their competitive advantage. Although by having that shared responsibility of thinking differently:

"So that it's, it's at least the job of the consultancy and architects and entrepreneurs for that sake to raise the question: "Can we do it in another way?" (MV)

Companies might still want to take this approach but find it difficult:

"I think when the SDGs as I said before, it's a tool for structure and easy to communicate afterwards but for a lot of the companies, they're saying we're supporting goal this, this and that and then trying to embrace others... Sometimes I think it's still hard for them to figure out how to attack it." (MV)

This indicates there is a lack of both experience with sustainable solutions but as well as knowledge and understanding how investing in sustainable development can help the construction companies to keep up with a changing market (Bygherreforeningen, 2013). Despite the fact that there are systems such as the DGNB certification system that acts as a common baseline and business tools like the SDG Compass, mentioned in 3.3 (Birgisdóttir and Madsen, 2017).

Suppliers

The role played by suppliers is not emphasised during the interviews, with few references. They are related to being part of the value chain, needed to follow the demand.

"And they again are supported further from in the value chain of going well, because the architects know that they can get the materials from the material producers. We have two things holistically on the value chain as pushing and pulling this demand we can only say that it's the building lord that needs to demand this." (MV) "(...) the partnerships, we can do this by ourselves. So, we work a lot together with a lot of different... could be schools, it could be the university, other suppliers, whoever wants to join in, we make a partnership." (PB)

Despite the suppliers are not being mentioned a lot in the interviews, their position as a actor seems quite clear. At the end of the value chain, to supply the demand from architects, consultants and construction companies. Their are either forced to adapt or have their market share being offered to others, by not being able to contend in biddings with an increased focus on sustainable requirement mentioned by (PB).

GBC-DK

The DGNB certification from the GBC-DK seems to work as a "safe place" in the sense that if knowing how it works and the purpose for which it is intended, will have more adherence when compared to the SDGs. DGNB in particular, because it analyses the three dimensions of sustainability, thereby being closer to what is intended by the SDG, as seen in section 3.1.3.

"(...) the knowledge is lacking on the SDGs still, like you might have heard of the SDGs and the SDGs are about sustainable development, then there's still a lot of lack on what is sustainable development. So, you could break down barriers saying that the demand needs to be there, but you would still have a tremendous lack... What, does that mean, then? That's why you see when there's been a lot on the whole DGNB wave that, some have been asking for sustainable buildings not really knowing what they wanted. The DGNB gives you a framework where you're certain that we'll work holistically with the sustainable development because we're going into the social, the economic, the process and the environmental." (MV)

"And I think that, actually, that DGNB has some really good concepts regarding the process and also that you get points for different process-related criteria. So I think that... Yeah, I'm not sure, but I think that the way to go is also to, to kind of interlink DGNB and sustainability goals even though I know it's two different concepts," (AG)

"So, I think that it's important to remember that sustainability is really complex. And that's why I really, I think DGNB is a very good tool, but it is comprehensive." (AG)

"And I think that is maybe the biggest change we have made to the Industry (n.r.: about the DGNB certification) that is as all consulting engineering and architectural firms and many, many, other different kinds of firms as companies in the value chain in the building industry today has somebody who has an understanding of sustainability and certification" (LR)

The interview statement supports what Birgisdóttir and Madsen (2017) mentioned in Subsection 3.1.1, that the certification systems provide a baseline of understanding. On of the main reasons why DGNB specifically was chosen as the best option for the Danish industry, was that it had an equal focus on the three dimensions of sustainability and compatible with the Danish construction industry. This indicates that despite the slow progression with sustainable development, there is

still progression. With the plea from the InnoBYG (2020), the new voluntary sustainability class is being introduced and is build on the structure of DGNB. With the DGNB it is possible to achieve the Danish commitment to the 2030 Agenda (United Nations, 2020a). DGNBs function as a tool to help achieve the SDGs is mentioned by:

"But it's also their task to go out and say, well, you can actually go this way. You don't have to necessarily have to be certified within the DGNB, but you make some certain choices within your building, they'll support this." (MV)

Certification produces documentation, so a way to show what some company is doing in the sustainability field. Through proper documentation practices, it is possible to show the value of the sustainable development investment:

"The reason why the pension funds are - like pension Denmark - is saying, everything we build, we want to have a DGNB gold certified. The reason why they do this is that they're going to, first of all, they are experiencing a demand for these buildings and then if they were to sell it, then the sustainability index is a lot better. They'll have a lot more value within this documentation than if they were building a usual house." (MV)

Also, it helps to avoid masking false practices as it is done by a certifying entity external to the project, adding credibility and avoiding situations of greenwashing (Lyon and Montgomery, 2015):

Because it, I don't know, but that happens everywhere, greenwashing. But it's and that's, you can't really do that with DGNB. Right? If you have done the hard work...!" (AG)

Educational institutions

Promote more education in sustainability and the SDGs seem to have unanimity among the respondents. Firstly, if it is time and availability that is needed, the newly educated people can provide the companies both the knowledge and the time to pursue sustainability.

"I think education is really important. And I think that we need to have a focus on that, in our education. And I think we have very much focused on this. (...) also as a practitioner to say that they don't have time (n.r. the companies), then they need to hire some of the students that are just getting out because they just had a lot of time to study this, this concept, right?" (AG)

Although the SDGs can be a barrier to overcome, education is an essential part of the solutions to overcome the barriers within the Danish construction industry (Bygherreforeningen, 2013):

"If we're talking about the SDGs, and I think that it needs some time for people to understand and of course now I'm in the educational part of the system. So of course, I think more education because the first step of implementing is that, that the actors need to know the SDGs and know the, the concept. So, I think that is important." (AG)

The relationships between the educational system and companies can be seen not only to promote new education and more training but also on the side of companies to receive newly graduated people.

"We are focusing on goal number four, which is quality in education. We need to make sure that all our people are well educated and also that we make sure that we get all the young guys while they are studying for carpenter, or as a bricklayer or whatever. Make sure that we have them in house, so when they are done with education, we can then hire them, then they know the company, they know the culture, and they know what we stand for. So, goal number 4 is very important for us. (...) And to make all this happen, we do focus a lot on this goal number 17. With this... the partnerships, we can do this by ourselves. So, we work a lot together with a lot of different... could be schools, it could be the university, other suppliers, whoever wants to join in, we make a partnership." (PB)

"With the schools, we're educating our workers. We have more than 10% of our workforce actually come from school at the moment. What do you call that? It's the "praktik", the internship. And the schools are always asking companies to take these interns, and therefore we have a focus that more than 10% of our workforce has to be these young people in internships. And then we also work with the university if I have some projects where I can use people like you where they can work on a project either it could be a project within supply chain management, where we combine it with sustainability. We also have "dimittender", what do you call that in English? Graduates." (PB)

"So, this is how we work with the universities and schools, try to involve them because then we get the newest theory and we can develop faster that way." (PB)

This indicates that educational institutions are plays a vital role in the sustainable development in the construction industry. With new education helps break the barrier of forced-habbit thinking mentioned by Birgisdóttir and Madsen (2017) and Bygherreforeningen (2013). Secondly, specific education in the field – certification systems – can contribute to the evolution of the industry on the present and on the long-term.

"Yeah, and we have educated like 700 DGNB consultants in the last 7 to 8 years something like that. And I think that is maybe the biggest change we have made to the Industry (...) I think that makes a huge difference and we have educated people in the Industry." (LR)

"So, the advocation kind of comes along with that, because it's like a snowball effect, because if you start setting demands within the value chain of the construction companies, and then suddenly you now have the regulations backing you, then the snowball would just get bigger and bigger, and then the urge of knowledge in education will become bigger because this is the demand." (MV)

"So first off, I will say, I have no idea if it's even possible to get to the actual sustainable Industry because all buildings have an environmental impact and so, I don't think it's the end goal, I have no idea how to get there, but I have some ideas on how to get on the right path, how can we change today and become more sustainable, but, but how to get absolutely sustainable, I think that is for future generations to figure out." (LR)

With a educated scholars assisting with adapting the companies within the construction industry, means expanding the mindset of the companies and help see the possibilities such ass the effects of pre-certification, mentioned in Subsection 3.1.3 and the possible profit of investing in developing sustainable solutions (Dahlberg, 2019).

Networks for Sustainable Business Development Norddanmark

The contact with this organisation is brought in the first interview. In its role establishing the bridge between the different actors appears that it is the main concern to implement sustainability concepts among all stakeholders in all dimensions.

"I am working in the Network in all parameters: social, economic, environmental: all value chain of the Construction Industry. From building lords, architects, entrepreneurs... all. Now the focus is on the circular economy, and how to implement it. How the process is, how to document it and so on. The Network aggregates all the municipalities of the north region +130 members. Wide range: overall goal is to support the transition in the Construction Industry and Maritime Industry. All the value chain. Is to support business, municipalities and schools achieving a more sustainable approach. Presently working in different projects, e.g. circular innovation in partnerships: not only in one segment... must be all the value chain – for example, building lord for a social house administration is a semi-public consultancy firm, architects, the landlord. What is going to do differently in a renovation project. How to do with financing, demolish companies – by creating dynamics in the value chain." (MV) This is a field note from the interview that cannot be seen in transcription since there was a problem recording the first half.

There is a reference about an example of the active role related to education.

"Where they've been educated through what they call "Det Grønne Rejsehold" (the green travel team)... And we had three of these students or graduates joining the company for four weeks. And actually, we prolong one of the one of the graduates for four months. And then after that, we actually hired her to be our project manager for sustainable solutions." (PB)

Confirmed by:

"(...) The Green Travel Team. We support that for newly finished candidates and stuff like that. We give them a crash course in sustainability, they work with a case and then afterwards you know, our members of the Network can ask them to come out and work with the project that they have." (MV)

The purpose of the organisation is the assisting the companies within the construction industry. The organisation is a non-profit organisation, which means their efforts are not based on their own profitability. This indicates their focus on the influence, they can imprint on companies.

The State

In its purpose of establishing order, it is the issuer of regulations. It appears that there is no unanimity regarding the role of the State. If, on the one hand, the State is invoked to regulate in order to create a guide and commitment:

"And that's actually also what the building owners they expressed that they need the political commitment and of course, there is a general political commitment to this, but they request some specific requirements like in the building regulations and so on. Because if it's just voluntary, then it might be hard to get that commitment." (AG)

On the other hand, is called to take the risk when it comes to creating innovation in a sector where it is expensive to make mistakes by experimentation, and for that reason, so conservative.

"I think it would be really prudent if the national, the government would take on the responsibility of being the risk investor and say: "well, okay, we need to try these materials this production technologists in maybe in a small scale, but it's okay because we can, we can carry the risk and we don't need it to be the individual building owner who wants to make a single-family house or the social housing, a company that have a very, very strict economy, to build for..." (LR)

It can be said that the role of the State is somewhat diffuse, where municipalities and regions acquire the role of developer of new practices. This was mentioned by Birgisdóttir and Madsen (2017), Bygherreforeningen (2013) and Ingeniøren (2020):

"We see some of the municipalities and some of the regions... that the public as a driver for sustainable buildings is present but it's not from some central, from the government, from the state level." (LR)

Mentioned in Subsection 3.1.1, the new voluntary sustainability class is based on the DGNB certification system, to which it could indicate the affect the DGNB have had since 2013, where it was chosen as the best certification system for the Danish construction industry (Birgisdottir et al., 2010):

"You could, you can actually see the little, little snowball in the DGNB and how like how that's been rolling. That's been getting bigger and bigger, and then now it's taking on in the building regulation from the government to call it out. Up until, I think, it's 2023 they're gonna say it's volunteer choosing this class of the sustainability class. But it's the same as you saw with the energy class back in time, you know, that was volunteer as well, but then it became mandatory, and we became, you know, very efficient in building energy efficient buildings, you know? So so the snow, the snowball was probably the... I don't know if you can say it was the DGNB, but you can definitely see a track from when they implemented the DGNB and then up until, like today, where they're talking about a volunteer sustainability class." (MV)

The general public

The public is the one who will enjoy the built space and the buildings. It is also conceptually the most interested because it constitutes society. Its role is claiming its well-being and that of future generations. It is somehow achieved with awareness, which is based on information and education (CSR.dk, 2020).:

"And I think that just the general awareness in public has also been increased." (...) "So of course, I think more education because the first step of implementing is that, that the actors need to know the SDGs and know the, the concept." (AG)

Altogether, with the description presented, is intended to draw an image showing the network of relations and power of each of the actors that make up the network of the construction industry, as this project sees them and which can be called status quo. First, it is necessary to clarify that it was assumed in the beginning only one public landlord. However, respondents revealed that this should be divided into two:

- Public landlord: municipalities and regions
- Public landlord: the central State (as a promoter)

Then, in order to understand the differences in power, a score scale is built as presented in Appendix C.2. Its chart representation should look like the following Figure 4.1.



Figure 4.1. Actors score graphic as found

4.2.2 Actors power relationships

The actors that show higher power are education institutions, private landlords and municipalities and regions. Firstly, because they are training future workers and has the opportunity to foster interest and knowledge by applying time that companies do not have to seek innovation. Although it has been verified by the literature, that doing continuous research can contribute to finding new solutions. In this particular case, for example, the study of Birgisdóttir and Madsen (2017) presented in Subsection 3.1.1, when used in conjunction with the DGNB certification, helped to produce a new voluntary sustainability class to be implemented into the Danish building legislation. The private landlords, because they were considered to have a social responsibility, and have been the ones that most request projects. Mainly because they want to communicate to the outside, that they are not only concerned with sustainability but can demonstrate with documentation that they are doing so. The landlords resort to project certification also with a view to creating more value for the investments. Although municipalities and regions are apart of the state, they have some independence over investments, hence they have been differentiated from the central state. It has an inherent role in promoting the well-being of society and as such promotes projects.

With a score of seven are construction companies, consultants, architects and the state. As previously mentioned, the first three can be grouped, as they have a vast level of knowledge about the industry's procedures, each at the stage in which they are called to participate. Although they have much knowledge, there are still some barriers that prevent them from currently playing a more prominent role. Either because they do not yet have full knowledge of the SDGs or because tendering processes are mainly based on price, does not allow room for innovation and risk. The state as the issuer of regulations has a similar score because it has not yet been able to create more ambitious legislation. It is worth noting again the Figure 3.5 presented in Subsection 3.1.3, where it is evident that this ambition is well below the silver level of DGNB certification. Finally, it seems to fail when it does not accept the risk associated with the implementation of unconventional solutions or materials that can put companies business at risk in a sector so conservative.

Then with a score of six, the state as a landlord and the GBC-DK. The first seems to fail when it comes to investments and it was not possible to discover why or to what extent. Regarding the GBC-DK although it has been verified, that its influence is quite significant when observed, that the state will issue new legislation based on some parameters of the DGNB certification. Although its power is limited, since being an independent entity with voluntary certification. So, the power is inherently transferred to the entities wishing to have their projects certified.

Finally, suppliers with a score of four and the Networks for Sustainable Business Development Nordjylland with a score of three. Suppliers have, what is considered, low power in the sense that occupying a position in the supply chain be limited to being followers and are dependent on third parties like architects, consultants or construction companies prescribing their solutions. As seen in Section 3.1 suppliers are dependent in the requirements and objectives needed to achieve in projects. Another sign about the low power may be the fact that little reference was made by the interviewees.

Networks for Sustainable Business Development Nordjylland is embracing all actors. The organisation is considered helping companies and institutions work together by establishing

connections with sustainable concepts as a purpose. Since the purpose of the organisation is to both connect companies in between but also assist companies in sustainable development thereby achieving the SDGs, means their power lies within its influence.

The connections in the actors network can be depicted in Figure 4.2 where it is possible to see the network of relations (lines) and power (circles).



Figure 4.2. Actors network status quo.

4.2.3 Actors proposed scenario

Concerning a possible future situation, a scenario is presented based on the new legislation to come into force, namely the new sustainability class explained in Subsection 3.1.1. With the information gathered, it is possible to show how the actors in the industry should interact, and the power needed to have towards a paradigm shift based on a sustainable development. A score was estimated to the actors and compared to the one presented in Subsection 4.2.1 resulting from the findings. That score scale is built, and shown in Appendix C.2.

A chart representation should look like the Figure 4.3. Based on the relative power relations, it is possible to propose a potential future scenario that should exist to change the status quo to a permanent mindset. It can be seen as follows:



Figure 4.3. Actors Score proposed in a chart

Applying the same approach used to present the actors' status quo, this scenario will be made with the same sequence from those considered to have a higher power to those with less power.

The actors that would have a higher power are the educational institutions and architects, consultants and construction companies. These three are considered as a group of interest and with an increase in power from seven to nine. All are considered equally to have inherent to their activities acquired enormous amount of knowledge, that can be used to implement new sustainable approaches. Not only solving challenges but also benefiting the business. As seen in the status quo, companies are stumbling implementing sustainability and are, in this scenario, forced by the inevitable entry of the new sustainability class, there is no reason not to change the mindset and approach to sustainability. First, the tender processes will be built on this new regulation and is expected more investment in sustainable solutions, methods and techniques through all stages of the project, as seen in Subsection 3.1.1. Those concepts that today can be timid approaches can become part of the lexicon and practice in projects, such as cradle-to-cradle, recycling and upcycling or circular economy. Solutions that Danish companies are proving to provide helping progress with the green transition (Leth-Espensen et al., 2018).

With a natural increase in the portfolio, the demand to present new projects increases, which also leads to greater competitiveness to seize opportunities, hence an increase in power. For the interest of these three actors, it is essential to note that one of the current barriers to the adoption of a mindset focused on sustainability is removed, that of the tender processes being based on price. Landlords will be forced to recognise:

"then it's about changing the perception of the economy from short term to long term" (MV) $% \left(MV\right) =0$

The market today gives us some references such as *The Lendager Group* or *3XN*, as referred also by (MV), that could end being the exception to become the new normal. This project consider these three actors are the change agents. Concerning educational institutions, also with a power of nine, but increasing from an eight. Its responsibility lies in the training of new professionals, that must be conducted focused on sustainability. From the first levels of education, a new mentality must be implemented because history is full of good examples, where education has a preponderant role in this change. On the other hand, new mentalities associated with time availability and research capacity give this actor a primary role, considered a mindset changer. Lastly, companies with new targets on sustainability are seeking for new graduates for this new business opportunity.

Next, with a score of eight, it was sought to consider the two public landlords. The Municipalities and Regions maintain the same power of eight. The role played by this actor will be maintained since they must follow directives from the government and are constrained by the annual budget that depends on the amount released to regions and municipalities or other incentives like *green taxes*. There is much interest as also some competitiveness occurs between municipalities and regions for the title of "the greenest" or "most sustainable" which has been proved beneficial.

The state as landlord, with an increase from six to eight in power score. Commonly the state as a landlord is responsible for significant capital investments in projects of national interest. It usually requires large amounts of money, sometimes dependent on public-private partnerships. The public, the voters want to make sure that not only that money is well spent, but more and more in a sustainable way, in all three dimensions of sustainability as analysed in this project. By serving the community, the state can be considered the frontrunner in the sense of establishing the pace for other landlords.

Also with an eight and an increase from seven, there is the state. Its increase is due to this new approach in which it apparently becomes more ambitious when creating the new sustainability class. It should therefore bring regulatory requirements, closer to the levels of sustainable performance required by DGNB certification. The present big difference in ambition can be verified in the Subsection 3.1.3 namely by the Figure 3.5. It was considered the state is a silent actor, because it is not present, but imposes limitations or incentives like green taxes is the reactive actor by the reasons point of being behind the certification systems or even from industry community like seen in Subsection 3.1.1. Ultimately is also influenced by the voters.

Receiving a score of seven increasing from six is GBC-DK with its DGNB certification system. As saw in Subsection 3.1.3, a certification system aligned with the Danish construction reality will continue to attract the interest of other actors. It is not given more power because, as seen, it is an optional project solution. However it gains this power increase as it has served and will continue to serve as an industry guide, by creating more ambitious demands namely by offering a more understandable framework in the three dimensions of sustainability. Something that the SDGs do not have, thereby providing interest as a means of communication and credibility. Admittedly, it can be speculated to be able to serve as a guide to the state as legislator. It is considered the change driver once causing significant change in the construction industry.

The private landlords have their power reduced in this scenario from an eight to a six. This decrease is due to the fact of being forced to adopt new regulations - sustainability class. Still, while in the status quo, the power was on their side while in this scenario, their lose

the opportunity to change the criteria of the tenders, from price to sustainability. In this future scenario, their power is conditioned to having to follow the regulation.

With a given score of four maintaining the power level, there are the suppliers. Their low power is due to the position occupied in the supply chain limited to being followers. They are dependent on the group of those, who will be leading, the architects, consultants and construction companies that should be requesting and finally prescribing their solutions. Besides, its low power is also due to the competition between suppliers, in the sense that if one does not want to or is unable to evolve towards more sustainable solutions, other company can take its place. Due to the concept of competition, market opportunities are always filled.

Lastly, the Networks for Sustainable Business Development Nordjylland. They can be seen as those that help professional groups, companies, municipalities, educational institutions to work better together. Helping them with understanding their shared goals and plan how to achieve them, by establishing bridges. Their work will continue, aggregating all the actors with the role of being the facilitators. A final note expressing that the example of the Network in Nordjylland can be used elsewhere for the benefit of the industry. Their power lies in their influence.

The general public is outside this network of relationships but is nevertheless connected to it. Whether conceptually as explored in Subsection 4.2.1 or as a society in general impacted by all actions taken by different industries, governments, countries. They (us) have to be more and more individuals, groups, associations or the like, well-educated and informed. Knowledge and information is power.

In the end, no one receives a ten since the relationships should be of symbiosis and not of monopoly. So in reference to the Figure 4.2 and after the analysis of a hypothetical future situation, is presented the adapted Figure 4.4.



Figure 4.4. Actors network proposed

4.3 Incorporating the SDGs into the business

This section of the analysis are with the focus on sub-question 2, on how can the adoption of a strategy based on the UN Sustainable Development Goals, be used as a driver to implement the necessary changes in the construction industry and contribute to these same goals. In order to answer this question, two elements will be explored. Firstly, an analysis using the SWOT-method, on how the SDGs can benefit a company in the construction industry and the external positive and negative perspective from an industry viewpoint. Secondly, there will be an analysis on the SDG Compass, set forth by the GRI, UN Global Compact & WBCSD (2020) to encourage companies to adopt the SDGs into their business strategies in order to contribute to the change.

4.3.1 SWOT: The potentials of adopting the SDGs

The first element of the analysis is to explore, why any given company should invest into the sustainable development in the construction industry. The question is important, because despite sustainable development is to the aim and betterment of the societies, the individual business still needs to survive. In Chapter 3, the SDG was explored further looking at the progression of the SDGs, along with the realisation that the industry itself have pushed for a voluntary sustainability class, due to both the achievement of the SDGs but as well give an advantage to Danish industry in adapting to a growing sustainable development market. Showing that through the DGNB certification systems, it is possible to establish a common baseline and gain expertise and develop technologies to further push the contribution to the SDGs. That the Danish government is due to present a voluntary sustainability class further, but also give the Danish construction industry the chance to adopt to the new circumstances that is inevitable after the two year period.

In order to understand the possibilities of adopting the SDGs into a company's strategy, from the aspect of any given company within the construction industry, a SWOT analysis of that scenario is shown in Table 4.1. Before going into the analysis and its outcome, there is a need to emphasise the fact that the basis for this SWOT analysis is from any given construction company within the industry. Therefore certain aspects that is unique to, e.g. a consultancy company or a construction company, is therefore not part of this analysis. From the internal viewpoint, the strengths and weaknesses will be analysed. From the external viewpoint, there is both the aspect from the company itself but as well the industry, in order to take into account the macro environment, that will also be affected by the SDGs. The latter can be seen in Table 4.2.

Any given company:	Positive	Negative
Internal	Strengths: * Sustainability becomes a part of the company and its beliefs. * Employees will be more involved by their individual contribution. * Employees become part of the solution by implementing sustainability into their work. * A set of clear goals, indicators and KPIs gives direction. * Creates meaningful work. * Motivates workers. * Increase in knowledge / education on sustainability * Possibility to optimise internal methods and practices.	Weakness: * ROI can be hard to see in the beginning, especially if not the organisation backs it up. * Resources: Money, time, people, can be bounded through the implementation phase. * Can shift focus on existing goals * If not communicated correctly, employees might be confused or forced to accept change. * Lack of motivation can stop the integration / implementation. * Traditional / cultural thinking can be a limitation. * Potential increase in the burden of documentation. * Potential limitations through conflicting target goals.
External	Opportunities: * Increase brand value. * Transparency to stakeholders and relevant interests. * Attracts new talent and knowledge. * Development of existing portfolio. * Expansion into new markets. * New type of demands. * Advantage in project tendering. * Becoming a leader in the industry. * Creating competitive advantage.	Threats: * Binding capital investment for a period. * A shift in focus, can result in competitors taking a larger market share on the existing market. * Conditions of the value chain can change. * Cost increase on materials, products and services in the beginning. * Chance to be perceived as "Greenwashing".

Table 4.1. A SWOT analysis, exploring the potential of adopting the SDGs into a company in the construction industry. Internally it is looking into the strengths and weaknesses effects by adopting the SDGs and externally on how the SDGs affect the opportunities and threats generated by adopting the SDGs.

Strengths:

By adopting the SDGs into a company's strategy, thereby creating a change in its business, products, methods amon others, in order to contribute to the achievement of the SDGs, results in a change of a company's vision, values and mission (VVM) statements provide direction for everything that occurs within the company. This states where the company is going and whats it trying to achieve. This also affects the values of each employee, since the values dictates, how people are expected to behave.

The next internal strength follows the values, since the values dictate how people are expected

to behave and conduct themselves, means that each employee will be more involved in the company's change of adopting the SDGs. Studies show sustainability is becoming more and more a concern for everyday citizens, both in how they live and their consumption's habits (CSR.dk, 2020). Meaning that the employees already have an incentive to assist and promote this behaviour in the workplace. Creating a more meaningful workplace, that in turn creates value for the company. It can be argued with the concept such as Corporate Social Responsibility (CSR), the public is informed of a company's effort to contribute to the SDGs, but as well fulfil the expectations of stakeholders, since sustainability is a concept that is becoming more in focus and in the future mandatory.

Through adopting the SDGs into a company's strategy means in order to fully implement the SDGs and thereby change the company's methods or products, the concept of change management is needed. Depending on the company, change management promotes to involve the employees in different stages but also encourages to be innovative, e.g. in the process of optimising of the workplace (Burnes, 2004). This enables the individual employee to not only assist with the the used methods but also quality of products.

In order to have a clear strategy, a set of appropriate goals and indicators needs to be set, to both track and trace the development within the company. Depending on the choices of which indicators adopted to evaluate the progression there is the possibility to provide a more concrete and in depth view on the SDG contribution along with enhancing the public image of the company.

Through meaningful work, motivation is provided to the employees of a company. There are several studies and authors who theorise on what creates motivation in the workplace. The most common distinction is the relation between Maslows Pyramid and the needs of humans. In this theory, every human has a need for self realisation, self-esteem and social interaction. These three needs, can be in various degrees, be fulfilled in the workplace, depending the work, responsibilities and the creative space. A different approach to the motivations factors is done by Herzberg (1974), who studied the two-factor approach to motivation workers. He suggest that through the work itself, recognition, growth, advancement and responsibilities promotes the motivation. Elements experienced in various degree for every employee, but in this case the value of the work itself is important since this is a common and unified concern and the efforts of the work is contributing to the achievement of the SDGs.

As stated by interview with Anne Gade in Appendix B.2, concerning what is necessary to achieve the SDGs:

I think education is really important. And I think that we need to have a focus on that, in our education. And I think we have very much focused on this. But that's the first point and also as a practitioner to say that they don't have time, then they need to hire some of the students that are just getting out because they just had a lot of time to study this (...) (AG)

Its evident that the education system has a focus on sustainability with the increasing studies related to sustainable construction and that newer generation of educated scholars, having both the knowledge and means to help business, e.g. achieve more sustainable methods (Udomsap and Halinger, 2019). By having the focus from the industry as well, would mean a more

dedicated education system to assist with the progression of sustainable development. This is also mentioned by (PB), when talking about developing faster through enlisting, e.g. internships or graduates from the universities:

(...) this is how we work with the universities and schools, try to involve them because then we get the newest theory and we can develop faster that way. (PB)

Weaknesses:

Its given that with any investment made, a ROI is expected. Depending on how the implementation phase is executed and every relevant employee has both understood the process and is engaged, the return rate, the amount or the period of the investment can vary, if the organisation and its employees do not support the investment through their work or efforts.

Through changing a company's strategy and its resulting operational change, means that an investment in this endeavour can be bounded to specific things, developments or people, depending on what choices in the strategic development is made. Especially the implementation phase can be expensive, depending on the level of investment that is made, since the current operational activities both can be disturbed and the transition to new operations activities will take time to both be acquaintance with by the workers but as well as understanding the new routines and operations.

In the case that an implementation is successful, the process of creating a strategy, setting new goals and correlate relevant indicators to track the performance, can set aside existing goals. The SDGs are no small element, the SDGs present a sizeable business investment, which means that existing goals amon others, can be either set aside or reduced in order to have more focus on the SDGs. Depending on the specific company and type of actor, this change of direction can have an negative impact if not handled correctly and appropriate.

Its imperative that the newly constructed strategy is explain and understood by all, in order to have a total effect in all the operational levels of a company. With the basis of the VVM, the expected progress with both implementing the strategy into operational understanding and the efforts to produce positive contributions to the SDGs and the company itself is neglected. This can potential result in a drop of motivation, if the employees are not taken into consideration and are not included in the process, especially if the employees are forced to accept change. This in turn can decrease the pace of the implementation. Therefore it is essential to communicate clearly to the employees in order to achieve the optimal conditions for everyone to understand the change in operations and help the implementation to become successful. As stated in the interview with (PB) in Appendix B.3, about the question of the barriers considered currently existing and the solutions the answer is related to his own business:

So, say we've overcome this, is this just something that we are trying for a short period? No. Now, people, they know this is this is it's part of our strategy now. So, people, they know that we were working on this and it's a very, very important focus for us. So that's actually the first barrier. So now I have all the project managers they know this is this has to be part of the construction site, so they're working on it, but I still need to have this project manager with the only gold To make sure that we have the most sustainable construction site in the northern part of Jutland. (PB)

Traditional thinking or habit-forced thinking is mentioned both by (PB) and Bygherreforeningen (2013). Limiting the cooperation process towards a sustainable progression in construction and renovation. The typical and traditional way of dividing the workforce into hierarchies and different craftsmanship's is setting boundaries on the sustainable progression throughout all the building phases. This attitude exist because known solutions are deemed economic for the construction or renovation, compared to a innovative holistic approach in the building processes. As stated in interview with (PB) in Appendix B.3, when answering a question related to the identification of challenges that are more significant then others due certain barriers:

I think... I don't know if it's if external barriers are bigger than internal barriers, I can just see that it's not part of the mindset of the people yet. It's still something that they have to, I need to remind them all the time. I think this you know... it just goes in your own apartment or your own house where you live. Why do I need to do something because I'm just one person out of 6 million Danish people, the world doesn't matter. It doesn't really matter if I make a change, but it actually just start by yourself. If we don't start some, if we don't all start at the some point, nothing will ever happen. And I think people in TL BYG, the workers are still where they think, well, it's not gonna matter if TL BYG is the only construction company doing this. But we need to make the... we need to take the lead and show by example. And actually I, I, can hear now that more and more about workers they actually think this is... this is really cool. (PB)

With the suggestion by Birgisdóttir and Madsen (2017), that a baseline is the first step towards a unified progression with sustainable development, pointing out the work done with the certification systems DGNB, Despite the beneficial potential of the DGNB certification, the fact is the way it is made produces potentially more documentation document than needed. This has been stressed by both Birgisdóttir and Madsen (2017) and InnoBYG (2020).

The last potential weaknesses is the potential limitations through conflicting targets. Depending on the existing goals and the newly set goals, related to the SDGs, then the different targets can be of conflict, e.g. a SDG of reducing CO2 footprint through reducing paper usage, but an existing goal is brand advertise in universities through posters or paper-handouts.

Opportunities:

Through adopting the SDGs into a company, there are a number of opportunities to capitalise on. Firstly there is the option to focus on the brand of the company. Since the concept and effects of sustainability is a well discussed subject both in public and private setting, then there is a branding value that can benefit a given company greatly. The effect can have a notable magnitude, since the world is more connected than ever, through social media and a positive branding can greatly help the company.

The effects of a good branding have several benefits. Firstly through the company's indicators, a company can in detail show the progression and contribution towards achieving the SDGs, which in turn can help the relevant stakeholders and interest groups to evaluate the progression and compare to the expectations set from the beginning. Depending on the chosen indicators and goals, the transparency can greatly affect the trustworthiness of a company. Through a good brand, new talents and attention can be placed on the company. With the newer generation

of educated scholars, having the newest knowledge and technology, can be a great benefit for a company who keeps investing in sustainability. This in turn creates awareness about the progression of a company, to which the possibility such as a partnership with the purpose, e.g. creating new methods, tools or materials can give an advantage or set the agenda on a national scale.

With the inevitable introduction of a sustainability class, it is clear that this also is an opportunity, since the first two years it will be voluntary. It is an opportunity for developing a company's existing portfolio of products, services and expertise. Through development it is possible to expand into new markets or move to a more profitable market unbeknownst to a company. With a changing industry, a new set of demands may occur depending of the development and the actors. Through sustainable development, it is possible that with new demands a company can gain an advantage in the tendering process, because the company can produce a specific sustainable solutions. As stated by interview with (PB) in Appendix B.3, when answering a question if the actors in the construction industry recognise either the need or the opportunity in adopting solutions aligned with the SDGs:

I saw this for more than a year ago, and that's why we've been focusing a lot on it, and I can see now that people are contacting me because of they... "Oh, we can have this very sustainable construction site where we reuse recycle more than 90% of all the waste." So, this, so... I hope that people, and also the industry can see that what we're doing is actually we are trying to change the game plan. (PB)

Threats:

The first potential threat to mention is the investment needed to adopt the SDGs into a company. Depending on what kind of company it is, which role they fill in the industry and from where came the profit, a large investment with a long-term ROI can be dangerous, because, e.g. a lawsuit or damages where the company is liable and are not able to reimburse the amount due to low liquidity. Speaking in economic terms there is also the fact that a shift in focus, e.g. a stable and low cost profitable product is performing poorly in a market due to the focus on sustainable development, gives the opportunity for competitors to expand their market share.

With the sustainable development comes the potential need for the value chain behind a product, to be reevaluated in order to comply with the new strategy and VVM. Depending on the product, this can have a lasting effect that the product cannot be produced, e.g. if components does not comply with the new regulations or SDGs and new technology is needed to either upgrade or replace the component. With the focus on the DGNB, where a potential demand dictates that the needed materials needs to originate from the local area, means potential compromising the value chain.

These conditions of the value chain can also dictate new methods, meaning that the product can be produced but the cost of this method, materials and services might change, thereby increasing the overall cost and reducing the profitability. This could be a reality in the beginning, until the companies within the industry catches up and adapt to the new methods, products or services used.

Lastly there is the element of bad branding, which can result in "greenwashing". Knowing that sustainability is a nation-wide concern, means that both the public and private sectors

will react negatively if any company takes advantage of a green image without being able to provide evidence or substance to their presumably efforts of being "green". A notable example of a greenwashing scandal is the Volkswagen scam in 2016, where the company had installed software to manipulate the data about harmful particles emissions, while proclaiming their highly environmental-friendly properties (CSR.dk, 2018).

With the completion of the SWOT-analysis from the perspective of a given company within the construction industry, there is the need to analyse the perspective from the construction industry itself, since the changes related with the SDGs will affect the macro environment. In efforts to analysis this perspective an continuation of the SWOT is made, consisting on the external aspect regarding the opportunities and threats that could occur with the integration of the SDGs into the construction industry. This can be seen in Table 4.2.

For the industry:	Positive	Negative
External	<u>Opportunities:</u> * Helping the acceptance-agenda in society. * Collaboration between different actors or competitors in the industry. * Unified effort to brand the Danish industry on a global scale. * The limitations in the market, can easily change.	<u>Threats:</u> * Mandatory change of the industry. * Possible change of the tendering processes. * The sustainable development can dictate the new methods or procedures. * Different competitors can affect the change in the industry. * Attraction of new actors to the market.

Table 4.2. An continuation of the SWOT-analyse, showing the external aspect regarding the opportunities and threats that could occur with the integration of the SDGs into the construction industry.

Opportunities:

Despite the current research and development within environment or social standards, there are still people that believes that, e.g. global warming is a hoax. By having a focus on sustainability, forces certain discussions to be conducted in a nation-wide scale. This in turn can create more funding and interest in exploring sustainable development even further and thereby eliminating any doubt that could exist through scientific research and methods.

With the change of the industry, certain opportunities can occur, e.g. collaboration that used to be unimaginable could become a positive partnership that in turn can give a positive change to the industry. In an effort to promote the Danish construction industry as a Brand, InnoBYG (2020) encouraged the Danish government to pursue the sustainability class, in order to promote sustainable development in the industry. To force a necessary change, so business within the industry can adapt and develop new knowledge and technologies to capitalise on a growing global market for sustainable solutions as stated by Dahlberg (2019).

With a controlled transition of a voluntary sustainability class into the building regulations, creates room for adjustment and changes in the period where the sustainability class is voluntary. This gives opportunity to any company set the direction and push an agenda in order to gain a competitive advantage, thereby making it possible for changes in the limitations that exist within
the market. Taking into account that the industry itself will be changing, there is also a survival element to the opportunity in order to keep being profitable. Through the interviews conducted, see Appendix B, all participants mentioned that adapting to the new market and demands are indeed a question of survival.

Threats:

From the aspect of the industry, with the sustainability class becoming a mandatory change in the future, can be a threat for some companies. As already mentioned, all participants in the conduced interviews in, see Appendix B, mentioned it is a question of survival. So, companies are forced to adapt to the new change, but are encourage to see it as an opportunity since the potential market is both large and growing.

With a change in the industry, means the potential change on how the tendering processes work. Since the tendering process are the bedrock from which companies gets a project, it is inevitable that the tendering process will also be affected by this, e.g. with demands related to the sources of the materials, the level of usage of the local area, specific sustainability tools or methods used, in order to qualify for biding options. With this change it is given the opportunity for companies to join partnerships, e.g. in order to develop new technologies or methods. This could be a threat, because competitors can affect a change, e.g on how projects or methods are being conducted, that later on can be regulated and be forced in by regulations.

With the changes and the fact that there is a growing market for sustainable solutions, means that the market itself can be attractive to expand into. In short, other actors may access the market due to its potential profitability and compete for the current market share thereby becoming a threat for other companies within the construction industry.

4.3.2 An analytic look at the SDG Compass

This section will first describe the general basis of a strategy, to which the SDG Compass is compared with, where each step will be analysed in order to understand its usability as a strategic tool, ending with a general overview.

Organisations are inevitable both diverse and complex with various internal organisational structures, objectives and values. But a unifying element in any company is the decision making process (Bryson, 1988). In the process of formulating any organisational decision, the direction and effort will be guided by the company's strategy. Johnson et al. (2017) define a strategy as:

Strategy is the direction and scope of an organisation over the long term, which achieves advantage in a changing environment through its configuration of resources and competences with the aim of fulfilling stakeholder expectations

Johnson et al. (2017)

Developing and formulating a strategy, means to have an understanding of the company's current strategic position, deciding strategic choices for the future and then managing that decision. This process is called Strategic Management (SM) (Mintzberg, 1987). Trough SM, it is possible to sort a range of possibilities, in order to highlight does which proves most promising and valuable in

both a short and long term perspective (Rasche, 2008). Strategic management has traditionally been conceptualised as part of the *Dynamic capabilities* framework to achieve a competitive advantage. The premise for the framework rest on that SM is in essence a method for accessing an organisations strategy and assets, in order to achieve and maintain a competitive advantage in business environment. Strategic management can specifically be used to reconfigure external and internal factors, thereby having the company to be successful despite dynamic conditions (Teece et al., 1998).

It is prudent to emphasis that the literature on SM, depicts several methods and processes for companies to develop strategies, depending on their core business, goals, financial status and products amon others, and despite the nature of each method of development, there is a unilateral process and key phases in developing a given strategy, supported by Barney and Hesterly (2018), Hubbard et al. (2011), Gamble et al. (2015):

- Defining phase: objectives of strategic importance and priorities are discovered and defined.
- Development phase: creation and evaluation of strategical roads to achieve priorities.
- Implementation phase: one or more selected strategies that is then executed and monitored.

In comparison with the SDG Compass, seen in Figure 3.9, then a similar pattern exist. Step one-two is about understanding the SDGs, followed with a process of defining priorities. Step three is about setting goals depending on the priorities set. Step four-five is about integrating the selected strategy and monitor the progression. Step two-five then act as a repetitive process.

Step 1:

This step is to understand the business case according to GRI, UN Global Compact & WBCSD (2020), through identifying future business opportunities, enhancing the value of corporate sustainability, strengthening stakeholder relations, stabilising societies and markets and capitalisation on a unified understanding and language. Identifying future business opportunities could be, e.g. innovative technologies in energy efficiency, meeting new demands and expanding into new markets and substitute traditional production methods in order to reduce waste and energy consumption. Enhancing the value of corporate sustainability, through integrating sustainability choices in the value chain and production, thereby protecting the created value by, e.g increasing sales, new market segments, brand recognition, improving operations and encourage innovative processes.

This is secured further by the global efforts of government to push forward the SDG agenda through, e.g. taxation for business on a lack of efficient production and waste reduction, thereby strengthening the economic incentive to pursue more efficiently production methods or sustainable alternatives. Alternatives could be, e.g. increased focus on sustainability to attract the younger generation and new talents, through a moral transparency and engagement with the SDGs, resulting in affecting the consume in their purchasing decisions.

Strengthening stakeholder relations through the enforcement and efforts of pursuing the SDGs contributions and thereby accommodating any future policy direction from international, national or regional levels, and gaining trust with the stakeholders while reducing legal and reputational risks and most importantly, building resilience against requirements or cost imposed by future legislation.

The last two elements are from a business perspective prudent to the extent that by business collectively pursue this agenda, helps improve the transition in the betterment of societies and business operations, and capitalising on the unified effort of pursuing the SDGs GRI, UN Global Compact & WBCSD (2020).

Step 2:

This step describes a practical example of mapping the SDGs possibilities in a company's current value chain, see Figure 3.10, and how to select indicators in order to monitor and track the data, see Figure 3.11. The aim of the mapping method, is to isolate the possibilities for large sustainable impacts in the value chain, where it is encourage to look beyond the scope of a company assets, where sustainable input are possible up or down stream of the value chain. Through examining each segment of the value chain and identifying areas such as core competencies, portfolio and technologies can contribute to the SDGs and activities across the value chain, where current or potential impacts may occur in a positive or negative outcome GRI, UN Global Compact & WBCSD (2020). The selection of indicators, assist with isolating the relevant data that helps a company to concentrates its efforts. The aim is to select indicators that show the relationship between the companies activities and the sustainable development, in the efforts of tracking the performance over time. Despite lack of indicators mentioned by SDG Compass, it encourage the company to select the relevant one for their usage through a search tool on their website. In order to identify the relevant indicators a logical model is used, to assist a company in this selection. This correlates with Mintzberg et al. (2014), about positioning and locating the core business in the value chain among and distinguishing the core business, that enables the company to achieve competitive advantages, as parts of the core elements to a strategy.

Step 3:

This step is about determine which goals to pursue that are aligned with step 2 and defining the relevant KPIs through a baseline for each selected goal. The SDG Compass presents two methods of setting goals and recommends at this stage to allocate an appropriate level of ambition towards the achievement of these goals. Can result in a potential increase of any value-activities or innovative processes in order to reach these goals. The SDG Compass does not give specific KPIs to follow or adopt, but encourage the companies to select the relevant ones from a search tool available on the website where the SDG Compass is placed. With the ending of step 3, then follows step 4 about an integration phase. This presumes a strategy has been formulated at this point, but the SDG Compass has not incorporated any strategic or making tools at this point, that helps a company to select a suitable strategy. Compared to the work done by Mintzberg et al. (2014), the core elements to a strategy also involves elaborating, extending and reconceiving the core business that focuses more on the external factors, e.g. market development, geographic expansion, entry and exit conditions among others.

Step 4:

This step is about implementing step 2 and 3. Through active leadership and creation of a shared understanding of the progress of reaching the sustainability goals that creates value for the company, through clear communication of the business case and the benefits of the strategy. The SDG Compass gives an example of this. This was mentioned by (PB), as an important element to support a sustainable implementation:

(...) you need to understand I'm the CEO of the company, and it stuck with me. So I need to make sure... it's not, it's not an option for me to say, Okay, we'll, we'll relax for a couple of months. As soon as I do that, everyone will say then it's not important anymore. So I keep the focus that every single day we talk about sustainability. (PB)

The sustainable development should be embedded with a company's integral part, financial strategy, operation goals, productivity and sales efforts, for the implementation of the SDGs to be most effective. In addition the SDG Compass also encourage to explore partnerships with other companies or governmental organisations through, e.g. value chain partnerships to improve internally, sector initiatives to raise new standards or practices and multi-stakeholder partnerships to handle complex nation-wide challenges. This is also supported by (PB), when asked about if it was a matter of survival of adopting the SDGs into the business:

Actually, I think yes. But that's because I have a very big focus on on the goal number 17, which is partnerships, and you can't do anything yourself. You need to partner up with the right companies in order to to move forward. And I think if you see that as an opportunity, there are so many solutions in working sustainable, that will make you a lot more efficient. (PB)

This step does not give specific methods or tools on how to ensure the "good" implementation transition, but highlights important elements to the process. Through the example the SDG Compass displays, gives an understanding of the thought process regarding the implementation but not a definitive guide.

Step 5:

This step is about the monitoring and reporting data to the strategy. Through step 3, the goals and the correlated KPIs where chosen. The SDG Compass encourage to have a focus on material issues, which reflect the company's significant environmental, social and economic impacts. The reason behind the encouragement is that it is likely to be correlated to the chosen strategic priorities in step 2. When reporting both positive and negative results is advised to be displayed, because that gives the opportunity to address the result and what could be done to change the curve along with how the company can utilise its core business to further contribute to the achievement of the SDGs. The SDG Compass presents a mapping matrix, to structure the significance of the sustainable impact versus the influence on the stakeholders, decisions and assessments. Through the SDGs, reporting the performance of the company capitalise with the common understanding framework language that the SDGs provide, ensures a common dialog with stakeholders. The reason behind the lack of a reporting phase could be that, through the SDGs, it is possible to increasing brand value, gain trust through transparency between stakeholders and the company, and capitalise on the fact that sustainability has become a central piece of focus within the construction industry.

With the analytic look into the SDG Compass it is clear that certain elements are missing, if the SDG Compass is to be used as a tool to adopt the SDGs and formulate a strategy based on the SDGs. The SDG Compass gives a generalised look focusing on the internal elements of the company, such as the intentions in the VVM, the competencies, the capacities and the resources. When taking an overall perspective of the SDG Compass an analogy can be made with the PDCA model and the DMAIC model in management.

PDCA:

This model consist of four stages: Plan, Do, Check and Act. The model in short, first try to isolate either a problem or an improvement opportunity. Based on this a plan is made. Secondly the plan made is then tested. Thirdly is to analyse the results from the test, checking if the problem is solved or an improvement has occurred. Lastly the plan is then implemented. If the plan did not work, then it becomes a repetitive process of going through each stage again.

DMAIC:

This model consist of five stages: Define, Measure, Analyse, Improve and Control: The model in short: First stage is about defining the problem or the possible improvement. Secondly to measure the magnitude of the problem or possible improvement. Thirdly analyse the origins of the problem to understand its extent. Fourthly is about how the problem could be solved or the improvement be done. Lastly is measuring if the problem actually is solved or an improvement has occurred. It that has not happen, then it becomes a repetitive process of going through each stage.

When comparing these models to the SDG Compass, it becomes clear that despite all three models are a repetitive process, the PDCA and DMAIC models purpose are different to the SDG Compass. The models provides a simple structure to either solve a problem or improve something. While the three models are not exactly the same in its core, but the approach is.

CHAPTER

5 Discussion

In this section the findings of the analysis will be discussed. The corresponding sub-questions are listed below along with the research question.

Sub-question 1:

How can the UN Sustainable Development Goals be used to encourage companies and actors to understand the process and the full extent of sustainability needs, as a permanent mindset?

What is evident from the actors network theory analysis, is the change in the power difference but also the potential future of the different actors and their individual power for changing the mindset in the construction industry.

The first element to mention is the choice on focusing on the power and not the influence as well. The aim is to change the construction industry and through the analysis we got the current and future ANT, see Figures 4.2 and 4.4, and it is clear that if any actor move towards the SDGs, then every actor will be eventually affected. Therefore, it was more prudent to identify the actor's power relations, although the influence is an important element but in this project is considered a consequence of the power. Through the relations of power, it was possible to put actors into groups and classify their change-capabilities upon the construction industry.

The second element to mention is the basis of future ANT. After the first interview round, follow up questions were sent to the interviewees to ascertain some of the findings and to support a possible future ANT. No feedback was received by reasons out of control from the research, but probably due to those presented in Subsection 2.1.2. Therefore the future ANT is based on assumptions and estimations from the researchers.

A third element to be mentioned is related to the absence of interviews with certain actors, such as architects and suppliers, meaning that not all actors in the network have been explored. However, its power was understood by the opinions of the interviewees. Based on the findings of Figure 4.4, it is interesting to mention that the architects, consultants and construction companies are classified as "change agents". They act as catalysts for change, since they will hold the expertise and the knowledge of sustainable development in the future and are therefore better equipped to assist the landlord in the decision-making process. Through this assistance, the landlords could see the benefits and pursue a certification process, to which sustainable development can be integrated into early stages of the projects. With the sustainability class becoming mandatory in 2022, then it would be imprudent not to pursue a DGNB certification system since the class is built around it. With the mandatory legislation, the power of the private landlord would decrease. However the public landlord would not decrease in the same degree, since the State would pursue sustainable development, and they represent the general population. It is all connected, and with the sustainability class incorporated into the building legislation, then the change and mindset of the actors in the industry will be affected.

Sub-question 2:

How can the adoption of a strategy based on the UN Sustainable Development Goals be used as a driver to implement the necessary changes in the construction industry and contribute to these same goals?

Performing a SWOT-analyse revealed the different positive and negative internally and the opportunities and threats externally, based on how could be a potential reality if any given company were to adopt the SDGs. So, the SWOT is, in short, the first step in producing a valid business plan, that builds on the SDGs, to which the SDG Compass is promoting indirectly. The difficulties with performing a SWOT-analysis is the relevance becomes more clear, when using a specific company. In this project, such has not been possible due to the industry-wide approach declared in the problem statement. Therefore the content of the SWOT is prudent to some companies and for others insufficient. The method used for the SWOT is a combination of a brainstorm and the interviews conducted.

Since the interview was not structured to enlighten a SWOT-analysis, then that analysis could only be supported to a certain extent. Despite this fact, the content is still deemed to propose a certain reality to the position that the adoption of the SDGs can give to any company. What is clear is the fact that all interviewees agreed that, adopting the SDGs, is not only to stay competitive but a matter of business survival. Therefore, the first question to be considered by any given company is positive and negative possibilities of adopting the SDGs. What is evident is the branding value of the SDGs and the increasing expectations that are related to sustainable development.

For the adoption of the SDGs into the core business, it is necessary to select the relevant goals and the corresponding KPIs in order to show the contribution towards sustainable development. Such is beneficial in two ways: the first is regarding the fulfilment of the stakeholder expectations and interests and the second, the branding value towards the public, the potential new employees and most important the new potential clients. Through the concept of sustainability, there is the opportunity to effectively unify the company's employees, since sustainability is a common subject in the public and private setting. Thereby encouraging the innovating process and actively incorporating an SDGs based strategy in the employees work. What is not clear through the SWOT-analyse is the needed level of capital commitment. Even though literature review revealed the existence of a large potential in investing in sustainable solutions, technology and practices, there are still risks involved

From the literature review concerning the SDG Compass, in Section 3.3, it was revealed that its usage as a tool can be beneficial. Based on the SDGs, the tool provides direction on how to locate, isolate and improve a company's value chain, that is aligned with the aim and the goal of contributing positively towards the achievement of the SDGs. However, through the analysis, it became clear that it can not be used as a tool to formulate a strategy, to which any future choices is based on. A comparison to the PDCA tool and DMAIC, showed the tool itself to be a mapping tool to improve the current system for the betterment of the company. In this case, the betterment was towards a company's contribution to the SDGs, its branding value and its competitive advantage of being able to have a more sustainable approach. Therefore its intended application is questionable since its usefulness is for the short-term perspective. Therefore, if a company is ambitious to pursue a sustainable long-term development agenda, it must be based on a strategy. So, it can be argued that the SDG Compass can be used as the initiative, and act

as the drive for the individual company to pursue a strategy for sustainable development.

Concerning the ANT-analysis in Section 4.1, it can be argued that the different actors can benefit from the SDG Compass to various degree. From the suppliers perspective, this proved to be a vital tool, since suppliers might not have the capital, in order to commit to a whole new strategy. Instead, they can optimise their value chain, and help win bids in the tendering processes. Other actors such as the landlords (private and public) could benefit from the tool, but not in a large degree towards the processes within the construction industry since they are the frontrunners. The main benefit SDG Compass is the understanding of the SDGs, to which it can act as a driver. To inspire or clarify the benefits for the landlords in investing in a sustainable construction project. From the architects, consultants and construction companies perspective the alignment of internal core competencies and, considering their amount of power in the future scenario, see Figure 4.3, is an opportunity to strengthen the core business. Lastly, it was seen in the Subsection 4.2.1 that some of these actors are still having difficulties understanding the SDGs so, an opportunity is given by the tool to get to know them and clarifying which ones should be elected to align the core business.

The main research question:

How can companies from the construction industry become leaders in sustainable development, by adopting a primary focus on the UN sustainable development goals?

Through the findings of the analysis, the SDGs provide an insight and prove the need for a sustainable development. Through the encouragement of both the UN and the Danish construction industry, there exist a drive for change both through the SWOT-analysis and the literature review. This drive is based on all dimensions of sustainability and in the last decade sustainable development has been in focus. Despite this fact, most companies within the construction industry has not been able to align their strategies with sustainable development, due to a nonexistent common baseline and operational experience converting sustainability contributions into a competitive advantage into the business. Through the analysis four aspects are of importance in order to change the mindset of business within the construction industry and thereby through actions, companies can be recognised as industry leaders. This can be seen in Figure 5.1.

The first aspect is the educational investment on educating the new generation of scholars and support more research of sustainable development, in order to assist companies in both optimising and developing new products, methods and services and give the opportunity to align the company's with sustainable development. Through the literature review and interviews showed, that sustainability are gradually affecting the tendering processes, through a focus on sustainable development solutions being integrated in early stages of building projects. This change comes primarily from public landlords, which is not a surprise due to the government and the municipalities attempting to promote a sustainable change with public projects and legislation. Increasing the demand for sustainable development solutions will either force or convince companies to incorporate the SDGs into their business, to which the SDG Compass is a great tool to optimise the value chain. Yet, aligning strategies with the SDGs can create long-term investment, creating potential competitive advantages. Through a common baseline of how sustainable development is measured in building projects, the DGNB certification system provides insight and structure with a general approach to environmental, social and economic dimension to follow, thereby reaching not only current building regulations but also levels of high sustainability performance, to the benefit of both landlords, users and society in general. This is recognised through awards by the GBC-DK, Dansk Byggeri and other interest group and recognised especially by the public through the transparency and exposure of the companies contributions towards achieving the SDGs. With the recognition a company gains great branding value and attracts more clients and new talents. Through this process a change in behaviour will be observed and a further increase in the awareness of the SDGs and the benefits of adopting a focus on the SDGs.



Figure 5.1. Cycle for a permanent mindset change.

Some relevant considerations can be highlighted. The construction industry is a system that is historical focused on the economic dimension, meaning that a change on one dimension to consist on all three dimensions of sustainability, which takes time to adapt to the sustainable development agenda. The companies within the construction industry needs to maintain a stable income while adapting to the SDGs, in order to sustain themselves through the transition period e.g. for their short or long-term sustainable development investment to take hold. Actions to help this transition could be, e.g. through programs of internships to benefit from newly graduated people in sustainability and fresh knowledge coming out from educational institutions. Furthermore the four aspects explained does not necessarily work in a specific order, but it is the essence in each aspect that is important and how actions are affected by the four aspects.

With the ending of the discussion, it is now possible to present an answer to the main research questions that will be made in the following chapter.

CHAPTER

6

Conclusion

As it turned out, it is no longer possible to keep the pressure on the environment in the way it has been done so far. Not only because the planet cannot support what humanity imposed on it, but also because of the inequalities in societies resulting from the imbalances in the fair distribution and use of resources, explored in the introduction. On the other hand, the economy must find new ways to balance the three dimensions presented in the definition of sustainability adopted by this project: environment, social and economic. The Sustainable Development Goals are used as a guide, since representing a collective agreement of the members of the UN in the search for this balance.

The construction industry, the case in hand, proved to be one that has contributed with the most significant impact on the environment, but has inherently the capacity and opportunity to promote the balance with the UN SDGs in perspective, showed in the literature review. Denmark is one of the best examples in the search for a genuine green transition, and this commitment makes it the number one worldwide, having the highest likelihood of being successful achieving the SDGs. However, the goal is still far from being achieved, so measures are continually being implemented. Considering legislation, a new sustainability class is already in trial period to become mandatory by 2022, explored in the literature review. Findings indicate that this is a result of influence both by the DGNB certification systems from GBC-DK, and the willingness of the actors from the industry. Thus, translates the opportunity to carry local measures to globally required ambitions.

Therefore, the application of the actor network theory, used in the analysis, allowed not only the characterisation and identification of the power of each actor, but also the potential future power to promote the changing in the mindset. Trough a SWOT analysis the internal different positives and negatives and external opportunities and threats were revealed, based on the perspective of the adoption of the SDGs by any given company. The outcome revealed an incentive to pursue SDGs.

Furthermore, it is concluded from the analysis of the SDG Compass that its purpose to formulate a strategy is incomplete. Yet, the analytical approach showed that the five steps could assist a company to align its internal business with the SDGs, thereby locating and implementing sustainable solutions within its value chain. A comparison was made with the PDCA model and the DMAIC model, due the overview point of sharing a similar structure of repetitiveness. Despite their similarities, the SDG Compass address the organisation itself through its VVM and core beliefs in order to implement the change.

Altogether, the SDGs provide insight and the need to pursue sustainable development. Allied

to the ambitions of Denmark, there exists a drive for change based on all dimensions of sustainability, mentioned by the interviewees. Nevertheless, a significant amount within the construction industry have not been able to align their strategies with sustainable development, due to a nonexistent common baseline and operational experience that could help to convert sustainability into a competitive advantage. A proposal is presented where the actors create a cycle for a permanent mindset supported by drivers and actions to change the behaviours, being the outcomes permanently giving feedback in order to promote the necessary adaptations for a continuous change of the context. If some companies become recognised as leaders in sustainable development, others have to follow their example to progress and stay competitive, which will consequently lead to a paradigm shift of the construction industry.

CHAPTER

Further Studies

As pointed out, this project has not focused on change management. Despite having some relevance, this project focuses on how companies can be recognised as leaders in the construction industry. The model presented in Figure 5.1, showed the mentioned progression for companies to take action. What it also shows is the action affects their surrounding environment, namely the construction industry itself. But the setup has some correlation with change management methods, such as Lewins change model of unfreeze, change, refreeze. Explaining the model in short: from the figure, the drive for action is related to the unfreezing stage by the need to adapt to a changing industry, due to an increasing demand for sustainable solutions. This is made by either pursuing a competitive advantage or strengthening a current competitive advantage, or the need to make a profit to survive. The change element in Lewins model, is related to the actions taken by the company. Through the actions, the company adapt to the increasing demand based on the four aspects and in a sense aligning their business with the sustainable development. The last stage of refreeze is where the new situation is taken as permanent. Elements explained in Lewins change model, could help understand, e.g. conservative mindset in the industry. Therefore a further continuation of the project could benefit by researching this model or other from change management.

A second point to be made is about the empirical data collected in this study. Due to COVID-19, it was not possible to interview representatives from all actors within the construction industry, that could help enlighten the power relations. In a further study, this could be made for the benefit of a project.

A third point to be made is the usage of the ANT. In this study a point was made of the importance to understand the power relations between the actors. But an interesting analysis could be done with emphasis on the influence instead of the power. Through the influence relations, perhaps an understanding on the flow and direction of the influence between actors could provide a new perspective unbeknownst to this project.

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A Interview guide and framework

This Appendix presents the interview guide and the questions framework used during the interviews. It is split into three parts as detailed in section 2.2.2. In short, first part concerns the respondent's contextualisation about the work and the interviewers. The second part is the development of the interview and the third part is the debriefing.

Concerning the construction industry, much has been said about the necessary dramatic change in the decrease of the dependency on fossil energy and greenhouse gas-emitting materials, products, and techniques – transition.
Given this responsibility, on the other hand, the Construction Industry has a great ability to contribute significantly to reverse the problem by incorporate sustainability solutions and changing attitudes and behaviours.
1 st - Briefing:
Daniel and Frederik are students from the 10th semester of the master's degree in Management in the Building Industry from AAU (candidatus polytechnices i byggeledelse). We develop an interest in sustainability durin internships last semester at COWI and Ramboll.
Giving an overview of the purpose of the conversation
The subject is Adapting the Construction Industry to the New Global Sustainable Demands, which will be related to DGNB certification and integration of Sustainable Development Goals in projects
AIM: We want to have a better understanding if the Construction Industry is already aligned with the SDGs and if it can help to change the status quo of the environmental issue.
The purpose of this project is to collect knowledge about the most recent sustainable demands related to the Sustainable Development Goals from UN and building certification systems. Present it in a struc and comprehensive way that can contribute to seeking eventual solutions.
We are looking for the perspective from different actors in the industry.
Interviewee:
 NAME + AGE, EXPERIENCE, POSITION, ROLE DATE HERE
Terminology:
SDG's – Sustainable Development Goals
CI – Construction Industry

ADAPTING THE CONSTRUCTION INDUSTRY TO THE NEW GLOBAL SUSTAINABLE DEMANDS and IMPLEMENTATION OF SDG IN THE INDUSTRY

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2nd - Interview:

Question	The actual question	 1.1 What are you work with now concerning environmental solutions? And for how long? A 1.1 : 1.2 What is your organisation main goal? A 1.2 : 	2 What are the benefits to the CI from work developed by your organisation? A 2:	3 What is your perception about the UN's sustainable development goals in the Construction Industry as a general/comprehensive view? A 3:	4.1 What is your view about the current development in the adoption of the SDG's regarding the Construction Industry in Denmark?A 4.1A.14.2 And about the role played by the different actors: Landlords, Architects, Contractors, others? GBC-DK?	A 4.2: 4.3 And the level of regulations by authorities? A 4.3:	 5.1 Have you noticed any changes in companies or entities stimulated by focus on sustainability and specifically on the SDG's? A 5.1: 	Page 2 of 4 ADAPTING THE CONSTRUCTION INDUSTRY TO THE NEW GLOBAL SUSTAINABLE DEMAND:
Purpose	What information expected to receive	General introduction about the interviewee's background and experience.	Evaluation of the approach of individual and collective work in promoting changes in the Industry.	Understand interviewee vision and opinion on the UN's sustainability goals.	Understand the extent to which the Danish Industry and his players has developed within sustainability objectives		Understand what companies have done so far to adapt the construction industry to	
Theme	Potentially relevant theory connected							Frederik Pedersen
Order		-	7	м	4		വ	Daniel Pais

ADAPTING THE CONSTRUCTION INDUSTRY TO THE NEW GLOBAL SUSTAINABLE DEMANDS and IMPLEMENTATION OF SDG IN THE INDUSTRY

6.1 Do the actors from the Industry understand or recognise either the need or the opportunity in adopting solutions aligned with the SDG's?A 6.1:	6.2 What do you believe is necessary for reaching SDGs with regard to the Danish construction industry? For instance, at this different level: Political / Regulations / Work ethics / Tools / Education? A 6.2:	6.3 contextualisation for the question: It can be argued that BIM was considered a tool that would bring an Industry paradigm shift but was not as successful as expected. Probably due to its conservativeness characteristic.	A 6.3:		7.1 What do you recognise as challenges implementing SDGs in the Cl, and why do you see them as challenges? From Clients' side, Suppliers or in the Industry as a whole. A 7.1:	7.2 Can you identify if the challenges are more significant due to some barriers? A 7.2:	7.3 There are already some barriers identified as well as solutions to overcome them? Δ 7 3.		7.4 How can organisations overcome barriers and challenges?	A 7.4:	Page 3 of 4 ADAPTING THE CONSTRUCTION INDUSTRY TO THE NEW GLOBAL SUSTAINABLE DEMANDS
Gather opinion on what will be needed for the Industry to achieve the SDGs as a whole and to change the mindset.					To understand what challenges the adoption of sustainability goals.						
											⁻ rederik Pedersen
Q					٢						Daniel Pais F
	6 Gather opinion on what will 6.1 Do the actors from the Industry understand or recognise either the need or the opportunity in adopting solutions aligned with be needed for the Industry be needed for the Industry the SDG's? to achieve the SDGs as a whole and to change the med or the opportunity in adopting solutions aligned with the med or the opportunity in adopting solutions aligned with the active the SDG's? A 6.1: mindset.	6 Gather opinion on what will be needed for the Industry 6.1 Do the actors from the Industry understand or recognise either the need or the opportunity in adopting solutions aligned with be needed for the Industry be needed for the Industry the SDG's? to achieve the SDGs as a whole and to change the med or the opportunity in adopting solutions aligned with be needed for the Industry hole and to change the mindset. A 6.1: A 6.1: mindset. A 6.1: A 6.1: A 6.1: A 6.1: A 6.1: Mole and to change the mindset. A 6.1: A 6.1: A 6.1: A 6.2: A 6.2:	6 Gather opinion on what will 6.1 Do the actors from the Industry understand or recognise either the need or the opportunity in adopting solutions aligned with be needed for the Industry 6 Be needed for the Industry 6.1 Do the actors from the Industry understand or recognise either the need or the opportunity in adopting solutions aligned with the solutions aligned with the solution solutions aligned with the need for the Industry in adopting solutions aligned with the and to change the whole and to change the and to change the and to change the solutions / Work ethics / Tools / Education? 6.2 What do you believe is necessary for reaching SDGs with regard to the Danish construction industry? For instance, at this different level: Political / Regulations / Work ethics / Tools / Education? A 6.1: A 6.2: A 6.2: A 6.2: Did mast not as successful as expected. Probably due to its conservativeness characteristic. B.3 contextualisation for the question: It can be argued that BIM was considered a tool that would bring an Industry paradigm shift but was not as successful as expected. Probably due to its conservativeness characteristic.	6 Cather opinion on what will be needed for the industry to achieve the SDGs as a more and to change the mindset. 6.1 Do the actors from the industry understand or recognise either the need or the opportunity in adopting solutions aligned with the SDGs as a more and to change the mindset. 6.1 Solutions aligned with the SDGs as a more and to change the mindset. 6.2 What do you believe is necessary for reaching SDGs with regard to the Danish construction industry? For instance, at this different level: Political / Regulations / Work ethics / Tools / Education? A.6.1: A.6.2: A.6.2: 6.3 contextualisation for the question: It can be argued that BIM was considered a tool that would bring an Industry paradigm shift but was not as successful as expected. Probably due to its conservativeness characteristic. Solutions aligned with solution of BIM, how can the adoption of a permanent sustainable practice and in particular the SDGs become successful, if BIM was not?	6 Cather ophion on what will be needed for the industry to advise the BOGs as a whole and to change the industry. 6.1 Do the actors from the Industry understand or recognise either the need or the opportunity in adopting solutions aligned with the SDG's? A 6.1: A 6.1: A 6.2: A 6.2: A 6.2: A 6.2: A 6.2: A 6.2: A 6.2: A 6.2: A 6.3: A 6.3:	6 Expendent on what will be expected for the industry to achieve the SIOS state whole with to change the modest. 6.1 Do the actors from the Industry understand or recognise either the need or the opportunity in adopting solutions aligned with the SIOS state whole with to change the modest. 6.1 1 A.1: A.1: A.1: 1 A.2: A.1: 1 A.2: A.2: 2 A.2: A.2: 2 Compared to the inplementation of BIM, how can the adoption of a permanent sustainable practice and in particular the SIOS become accessful, if BIM was not? 2 Compared to the inplementation of BIM, how can the adoption of a permanent sustainable practice and in particular the SIOS become accessful, if BIM was not? 3 A.3: 7 A.3: 7	6 Gather capridon on what will be SDC:37 to achieve the SDG: as a whole and to change the model or the media for the mark SDG: as a whole and to change the model. 6.11 A out a submet FSDG: as a A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of : A of :	6 Caffer on Mat will be reacting from the Industry to reacting the SDGs4 6.1 Du the actors from the Industry understand or recognise either the need or the opportunity in adopting solutions aligned with the SDGs4 7 A 6.1: model A 6.1: A 6.1: A 6.2: 8 A 6.1: model 9 Cather price 9 A 6.1: model 9 Cather price 10 Cather price 11 A 6.2: A 6.2: 12 A 6.2: A 6.2: 13 A 6.3: A 6.3: 14 Constructual for the question if an excession of the question if a	a Control optimizing biologistic members for methoding previewed for the mediancy where and is obtaining the solidistic members in the members of the members in	6 Controc option or whit regist C1 Do the actors from the industry in a copring solutions aligned with regist of the solution industry for instances at this work and inclusions and the industry industry industry for instances. 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For instance, at this induction. 7 A.1: 7 A.2: 7 A.2: 7 A.2: 7 A.2: 7 A.2: 8 compared to the implicant. 9 compared to the implicant of BM, how can the adoption of a permanent station? 7 A.5: 7 A.5: 8 compared to the implementation of BM, how can the adoption of a permanent station? 7 A.6: 7 A.6: 8 compared to the implementation of BM, how can the adoption of a permanent station of a mouth of a permanent station of a mouth of a permanent station of a permanent statio

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8	How to face the national	8 contextualisation for the question: Is known that Denmark has set ambitious goals in terms of a reduction in 70 per cent of CO2
	and international pressure	emission by 2030 compared to the 1990 emissions.
	over one of the sectors that	
	contributes the most with	So, can be said that the adoption of solutions compliant with the SUG'S will be a question of business survival in the long term?
	the production of	
	greenhouse gases emission.	

3rd - Debriefing

To thank you for the time and contribution

We will share the outcome

Follow-up questions

B

Interview transcripts

This Appendix presents the outcome of each interview conducted in chronological order, with its complete transcript. The interview was conducted through telecommunication program Microsoft Teams, in which the conversation was recorded. Then automatically transcribed by a web application called www.otter.ai. In short, the program transcribes the recorded sound and then by a manual process it is performed a quality control check to ascertain and verify the outcome.

B.1 25-03-2020, Morten Vinde

Area of Expertise: Environmental management and sustainable science in Netværk For Bæredygtig Erhvervsudvikling Norddanmark

Content: Perspective from an organisation that connects education with companies and helps sustainable business development.

SUMMARY KEYWORDS

SDGs, building, consultancy firms, goals, landlords, sustainability, BIM, demand, company, sustainability goals, green, construction industry, architects, sustainable development

SPEAKERS

Morten, Frederik, Daniel

Morten 00:37

Now we're recording at the moment, and later I'll try to figure out how to send it to you guys. So part two is officially started.

Frederik 00:50

Fantastic. Okay. So yesterday, we got off from the question of what was your perception of The UN sustainability goals in the construction industry and your answer was more emphasised by your understanding of from where you stand from in this Network you work in. And we also had a question relating to what this aspect could be from other players, like the landlords or the architects or the entrepreneurs. If you can put yourself in that situation.

Q.4.2 And about the role played by the different actors: Landlords, Architects, Contractors, others? GBC-DK?

Morten 01:32

Well, how they would see their perception of the sustainability goals or ...?

Frederik 01:42 Yeah if it's possible.

Morten 01:46

Yeah, well, for the building lords. I work with some of the building lords, and they're actually... they like the fact that, as I said yesterday, that these sustainable goals, gives them a framework where they're sure that they have documented that they've been doing something within the sustainable development. I think that's also why the DGNB is going in, you know, coupling the SDGs together with the DGNB. To make sure that they are trying to ride the wave for that people: the building lords, like the pension funds and stuff like that. They want to make sure that they have their documentation in order so the building lords, from their perception it's... I think there's one building lord saying at one point, "...you just got 17 bananas", you know, turban or hat! Why you say that? (laugh). Because it's very nice for them to have these very divided targets and goals where they can kind of put all the developments into... some of them easier than others. But again, it's very structured, it's easy for them to communicate out afterwards.

Daniel 03:39

I want to ask something. Because, with the SDGs the building receives afterwards a label saying, according to a framework, how much or how green is the building, the process, the construction and the materials, and so on. But, that doesn't happen with the SDGs. How the landlords, in this case, identify it as an advantage because it's marketing or what?

Morten 04:16

I mean, I think with the DGNB - and that was what I was trying to say just before... the DGNB or the Danish Green Building Council last year they... they published this report on how the DGNB is fitting into the SDGs. So I think, (don't hang me up on this) but it was like 14 out of 17 goals that were directly related from the DGNB to the SDGs. So, it's one more communication tool for the landlords. I think that the DGNB is kind of hard to communicate out if you are standing with, you know, the user of the building. But if you're talking

about the development goals, that communication strategy has gone, you know, what to say, viral? Pretty much everybody knows the SDGs, right? Not a lot knows the DGNB. So, for them, it's a fantastic tool to communicate out what they're doing with their activities of building, you know, houses or offices or whatever, to support the sustainable development. Just for my sake, like, you can always question if it's enough, and I... that's not. That's a different question, but it's just how they're seeing it. And their perception of it is, I believe, that it's a good tool if they're already working with sustainable development.

Frederik 06:14

Okay. We have a follow-up question. Since this whole process of going green, if you will, as the drive for this is always the landlord because they decide if they want to pursue a green angle for a building or whatever. So, could these SDGs also act as an incentive for landlords to pursue this?

Morten 06:55

Actually, I'm not... I don't totally agree on the fact that it's always the landlords that need to come up with the idea of: "let's stick to the...let's go green". Because you have consultancy firms, you have architects that have tremendous knowledge on what you can do within... what they want to build, you know... that should advise them. And that's one of the things that yesterday we talked about: trust. And one of the things that needs to happen is that in a much higher degree, the architects and consultancy firms need to deliver this knowledge to the building lords. Because some building lords are going out saying: "we want to build this office". And then because... your perception is that... then that consultancy firms and architects say: okay, let's just build it as usual, you know. But it's also their task to go out and say, well, you can actually go this way. You don't have to necessarily have to be certified within the DGNB, but you make some certain choices within your building, they'll support this. But the building lords doesn't always have the capacity of knowing this. So that it's at least the job of the consultancy and architects and entrepreneurs for that sake, to raise the question: "Can we do it in another way?" Do you agree with that?

Frederik 09:07

For me and I'm kind of split because the reality is that for at least for private people, we're issuing this construction. Most landlords will maybe erect one or two building in their lifetime. So whenever they decide to, I want a new building, or something renovate or stuff like that. They wouldn't know anything about whatever. But what they do know about is... their money, the economy that they have. And in most cases, going green is relatively more expensive because you need to invest in more green products. Maybe invest in materials that are maybe harder to get but have a greener side. All this, since they haven't really most haven't thought about this in the beginning but all but mainly focused on the economy of it then they don't have an incentive to the beginning of it to have a green building rather than just a regular building. And but I also agree that of course, they hire consultancy firms to guide them in this way. But in most cases, the consulting firm will always try to please these new landlords. So if they have a feeling that they want this building to be cheapest possible, but up to code, then they would know that going green isn't always the most economical way.

Morten 11:06

What do you see as being more expensive? Because tuns of times it's been proved that if you build more sustainable, like, you have to remember that building sustainable is also about being economically sustainable, you might have to put on a little bit more upfront, but being in the house over the long term, it's it cheaper. So you might put, in some cases, you might have to pay a little extra for materials, but they'll have a longer lifespan, you won't do service in the degree that you should have done if you were chosen cheaper materials. So that task I'm just saying, this knowledge, it's not rocket science. You know, the consultancy firms know that if we're diving into the perception of the economic perspective for the landlord and the consultancy firm, then it's about changing the perception of the economy from short term to long term. And when it comes to sustainability, that's the, like, bottom line, you have to do that otherwise... most of the times, if you're only looking at the down payment for your house, then yes, it will probably be more expensive than a standard house. So, I still believe that it's the task even though the building owner saying. And then again, there's a very big difference on you know, the private building lord, building a family house, and then, you know, professional building lords. I totally agree on that. But it's always the task or the consultancy firm saying, well, when you're saying cheap, do you want to have it cheap upfront? Or do you want to live in a

house for 20 years? Or 15 years, whatever. Right? The reason why the pension funds are - like pension Denmark - is saying, everything we build, we want to have a DGNB gold certified. The reason why they do this is that they're going to, first of all, they are experiencing a demand for these buildings and then if they were to sell it, then the sustainability index is a lot better. They'll have a lot more value within this documentation than if they were building a usual house. But that's, that's, it's something else from I know the private landlord or building lord I don't really go into, you know, private family houses and stuff.

Frederik 14:31

I must admit, I wasn't only thinking about like smaller houses. I was also thinking about like, smaller intrapreneur, small companies. Because, again, from us from a small enterprise, they might want to build a new location for their, like, main office, if you will. And the ones who are supposed to say okay, we're gonna call for we're going to call it we want this building, this person will probably not be having the choice again, because it'll be so far down the line that until they want maybe an upgrade or something else. So that was what I was thinking.

Morten 15:19

Of course, who's not focused on making a good deal or making a cost-efficient, but it's just it's to perception. What I'm, you know, arguing is that what we started out was that it's the building lords that need to create the demand. But I'm not agreeing on that, because that they are having some responsibility of creating that demand. I agree on that. But the demand should also be supported by the value chain of the consultancy firms, entrepreneurs and architects saying we can do this. And they again are supported further from in the value chain of going well, because the architects know that they can get the materials from the material producers. We have two things holistically on the value chain as pushing and pulling this demand we can only say that it's the building lord that needs to demand this.

Daniel 16:39

So, the different parties also have... because the marketing is not only on the side of the investors, of course, they want their assets to last long and also to sell it or whatever. But also architectural firm and the consultants are engaged in this process, and they must be, but they also have this reputation of giving solutions on sustainability, isn't it?

Morten 17:15

Yeah, they have the experience, and they have a tremendous amount of knowledge if you go across. There are some big consultancy firms in Denmark where sometimes, you know, you wonder why they don't give better advice. Sometimes they're getting too big, but that's off the record.

Daniel 17:55

Okay, I think we can jump to the next question because it is related to this. It's related to what we are saying. But you see and can identify how far as the adoption of the SDGs went in Denmark? Are people really engaged with it? We have been talking about those who want or have the will or the position to do something, but how far as we been in Denmark with it, with the SDGs? The use of SDGs for achieving a better result in the construction industry.

Q.4.1 What is your view about the current development in the adoption of the SDG's regarding the Construction Industry in Denmark?

Morten 19:09 Hmm.

Daniel 19:12

Is it possible to measure or to have, I don't know, probably it's hard to have numbers we didn't found yet, but ... your perception and experience?

Morten 19:29

It's hard for me to say all of Denmark. Well, the municipalities, some of them, some of them are starting to use it as like, where do you where they can measure on it? Like where... where are we heading the SDGs right!?... And then the only project I know of where they really used it is the Stigsborg, the development of Stigsborg where the SDG's were actually the foundation of how to develop that area. At least they tried to make the SDGs the foundation of how to develop that area. There's a lot of if it's possible, and you know, terms like that, but that's so that would be a way where you could go in and measure it. I'm not sure you can measure, at least they have like a check-list upfront saying, Okay, well, if we go into the development project, how many of the areas we said we would contribute to within the SDGs. How many did we then actually contribute? Have you seen the vision catalogue for this Stigsborg area?

Daniel 21:20

No. And you mentioned it yesterday that you could send us some slides...

Morten 21:32

Oh, yeah, that was from the volunteer... okay when I'm saying slides. It's three slides. We got them from... the... it was the parliament or something like that.

Frederik 21:50

Can you hear me? Cool. I must admit I had just had some issues, but Also, the reason why I'm muting on you is simply, so I don't blow into the microphone to annoy you. But I just forgot that, that I'm muted before so so I was speaking for myself.

Morten 22:16

Well, then it makes sense anyway. Just...just two seconds, I'll send the slides and then send you information about the Stigsborg vision catalogue.

Daniel 22:32

Because you make me a note the other day in the message about Lendager group in Copenhagen. We went to see them all their work. They are working and yeah, they are advertising a lot. Their experience in this field with the SDGs. About the compliance with this ambition of the goals.

Morten 23:08

I think Lendager is in a league for himself, you know? Yeah, the first mover on a lot of it together with the 3XN and some of the others, but he's really good at communicating what he's doing.

Frederik 24:04

Okay, so the next question that we have is, since there are this development and this push for green building buildings. We would like to know if you have a with the work that you've done so far, have you noticed any changes within the companies or entities were more focused on sustainability now or even more specifically focused on the SDGs?

Q.5.1 Have you noticed any changes in companies or entities stimulated by focus on sustainability and specifically on the SDG's?

Morten 24:39

I would say it's a lot like from starting, and then up until now, it's been a lot easier coming out with the message of this is a thing that you need to do for your company. Like you need to implement this within your strategy for development in your company, you need to have a product of going out. If we're talking consultancy firms or architects or entrepreneurs like you'd have to be able to embrace the sustainability if you want to meet this demand. So that's a lot easier. I wouldn't say there are some building lords focusing on the SDGs but the main drive, and that's mainly because that's primarily what I work with, it's the circular economy. How is that going to make an effect and again, it plays into the SDGs, but it's more hands-on with the circular economy and energy efficiency and stuff like that then specifically mentioning the SDGs. I think when the SDGs as I said before, it's a tool for structure and easy to communicate afterwards but for a lot of

the companies, they're saying we're supporting goal this, this and that and then trying to embrace others... Sometimes I think it's still hard for them to figure out how to attack it. But I would say there's a really good case we work with TL BYG, who's an entrepreneur. If, like, we talked to him on about how to change the business into being more sustainable and offering sustainable solutions and stuff like that. They're like 250 here in Northern Jutland. It's a pretty big red and yellow logo. They went in and embraced that. We have a program in the Network called the Green Track. I think that the direct translation is The Green Travel Team. We support that for newly finished candidates and stuff like that. We give them a crash course in sustainability, they work with a case and then afterwards you know, our members of the Network can ask them to come out and work with the project that they have. And they see after we had worked with them for a while on this and tried to help them implement some of it, they had one of the travel team members go out and help them with the SDGs. So, they actually look in the SDGs as a parameter of guidance ongoing in a new direction. When you come into the company saying this is what we want to work...they embraced it. So and for me, like two years ago, if you would have said that a company that size in northern Jutland would have taken the SDGs as a baseline for their Yeah, I probably would have said Yeah, well, good luck. But yeah, now it's a lot easier to come out with the message of sustainability now than it was two years ago.

Daniel 29:55

Do you think they are accessible to reach out and to have someone we can have a chat or something? Also, see their experience?

Morten 30:10 If you want to talk to TL BYG?

Daniel 30:11 Do you think it's relevant or not?

Morten 30:18

Well, if you wanted to see how, how a construction company is engaged in the Sustainable Development Goals, then that's your company right there.

Daniel 30:37 Okay, let's see. Let's explore that.

Morten 30:46

The CEO out there, Peter Boltau, is a good guy, so he would probably be able to take in you to an interview with you guys.

Frederik 31:06

We have a follow-up question on this: since the SDGs, they're pretty well, there's a lot of them - there are 17 goals - but they all have small, smaller minor goals if you will. And but since any, I think you mentioned this as well, since a lot of them is maybe not all, definitely not directly affected by the construction industry. Because I know, for example, one of the SDG goals is to end poverty, for example. And that's a tough sell to have on in the construction industry. But so having this SDGs as a tool for communicating what you actually do like... In your experience, are people the people using this as a tool? And to what extent with regards to the number of goals that they're going for, at least?

Q.5.2 Are companies focused on all the goals or have selected some? Can you point why?

Morten 32:14

Um... I think, first of all, I kind of... It all depends on your strategy to like how you take on the goals. If your plan is to take on all the goals like all 17 and then going into the sub-goals, then you could find a way of saying that you're dealing with poverty. You could say, well, we're hoping within social sustainability, we're taking in people on the edge of the working market, people with lower resources and stuff like that having a hard time. That could transit into a way of working with that goal. Now that was just an example. I know that. I think that the best thing to do from my point of view is not to try and make up a way of dealing with a goal.

Just be more persistent on how are we working? And then in that sense, what can we really deliver on within the scope of the goals like is a goal 12, 17, six and whatever, you know. Choose out some goals that you're really concerned like that really concerns your business and then do better there and then still have the goals. Maybe then you could do a scope of saying, Okay, these are a little longer out in the perimeter, but we still need to have in our focus, you know? And then these are way out, then our strategy on those are, how is that going to be a part of our business in let's say, a two-year plan or a five-year plan or whatever? I don't see that the SDGs as a... that you need to hit all 17 goals at the same it's simply impossible for a company to do that, I believe. From day one at least.

Frederik 34:48

My experiences so far, based on a workshop that I participated in, was that a lot of people, professionals within the consultancy firms were having difficulty saying When do you actually pursue a goal. Has a communication tool, you can use it Yes. But how to how to define when you're pursuing a goal can vary from, person to person. So, meaning that if you say, if, let's say, if we're going to sample that you are for this project you are achieving maybe 10 of these goals, but from another perspective, others would might say that you are only achieving eight of these goals, meaning that it could dilute or even damage the communication of it.

Morten 35:58

I think when you're going out saying that, okay, we're really working with the sustainability goals and then, you know, these are the goals that we're... how do you say...?! delivering into, then your act and your description of how that you're delivering into these goals needs to be solid. You can say that you stop hunger crisis because you have a canteen at your place. You know? That it is stupid. Like you need to have... you need to put in a real effort on describing how you deliver it good, and I don't really care if another company says that we don't believe that or we don't think that you deliver into this goal. Why then? If you have a good solid argumentation of why do you believe that you, as a company, are delivering on that goal, then it's your strategy, then I'm not sure who would come saying, "I'm not entirely sure that you're delivering on that," right? So, yeah, but again, if you go out, ask a consultancy firm, you would probably get three different opinions. So that's why it's very important that you take in your whole organisation or at least members from the whole organisation saying how are we working with this, and we set that up, so you see it from all different perspectives of the company.

Frederik 38:00

I think we should proceed to the next question that we have. Just to give you a sense of where we are. We have four questions left.

Morten 38:16

And we got 20 minutes. Stop talking that much. I'm sorry.

Frederik 38:24

No, it's okay. It's okay. So, the next question that we have is: Do the actors or players from the Industry understand or maybe recognise either the need or the opportunity in adopting the solutions or ideas of the SDGs?

Q.6.1 Do the actors from the Industry understand or recognise either the need or the opportunity in adopting solutions aligned with the SDGs?

Morten 38:59

I think it depends. What I can say is my work with the companies within northern Jutland, it's it very much depends on where they are like some of them are still trying to grasp the whole sustainability concept, you know, and others are very much into the whole idea of using the SDGs as a framework, as I've been saying. So, it very much depends on what company you're working with. But still, you're Northern Jutland so, there's culture playing there. And sometimes it just takes longer up here. I don't know why. It's something about...

Frederik 39:58

Along with this question, we also have the follow up with: what do you think is necessary for actually reaching these un goals? Regarding the Danish building industry, since the UN wants to achieve these goals by 2050. So regard to that what do you think is necessary to perhaps reach these goals?

Q.6.2 What do you believe is necessary for reaching SDGs with regard to the Danish construction industry? For instance, at this different level: Political / Regulations / Work ethics / Tools / Education?

Morten 40:39

Ah, that's a tough one. Like, if I had the answer to that, you'd probably be paying me a lot more than they're doing at the moment. But you know, there needs to be more just practical... okay... There needs to be for the construction industry there need to be more demands on: "this is the way that we're want to do it" from all sites, you know? And then it's hard to say when did we reach the goal? You know? Is the definition of the better water quality or whatever, like we reached that in Denmark before, you know they started that we can improve on that improve, improve, improve, but when did we reach the goal? So it's something about the definition of when is the goal reached. But, but definitely of like, if one of the goals is that the majority of companies within the construction sector should work with the goals then it's that everybody is putting demands, whether it's you whether you're a consultancy firm or you're building lord.

Frederik 42:20

When we thought about this question, we had in mind that you could potentially say that there needs to be like a political focus on maybe put down regulations or laws towards it, or even at developing more tools, having more education about it or having a change of work ethics. That's at least we thought off, that you could be entering.

Morten 42:56

That's, that's again, you know, that some of the demands as opposed to Political demands. So, the advocation kind of comes along with that, because it's like a snowball effect, because if you start setting demands within the value chain of the construction companies, and then suddenly you now have the regulations backing you, then the snowball would just get bigger and bigger, and then the urge of knowledge in education will become bigger because this is the demand. So, you know, like within the demands in the value chain, as I'm saying that we need to demand this, whether you're public building lord, private building lord, architect, whatever needs to kind of go out and push this before it goes, and it needs to be every time like you don't have the whole... well... we're only gonna advise or put out the opportunities of sustainable buildings if we're asked to do it. No, you need to put out that as an option every time. So, you make what do you say like a knowledge-based choice. What am I choosing? You get what I mean? Do it all time, and definitely, I totally agree with you that of course, the regulations need to put out this demand as well pushing the demand.

Frederik 44:46

Okay, well, based on that analogy, having this snowball effect, what would you say could be the first snowball.

Morten 45:05

You could, you can actually see the little, little snowball in the DGNB and how like it's been rolling. That's been getting bigger and bigger and bigger, and then now it's taking on in the building regulation from the government to call it out. Up until, I think, it's 2023 they're gonna say it's volunteer choosing this class of the sustainability class. But it's the same as you saw with the energy class back in time, you know, that was volunteer as well, but then it became mandatory, and we became, you know, very efficient in building energy-efficient buildings, you know? So, the snowball was probably the... I don't know if you can say it was the DGNB, but you can definitely see a track from when they implemented the DGNB and then up until, like today, where they're talking about a volunteer sustainability class.

Frederik 46:31

I think we're running a bit short on time now, the next question that we have is that what do you see are recognised as challenges of implementing SDGs in the construction industry? And maybe also why you see them as challenges.

Q.7.1 What do you recognise as challenges implementing SDGs in the CI, and why do you see them as challenges? From Clients' side, Suppliers or in the Industry as a whole.

Morten 46:49 Hmm.

Daniel 46:52

We have been talking about it a bit...

Morten 46:56

I know like, again, it's very much too depends on where you are with your company. What have you been choosing to do in implementing as a strategy with your company? Because again, we're talking about knowledge, like if you don't have the knowledge on the SDGs or sustainable development in general, and then you need to be aware of the opportunities and how to work with it. That's some of the things that we're doing in the Network is trying to just spread out this message and trying to help the companies start this journey. But again, as you said, you'd been to a lot of workshops with the SDGs. And there are different opinions on who is like, what does it mean for a company or how can you work with (break in connection, indistinguishable) (...) and it is hard because it's if you don't just do the bingo, where you're looking at the colours, seeing where we're hitting that, then you really need to you need to put in, like good work together to get the SDGs implemented.

Daniel 48:31

Morten, I don't want to influence but let me ask you directly. Do you think it is a question of implementing it in the business, the business strategy? If it's going to have a return to the company that's a little bit more on something related? Is it a question about how can I get a return on my investment?

Morten 49:02

Well, a strategy is always bound up to economics, so they need to see the light in that this is an area where they can have an advantage. You know, and definitely more and more people... then the hard thing is probably for you guys that you are focusing on the SDGs and a lot of the companies are saying that they're building within, you know, sustainable environmental, focus and stuff like that. So they're not specifically mentioning in the SDGs. But a lot of companies as I said before, it's a lot easier to come out with the message of sustainability because a lot are saying it's only going one way. And you know, what you're saying about if they need to see the return of investment... They always have to see the return, but it's easier for them now to see that they need to put in some hours and develop a strategy within this.

Frederik 50:17

On all the last few questions that we have, I'm just going to try and sum it up. Because basically what we're interested in knowing on this part is also what are the potential barriers or challenges that are currently in the Industry? And how can organisations smaller, medium and big? How can they overcome these challenges? Again, with regarding the SDGs and DGNB?

Q. 7.4 How can organisations overcome barriers and challenges?

Morten 50:55

First, why the barriers in relation to why it's not more implemented?

Frederik 51:03

Yeah, like what could ease up the whole process basically?

Morten 51:13

It could ease up the whole process, as I said, if there were like if the demands for the SDGs if there were demands to do that. The SDGs needs to be handled within every building project, like if everybody had to. Like if there was a demand, every time that they need to be handled, in tenders, regular business deals, that would be the breaking down the barriers, but then again, the knowledge is lacking on the SDGs still, like you might have heard of the SDGs and the SDGs are about sustainable development, then there's still a lot of lack on what is sustainable development. So, you could break down barriers saying that the demand needs to be there, but you would still have a tremendous lack... What, does that mean, then? That's why you see when there's been a lot on the whole DGNB wave that, some have been asking for sustainable buildings not really knowing what they wanted. The DGNB gives you a framework where you're certain that we'll work holistically with the sustainable development because we're going into the social, the economic, the process and the environmental. And for the construction industry that just works. As I said before, it's it, they're already documenting. So yeah.

Frederik 53:16

So what I'm what I could dissect from that is that in order for it to make it all easier, is that the process as a whole needs to be more like everyone needs to be on board with both the tendering the demand, the education, the knowledge, etc.?

Morten 53:40

Yeah, But in what world is this happening? Because I want to live there!

Frederik 53:49

Okay. And we also had the question of, could it? Maybe this is a bold question, but: Could it be said that by adopting this, these SDGs into maybe a business strategy or whatever, could it be a potential question of a business surviving these days and in the future?

Q.8 So, can be said that the adoption of solutions compliant with the SDG's will be a question of business survival in the long term?

Morten 54:18

Definitely. So now the companies doing this now is seeing it because they see an advantage. And what I'm saying is if you don't do this, then in 10 years, some may be longer, but you're gonna see a major difference of the companies that took this in and started working with it, and then has something to offer within this spectre of the SDGs. The SDGs kind of hard, but the whole system working with sustainable development and working with how you can deliver or create a more sustainable product or service, or whatever you do, it's going to be essential. And if they're not doing it, my personal opinion is that they're not going to make money in, let's say 20 years then. And in one in one way or the other, like just that as we're not going to stop using oil, like from one day to another, but it's a transition, and the faster you are too kind of adapt your business into this new setting, the stronger you'll be in the future. That's my belief.

Daniel 55:55

It's a good message to end up!

Frederik 55:59

We have the last following up question regarding this because both Daniel and me and as I can hear from you, this development in this area are definitely needed, but also recommended due to just being economically responsible. But couldn't you say - are you familiar with the BIM set up with the whole building informatic? - because of this idea, it's older than this whole green transition. BIM was really large in 2008, and it was really thought off to be kind of this is the new heading. But as both me and Daniel can consist to do to our internships, is that this whole BIM idea kind of fell a bit to the ground, and even though that if everyone really pursued this idea of BIM, they could really benefit a lot on both resource management, time management, a lot of stuff. But again, then you have this new idea with the green transition. Why should this work if it didn't work with BIM?
Morten 57:35

Well... we're talking about BIM, I just need to be sure that the BIM is the way you design the buildings and all that, the program, right? So, your question is why is BIM not contributing, or... ?

Frederik 58:17

Well the idea of BIM because when it came out, it didn't, like become this big success. In fact, a lot of companies both bigger and smaller, they handle very, very little, with this concept despite the fact that the idea of BIM is a lot of it contracted within the holistic view of this green building idea. But since BIM kind of fell a bit, then how can these green SDGs etc., how can it be a success?

Morten 59:12

Actually, I think that BIM is still... there are still companies trying to use BIM as a tool for the circular transition where you're using BIM as part of creating the material passport of the building. So you're using it as you know the registration - there are this many beams of this quality, how do you dismantle them all that - in that sense, BIM is still in the game. How to... because the other things... they're not a program, you know? So, how the SDGs can become a... it's probably also something about that the whole society is looking at you saying that we need to go towards away being sustainable. And with BIM, it's very sector-specific who's using, you know, okay? There's a lot more with the society like it's the social capital of all being like, if we don't work with this, then we don't have the license to operate, you know?

Frederik 60:43

I think we actually got what we needed. Unless Daniel have any questions?

Daniel 60:57 It is okay for me.

Frederik 61:00

Okay, well I think that's it, then. Thank you so much for taking the time, man, thank you so much, right?

Morten 61:08

I will send you the interview. Just before you send out your assignment, can you send it to me? I'll doublecheck if I'm not stepping somebody's toes rolling back?

Frederik 61:33

We can say that if you want to, the information that you gave us now, we will, of course, use it. But the report itself, we can put a label on it saying it's confidential, meaning that it's only for the eyes from the University.

Morten 61:53

Yeah, but as you can't use it, then it's not very interesting for the companies to look into it. Just If you could send when you're almost done, and you want to double-check if that's alright, or something like that, just send it and I'll give the go-ahead or confidential mode on it. If that's okay for you.

Frederik 62:20

Okay, good. And of course, if we come up with anything, maybe a follow-up questions, I hope we can send you an email, and you can answer?

Morten 62:37 Yes, sure.

Frederik 62:39 But then I think that's it then actually.

Daniel 62:43 So again, thank you for your time. And keep safe.

B.2 02-04-2020, Anne Gade

Area of Expertise: Architectural design. Researcher with focus on the UN goals in construction at UCN - University College North Jutland.

Content: The perspective and role of the education in sustainable building design and sustainability.

Anne Gade Interview [Duration 01:05:00] 02/04/2020

SUMMARY KEYWORDS

SDGs, goals, sustainability, sustainability goals, building, construction industry, BIM, owners, actors, tool, challenges

SPEAKERS

Anne, Daniel, Frederik

Anne 00:10

I just started recording now. Could you maybe give a short presentation of yourself and the project because then I'm up to date?

Frederik 00:37

Yeah. Okay, let me describe who we are. My name is Frederick, and you've talked to my colleague, Daniel. We're both on the candidate on building management, and we are currently at our master thesis project. Basically, our project is about understanding the how the industry or the building industry can adapt to these sustainability goals with regards to the UN's 17 sustainability goals, but also to understand what kind of limitations currently exists, and maybe how to maybe push it in a direction that is favourable for all parties. So that's really the gist of the whole thing.

Anne 01:44 Yeah, ok. Who are your supervisors in the course?

Daniel 02:06 Lene Faber Ussing and Søren Munch Lindhard.

Anne 02:11 Okay, I don't know him.

Frederik 02:18 Søren is a rather new part of education. I think he arrived two years ago.

Anne 02:28 Yeah. Perfect.

Frederik 02:32

Okay, and just to give a short overview of what we're hoping to achieve anyway. So, again, we want to get a better understanding of how the industry has, or will or might need to align in order to actually achieve the sustainability goals. And we would like your opinion of it basically. What we're gonna do is and you already This, we would like to record the interview. And Daniel will take notes during the interview, so I'll be the main person to talk. But Daniel is, of course, welcome to Ask anything or, or follow up. But he will take the notes of it. First off, are we allowed to use your name in our document?

Anne 03:28 Yeah, you can do that.

Frederik 03:31

And I can see as a beginning that if there's anything that you don't want to have named or anything, just say so. Because we can put a label on it making it secret.

Anne 03:47

Yeah, I don't think there'll be anything in that direction but good to know.

Frederik 04:20

Okay. If you need a break or anything or just need to walk for a minute, you just say so. Because we all need to adapt to this whole new situation. The last thing is that this is kind of like a semi-structured interview, meaning that we will, of course, have some questions that I believe you already see them. But if we talk about something there's a chance that we might get off fields it's just to understand it better, but we would like to use these questions as a framework. It gives us an opportunity to ask you a few follow-up questions.

Anne 05:08 Ok

Frederik 05:11

In total, we have eight questions with a few sub-questions. And we are hoping that we can do it in an hour. But again, if if you really want to give a big explanation of things, you're welcome to, to do so. Then we hope that we can maybe have a follow up into, into anything. So are you okay with this?

Anne 05:44

Yeah.

Frederik 05:47

And the questions that we have you already seen them, the first few questions will be more related to you. Meaning that we would like to have a base knowledge of your job and work environment and so on. And then we will diverge into some more opinion wised and insightful questions. So, the first is a generic question that is what are you currently working with concerning these environmental solutions that are currently happening?

Anne 06:31

Yeah. So, I am doing a research project at the moment which focuses on the UN goals in construction basically. And I've, I've been working within the field of sustainable architecture really since my education which I finished in 2012. But it's it has mainly been from a research perspective. I studied architectural design at Aalborg University and then I worked as an architect for around a year working with the Passiv Huse design with the German certification and then I have been doing a PhD since from 2015 to 2019 in the field of sustainable renovation, actually and prioritization of sustainability criteria, basically. So I have been working with this for a while, and the current research project is mostly related to the point of view of the building owner because I think that it's very important that we have some professional building owners who are willing to, setting goals regarding sustainability. And I think that's I mean, all the actors within the building industry should be involved in this work, but we are looking particularly at the building owner at the moment. And the first step has been to look into the challenges and barriers regarding the Sustainable Development Goals. And the main barriers is that many of them feel like they don't have time to, to understand and learn the goals and it takes some time, and it's, I think it's, it's a really comprehensive set of criteria, and also an obvious barrier is set We're still missing the Danish indicators for all the sustainability goals. So that's of course, the first step to being able to set goals that's to know how they will be measured. So I think that as soon as we get those - we have them for a goal 11 now, where we have a baseline and, and the Danish set of indicators - and soon more are on the way, and hopefully, we will have them all this year. And I think that will, that will ease the work because that's the main barrier, in my opinion.

Frederik 09:41

So you would say that you will, the overall goal is really to, to perhaps give an easier way of understanding this as a whole?

Anne 09:54

And the sustainability goals?

Frederik 09:56 Yeah.

Anne 09:58

I don't think it needs to be easy, necessarily because it is complex. And but I think that the practitioners in the building industry need very practical tools or guidelines and examples and inspiration. I mean, that's at least what they request. Because it can be very abstract in that sense. So, I don't think it needs to be easy, but we need the global indicators to be translated to the Danish context to be able to make complete sense of the goals, I would say.

Frederik 10:44

We're actually jumping a bit now. So based on this, you've actually been working within this field of Sustainability for quite some time.

Anne 11:18

To give you an exact number, I would say, my Master's was in 2007. So you could say actually 10 years. Wow, that's a lot.

Daniel 11:35 Time goes by.

Frederik 11:39

Well, since you're kind of jumped the gun a bit, we can go. Go on to our next questions. We would like to have your elevation on what are the benefits to the construction industry and from the work that you have been working on or by the organization that you're working for?

Q.2 What are the benefits to the CI from work developed in the organisation / by you?

Anne 12:07

I'm not sure that's a bit broad. Do you mean the results from our research?

Frederik 12:14

Yeah, you could say that, what the results of your research? How can it be beneficial for the industry?

Anne 12:28

I would say this project that I'm working on now is rather new. And so, the results that we are having now we are just about to get them published. And so, so it's still new, but we really would like to make or to help with making the sustainability goals more operational in the construction industry, and especially for the building owner. So, as a first step to that, to investigate the challenges and the barriers for adopting the goals, I would say that's a good first step that those results can be used by both the other researchers or the practitioners in trying to come up with a solution on how to address these challenges. I mean, the first step is to know what is wrong and then we can help find some solutions to those challenges. So my waist is at these results and the results that we hope to come up within the next few years that will be some practical tools that can help make the goals more accessible and especially for the building owners to get support. Support in setting goals and make priorities regarding the goals. But at the moment, I will, I can only make guesses on what our actual solutions to the problems are because we haven't really gotten to that yet, but I guess it will be some kind of decision support tool to support the building owners. It can also be a collection of practical examples like some kind of a handbook. Or it can be I mean, we recently had a workshop with 22 building owners, both public and private. And we also get questions... actually, one of the participants he suggested to make this like an online place where you can monitor the progress on the goals. So, you can have like a baseline, and you could have like this system where the different actors in the building industry or the different companies could kind of measure their progress towards the goals. So, you could have something to compare yourself with. And I think that was actually a quite good idea. So, let's see where we will go with that. But to answer in short, that we want our results to be practical guidelines and solutions to help the practitioners. That's the goal.

Frederik 15:49

Just a small note. Since we're doing this in English being the main language. If, if there's a wording that you are having trouble just say it in, in Danish, and I will make a note of it. So, we have it for translation later on.

Anne 16:11 Okay, perfect.

Frederik 16:20 Danny, did you have a question there?

Daniel 16:23

No, no, I was just following your explanation and actually by experience, I think Fredrik, also have during the internship, mainly, is this question about how to measure. Are we doing it okay? Are we doing better? And you came up with is also with that opinion from the landlords. Do you think that is... the tricky question here is, how good are we performing it? Implementing green solutions, and so on. Do you think is that?

Anne 17:07

Yeah, I think that's the issue, and that's what is very difficult. I mean especially regarding the SDGs I don't think there are any really baselines yet. But I know that those just report from - what's the call now? - You know Statens Byggeforskningsinstitut where they made a baseline of I think 60 buildings to actually measure the performance and I think that kind of tool is really, really useful for because otherwise we are just going about in the blind, not really know what's working.

Frederik 17:57

No one has really a guide to follow.

Daniel 18:01

Yeah, but I think I didn't quite get that. But do you have a link that we can go through to see it that we can you can share it with us?

Anne 18:11 Yeah, I'll just make a note, and I'll send it to you.

Daniel 18:14 Perfect.

Anne 18:16

And I just thought about what I talked about earlier about the challenges for implementing the SDGs. I think that the thing is the construction industry... Now they've spent some time getting their head around DGNB. And I think that many feel quite confused that. Okay, now we get introduced to just another buzzword. And I don't feel I don't think it's a buzzword the SDGs, but I think that it can be experienced in that way and that... Okay, now we just get to know DGNB and yeah, now, we don't want something new! So I think there's actually a challenge in making these concepts work together. And I think that the Green Building Council, they're also doing great work. They just put a new DGNB manual in hearing, and it's very explicitly linked to the SDGs. I don't know if you have seen it?

Frederik 19:27

What we'll actually we're kind of jumping onward to the next question. The next question that we have is also what's your perception of these sustainability goals in the construction industry?

Q.3 What is your perception about the UN's sustainable development goals in the Construction Industry, as a general/comprehensive view?

Anne 19:48

I think I have said a lot about that. Because I think it's it's a challenge right now that they are not operational enough and at the (...) Of course, the goals are global, but indicators, they need to be translated to the Danish context. And they will be I don't know if you're aware of the -what is t called? - it's called our goals in Danish: vores mål. Because they've been trying to involve the public, so it's not specifically regarding the construction industry. So, this is just the general Danish indicators, and then we need to do some kind of adaption to the construction industry because and I think actually this is an important point because the SDGs they are balanced regarding the environmental, economic and social dimensions of sustainability. And I think that's very important. And they also are interlinked. And the issue, in my opinion, is that it can be a challenge to look at the goals individually because then we lose the balance of sustainability as a whole. And I think that's what is happening that many companies are cherry-picking. Of course, it's better to do something regarding... so it's not that I have the right answer. I just think it's a very important reflection that if we just focus on climate change, then we'll miss some of the social aspects, for instance. But with that said, not all the goals are equally relevant in construction, I mean: to stop hunger, that's, that might not be the building environment that should be having the responsible there.

Frederik 22:21 Yeah, it's a... it's a hard sell.

Anne 22:24 Yeah.

Frederik 22:28

Based on this. What do you think? Well, to kind of understand the extent of how far we actually go on Denmark, we've kind of become and then with regards to the industry. What is your view on the current development of adopting these goals? As you say

Anne 22:49 In the construction industry?

Frederik 22:51

Yeah. Because you just mentioned that it's kind of like the companies are kind of cherry-picking...

Anne 22:59

Yeah. I think at least those that I've talked to, they find it challenging because it is a new concept, first of all, and yeah, they just find it pretty hard. So I think that it's still very new to many companies even though that it's been here for five years, but, but it's getting more and more attention. And I think that most companies know that they have to deal with these goals. But, but, one issue that I have is really regarding the balance of sustainability. Because what we see now is also like this retrospect view were you, you've maybe done some projects before and then you put a stamp on it like key goal 13 or whatever... we did this, but, but I think it's the nature of the SDGs that they are goals towards 2030. And I think that then it's very important to recognize working with the goals that it that this actually goes and not just a checklist what of what you normally do, it should be something that pushes the ambitions further, in my opinion.

Daniel 24:34

Can we say that, and sorry to interrupt, can you say that is the sum of all the attitudes towards different... because you were saying is not construction industry also needs to be engaged in it. But it's not only part of the construction industry, it touches different parts of the society and different industries, but it will be the sum of the attitudes and the changes from each that goes to the main goals that will give better or worse results? In the sense that each of us needs to do something. It's like recycling at home. We are not changing the world by putting a plastic bag on a different bin. But if we've 1 million people do that... That makes an impact probably?

Anne 25:37

Yeah, I think you're right that there really needs to be this commitment. And that's actually also what the building owners they expressed that they need the political commitment and of course, there is a general political commitment to this, but they request some specific requirements like in the building regulations and so on. Because if it's just voluntary, then it might be hard to get that commitment. I really, I don't really have the answer to, to how we should do that. But I think that most companies now they know that they have to have this some kind of sustainable agenda to be part of the game. I don't know...

Frederik 26:39

This is also a sub-question that we have for this. Because you mentioned a lot about the landlords regarding your own research. But we also like to understand the roles that are played by the different actors like the like you say, landlords, maybe architects, contractors and so forth. Could you maybe shed some light on those?

Q.4.2 And about the role played by the different actors: Landlords, Architects, Contractors, others ?

Anne 27:05

Yeah, I think, of course, that the all the actors play a really important role and I think excellent is the partnerships and the feeling of responsibility for a specific project is very important to ensure the commitment of all the actors because they need to see the kind of the big picture. And at least that's my experience with... Now I teach some craftsmen. My point was that I have recently been teaching some, some a craftsman who, who I had to teach some sustainability and they, I mean, they had very they had the idea that, first of all, "why do we need so many academics in the construction industry?" And "what do they do?" And I mean, I think the whole problem is that if you don't see yourself as a part of a bigger idea or project, then you will don't you will not go that extra mile for him arranging your garbage or whatever. I mean, I think so I think that the commitment and the partnerships are kinds of the first step. And maybe we need also to rethink the ways of collaborating because of course, is a huge challenge. If the actors change throughout a project, then the knowledge sharing and maybe the ideas and the thoughts about different decisions and priorities will not always be shared. I mean that it just has some natural barriers if people change. So, so maybe we also need to look at different ways of collaborating. And I think that, actually, that DGNB has some really good concepts regarding the process and also that you get points for different process-related criteria. So I think that... Yeah, I'm not sure, but I think that the way to go is also to, to kind of interlink DGNB and sustainability goals even though I know it's two different concepts, but I think we should be careful not to broaden the ideas too much.

Frederik 30:20

We would also like to have an understanding of the regulations from the authority because, as you said so earlier, the current regulations are more on a volunteer basis. But also want to understand their role in this.

Q.4.3 And the regulations by authorities?

Anne 30:45

I think that if, of course, I think making the sustainability Classes (" *break on the recording) as a first step, that would be, that will push the industry. I mean, because then you have to follow these requirements. Then there needs to be a balance, and I don't really have the answer to if we should....

Frederik 31:21

Because I know currently, I do believe that by 2023, if... I don't think it's all of them, but a good portion of them will be mandatory.

Anne 31:38 In the Bygningsreglementet? Ok.

Frederik 31:41

Yes. And, like, from my understanding the deal is to have it voluntary now. So that the company can adapt to the situation. So when it's in, by law, Then they are actually prepared for it, and it's not something I've ever had.

Anne 32:09

So, when you, when you say that, so you (record missing!)

Frederik 32:19

In this case, it would actually be the DGNBs that it would be more intertwined with the building regulations since the SDGs are not in a direct sense, because there are a lot of goals, but some of these goals are in a direct impact with these building regulations and DGNB. So, we what are we really trying to understand is that based on this, and perhaps, in your opinion that this process needs to be or could be faster or hastier, or maybe at the current pace is good?

Anne 33:07

I think actually I didn't know about that ambition to implement the parts of the DGNB or something like that in 2023. So I think that's, I think it's just great if that happens. And if there's some kind of an adaption period, that's how it is, but I think it's very positive. But can I ask you where... do you have some kind of resource to learn more about that? Because I think it's interesting to know.

Frederik 33:42

Again, it's not the DGNB isn't. It's more like an indirect sense, because...

Daniel 33:48

It's a change on the regulations via the certifications. Because they are changing the criteria within the DGNB. And there will be a period of adaption. So until 2023, so it will be optional to implement it. So it's just to keep up, pick up the pace. Now it's voluntary, the Industry, we will adapt and at a certain point will be mandatory to have integrated certain goals, not SDG goals, but something that will help to achieve the goals.

Anne 34:00 Yeah...

Daniel 34:26

But I think we have a link also because this is an interaction and we had an interview the other day, and we were told about this so of course, we can pick up this link and share it with you.

Anne 34:48

Yeah, that would be perfect.

Frederik 34:54

So jumping on to the next questions. Since you're working with this area rather than us, and we would like to understand if... Have you noticed any changes within the companies or entities that are more focused on the SDGs or rather focused on sustainability?

Q.5.1 Have you noticed any changes in companies or entities stimulated by focus on sustainability and specifically on the SDG's?

Anne 35:28

And, yes, I think there's a really an increased focus on sustainability. And I think that just the general awareness in public has also been increased. I think now we have seen, for instance, I mean, just the consequences of climate change, and I think that's pushing both.... I mean, the market push requests for a more sustainable solution and I, in my opinion, the, the companies they have more and more focus on this. And as a part of that, of course, DGNB has been, has been the central theme there. And now they're, they're taking the SDGs and adapting those, or at least wanting to. Recently I've spoken to some, some architects and they were like, "Can you just tell us where should we start learning about the SDGs because we feel like

it's just such a broad concept and we don't have time to getting to understand them?" And I think that's all the way around with the different actors as well. Also the... now it has mostly been the public building owners I've worked with, and many of those they have committed to the SDGs on a larger level for the municipalities, and now they're trying to make... make some kind of strategy regarding the construction. And I think that's, that's the general picture that ... there's a lot of interest, but there's also a lot of "we don't know how to make it practical."

Frederik 37:17

Well, okay, so I have a follow-up question with this. And this might be a bit hard. But we would also like to know if, if maybe some companies have focused on a few goals, they have the selected some? Or maybe there's just aiming for all them? I know, it's a hard question, since you kind of already said that. A lot of them don't understand them yet.

Q.5.2 Are companies focused on all the goals or have selected some? Can you point why?

Anne 37:48

Yeah, and I think it's actually a really interesting reflection because of many committees... well... Some of the goals and in some ways, I think it is a good strategy, I mean to look into, what are we doing? What are we doing good now? And then where can we make some more ambitious goals? Because I think it's ... maybe I'm contradicting myself a bit here because I think that's it is good, but I just think that it's a... Faldgrube = Pitfall or trap it's....!? I mean, do you know, for instance, NIRAS has made the tool called SDG Capture? The free one. It's, like okay, you can prioritize which kind of goals. And I talked to NIRAS, and I think it's a really nice tool because it's something that can support the implementation. But then also with the examples they gave was like: "Okay, now the goal 7 - sustainable energy, that's something that... and on a side note: that's actually one of the goals most of the building owners they, they say have implemented and I think actually that's because it's the one that's easiest to measure. But that's just I think it's something that, yeah, it's not too abstract in that sense. But I think it can be too easy to (record break) ... well because we have chosen these three SDGs and they look really good on our website. So, I think that it's important to remember that sustainability is really complex. And that's why I really, I think DGNB is a very good tool, but it is comprehensive. And there's not really any quick fixes. And that's what I see potentially can be a problem with the SDGs. Is that if you say, yeah, we have these two or three goals, and now we go and save the world, and now we're sustainable, then sustainability just becomes this buzzword, and that's, that's a problem.

Frederik 40:46

Maybe I could just add a follow-up question. So in short, could you possible summarize if the SDGs are more of a communication tool? Let's say, a company wants to work with, I don't know, three sets of goals, and it's their way of telling it to the world. But it's only working as a communication tool?

Anne 41:19

I think that there are two sides to this because I think that sustainability and the SDGs need to be a good business as well. It's not like you just have to save the world and don't be able to make your company run. So I think that it's important that it's communicated clearly and they use it as branding. I think that's really nice, but I think that this needs to be some accent behind it. And this needs to be some actually ambitious goals...

Frederik 42:03

Is there a danger that people are taking advantage of the image?

Anne 42:07

Yeah, I think so. Because it, I don't know, but that happens everywhere, greenwashing. But it's and that's, you can't really do that with DGNB. Right? If you have done the hard work...!

Frederik 42:26

Greenwash that's a good one. Okay. For the next question we have, we actually would like your opinion on what the industry needs to achieve the UN goals as a whole. So we would like to ask if the actors within the industry understand or recognize the need or the opportunity for adapting these sustainability goals into solutions.

Q.6.1 Do the actors from the Industry understand or recognise either the need or the opportunity in adopting solutions aligned with the SDG's?

Anne 43:11

I think, I think they really want to, and I see a lot of interest and willingness to do this. I just think it's it's still... I still think there are needs for a practical solution and support to get it operational and to get it... to get it done in practice because I think it's it's still a new concept, but I think there's a lot of willingness to do it. That's the short answer.

Daniel 44:00

Let me just add, because there will be that willingness, but this, there is also a commitment from the countries. To achieve certain objectives and goals.

Anne 44:14 Yeah.

Daniel 44:15

And this is a tool to help, isn't it? Because the main goal is to have fewer emissions, more respect, more balance within those three dimensions, the people, the economy and the environment. So the outcome, it's difficult to measure, point by point, but it will be the biggest one. Is the performance of each country, isn't it?

Anne 44:43

Yeah, yeah, you're right. And that's why we maybe need to measure the performance within the construction industry. But I don't know that's that will also be a lot of work, right, but, but it's some way where you can visualize the progress or if you're not getting any progress so I think it's if we want to get it from this abstract concept that it can be to some something specific then we need first of all the Danish indicators, and then we need some kind of baseline and, and the tools for measurement.

Daniel 45:27

And also to bring people in? Like in the sense that if people see, or companies, in this case, people that are working in companies with solutions, see the outcome of the that investment usually is an investment on a need to change processes. You need to change mentalities. And if you don't see an outcome on that, the business can be ruined by that perspective.

Anne 45:57

Yeah. So, I agree that we also need good business cases because it needs to be a good business case as well.

Daniel 46:08

Okay, but we have a question about it in the end, but okay, it was just to make a point here.

Frederik 46:16

We will also like your opinion about what you believe is necessary for reaching these UN goals with regard to the Danish industry. At this level, we actually made a few suggestions on what could be? It's like political regulations, work ethics, tools, education? But from your standpoint, what do you think is necessary?

Q.6.2 What do you believe has necessary for reaching UN's goals with regards to the Danish construction industry at this different level? Political / Regulations / Work ethics / Tools / Education

Anne 46:46

I think education is really important. And I think that we need to have a focus on that, in our education. And I think we have very much focused on this. But that's the first point and also as a practitioner to say that they don't have time, then they need to hire some of the students that are just getting out because they just had a lot of time to study this, this concept, right? And I think that new tools are something that can help make it more operational. So, decision support tools, dialogue tools. And also, these practical examples. I think that will be helpful as well, and of course, the regulations are somewhere that where you can push, push the industry even more so. Yeah, that was all of the themes, but I think everyone is important. Then you mentioned work ethics? Or was it? No, I don't think that's really an issue.

Frederik 48:07

We actually have a specific example of... Are you familiar with BIM?

Anne 48:17 Yeah.

Frederik 48:19

Because you could argue that BIM is the setup of it, having the knowledge of every material, the layout, etc. It could be a helpful tool to understand the processes needed, for example, in the circular economy and DGNB?

Anne 48:42

I don't really understand that. So, do you mean, how do we mean to link the criteria to a BIM model?

Frederik 48:51

It's because ... Since the companies and the industry can use this DGNB as kind of tool in order to maybe understand the process and the scope of the same sustainability issues, then it could be argued that BIM is also a tool that would bring a paradigm shift. But this is kind of a tease: but it wasn't as successful as expected when it got introduced. BIM in general. So, how can the adaption of the sustainability practices and in particularly the SDGs, become successful compared to the implementation of BIM?

Q.6.3 How can the SDG be used as a tool, so that companies and others in the industry understand the process and scope of sustainability issues?

Anne 49:54

I think that's a tough question, but it's, it's a good one. I don't know. I don't know if you can really compare those two concepts because BIM is more like a collaboration tool. I think that's some of the issues with it, at least where sustainability is... Yeah, I don't really know how to answer that question. But...

Daniel 50:29

Putting the simple question is the industry also tried to change the way it works. From the table, we can say from 20 years ago, the drawings came out from the table to the computer, and then from CAD systems to a BIM system based on information that can be shared and can be used for collaboration as you're saying. But given the circumstance of construction being a hard industry in the meaning that is difficult to change mentalities as, as we probably experienced, it didn't result as fast as needed. But we now need to change the industry again. But now towards a green concept and towards these goals. And we have that experience with BIM. So, how is it to change again, to ask the industry to change? You also mentioned that this is a project-based and the transfer of the knowledge also is important, because from project to project is completely different being in the factory in a linear process to a project that is different from the previous one. And this is different from the next one.

Anne 52:07

Yeah. I would say that even though the SDGs are quite new, then since the late 80s or something, then there has been an increased focus on sustainability. So I think that the industry has, has had the time to adapt. And I think that we've seen some companies, you know, focus on, let's say, the Passive House standards and, and other more. In the beginning, it was more environmental. The focus was more environmental. And we see that also for the first generation of the sustainability assessment methods were DGNB in the second generation more holistic in their approach to sustainability. So, so I don't think it is a new concept and or, of course, it is, but this should not be surprised, I think. I think it's evident that we cannot just change or stay in the direction that we are going now that some something needs to change. And so I think in that sense it's...

Daniel 53:33

...it's not new!

Anne 53:35

I mean, the SDGs are but not the sustainability concept. And what I hope to achieve... actually, I was at a presentation with the manager of Grundfos, who said that they actually closed down the CSR department. And now sustainability was just a part of all the operation. And I hope that in the future that we don't talk about sustainable building design or green buildings or whatever, but it's just buildings, and it's just an integrated part of how we do things. So I think there's really no way around it. And of course, with BIM like... Yeah, we had some requirements, like the IKT-announcement and so on. So, of course, it was a bit of a push there but then it was more like the idealistic idea of how we should work together. And I think here that we really have no choice. And I think that's just the way it goes. So we just have to change.

Frederik 54:58

We only have one more question with a couple of sub-questions. But in total, we have only two. So I hope it's okay for you. On the next question that we have a small to understand the challenges of adopting these sustainability goals. What do you recognize as challenges of implementing the SDGs in the construction industry? And also why you would see them as challenges? And if you could, we would like to kind of see both from the client-side, supplier side or and also the industry as a whole.

Q.7.1 What do you recognise as challenges implementing SDGs in the CI, and why do you see them as challenges? From Clients side, Suppliers or in the Industry as a whole.

Anne 55:44

If we're talking about the SDGs, and I think that it needs some time for people to understand and of course now I'm in the educational part of the system. So of course, I think more education because the first step of implementing is that, that the actors need to know the SDGs and know the, the concept. So, I think that is important. Yeah, what is another challenge? Of course, the obvious one, as I mentioned, is that we don't have the Danish indicators yet. I think that's evident to start setting goals. And yeah, what else? We were talking about political incentives and requirements. That's, that's also an important step. And...

Daniel 56:52

You mentioned the business!?

Anne 56:55

Yeah, I think that it's really important that it's still a good business and the We get some good business cases and good examples and good useful guidelines and really practical approaches for all, all actors and the feeling of commitment and ownership. And I don't really know how to do that. But I think it's so important that all actors in all levels of a project have a feeling of ownership to actually help achieve these goals.

Frederik 57:38

Since you mentioned a couple of few, could you maybe say which challenges are more significant than others? Perhaps due to some barriers that could exist?

Q.7.2 Can you identify if the challenges are more significant due to some barriers?

Anne 57:52

Yeah. I think that the knowledge that more actors need to be aware of the SDGs and we need to, Yeah, we need to make them easy to understand for the actors and needs to make them, I mean, make maybe make a guideline, focusing specifically on the different actors. And we have seen that, for instance, like the Byggeherreforeningen they have, like a manifest for the SDGs for building owners and how they can work with it. And I think that...

Frederik 58:35

... you mean the white pages?

Anne 58:37

No, they just made... they call "Bygherre Manifest", I think. And it's, it's just a, it's just a broad conceptual idea of how you can work with the SDGs. And it's not going into detail, but I think we need those Unions of the industry. We need them to commit as well for the actors.

Daniel 59:12

I am aware that one is from BIPS (MOLIOS) is not that one that you are mentioning because there are manifest in changing also.?

Anne 59:23 No, I don't know that one.

Frederik 59:28

Okay. So, based on this taking down to a small scale, how can organization or companies perhaps overcome these barriers and challenges?

Q.7.4 How can organisations overcome barriers and challenges?

Anne 59:41

And I think the first step is the management commitment. And I think that a practical step would be to make a sustainability strategy or a strategy regarding this SDGs or whatever. But I think that's, that would be a good framework to... because of the nature of construction projects, of course, that they change from time to time. And so I think if you have an all framework on how you approach the sustainability goals within your organization, then I think it's easier to set goals in the individual project as well.

Frederik 60:35

Okay. And the last question. Can it be said that the adoption of solutions compliant with the SDGs will be a question of business survival in the long term?

Q.8 Can be said that the adoption of solutions compliant with the SDG's will be a question of business survival in the long term?

Anne 60:55

Yeah, I think so. I definitely think so. I think that there'll be a request for sustainable solutions and I think that the public building owners are the ones who should and will be the ones in the front line who also set these goals regarding the requirements and I think it's their responsibility to do so.

Daniel 61:29

Like they are doing it with the DGNB certification? Because is the owner mainly, that request for a certain asset a certain building to be certified according to a specific level, the gold, platinum or whatever. But you cannot have, today, an owner requesting: "I want to achieve the highest level in SDG number 11" or something because there are no ways to do it?

Anne 62:00 No.

Daniel 62:01

So also the owners, the landlords also have this difficulty in requesting, and then you said also architects don't know where to start. And also the people are taking education the practical way, also don't know the SDGs. So, it's difficult to implement something that people don't see, people don't recognize?

Anne 62:30

I hope they will.

Daniel 62:31

But, you agree that people are aware of the SDGs or the goals as a concept?

Anne 62:37

And I think many building owners are, especially the public and housing associations. They are because they have a social responsibility. So they are. I know that many of them really want to do this but find it hard.

Frederik 63:02

We actually don't have any more questions.

Daniel 63:04

Yes, we have, but not now... in the sense that we have a lot of more questions. That's why we are researching, but not for now. I was just chilling a bit.

Frederik 63:21

Well, if you have anything on the last point, Anne, for us to maybe take into account_

Anne 63:32

No, but they... I think it's really interesting, what you're working with and if you have further questions, just let me know. And also, if I can read your project afterwards, it would be interesting.

Daniel 63:49 Okay.

Frederik 63:49

We actually discussed it early today that there might be a chance that based on the interviews that we were conducting, that we might be in need of maybe a follow up in some kind? We don't know that yet. But that could be a possibility. So if we are allowed to ask again.

Daniel 64:17

And I will send the link for that change to the 2023 objectives.

Anne 64:27

Yeah. And I'll send you that report I talked about earlier. I'll see how you get the recording. I think it will just publish itself actually in this room when we hang up. Otherwise, I will see how I can share it with you.

Daniel 64:48

Perfect. Thank you so much for your time.

Frederik 64:51 Yes, thank you.

Anne 64:54 You too. Bye

B.3 02-04-2020, Peter Boltau

Area of Expertise: Chief Executive Officer on the construction company TL-Byg, Aalborg. Aiming to have the most sustainable construction site.

Content: As a construction company, it is the end of the line and has less influence on early design decisions.

SUMMARY KEYWORDS

SDGs, sustainability, construction site, focusing, sustainable solutions, people, solutions, regulations, price, construction industry, tender, sustainability goals

SPEAKERS

Peter, Daniel, Frederik

Frederik 00:04

We already talked about it, but just to make sure it's on the record as well. So, the aim of this project is to understand if the construction industry is already aligned with the Sustainable Development Goals and if it can help to change the status quo of the environmental status. So, the purpose of our project is basically to collect knowledge about sustainability demands related to the SDGs and certification systems regarding the DGNB. And as I mentioned you just a minute ago, we kind of looking from the different perspective of different actors in the industry. For this interview, we will record it and as you agreed to, Daniel you will take notes, meaning that I will be the main to talk, but Daniel of course, if have anything will ask. All the information is that this is purely for academic purposes. So, if there's anything that you deem is a state secret, if you will, please say so because then we can...

Peter Boltau 01:19

We have nothing to... nothing is secret.

Frederik 01:22

Okay, cool. Because in that case, we can kind of make it secret, so to speak. So only a certain amount of people can actually read it.

Peter Boltau 01:34

So there's nothing that secret actually, on the contrary, I like to talk about this as much as possible because we're not doing very well in the construction industry, as I say.

Frederik 01:47

So the interview itself is what it's called a semi-structured, meaning that we actually have prepared some questions. But it is possible that we can diverge a bit in order to both develop the conversation but also if you maybe have some insight that we simply didn't expect you to have, then we would like to pursue that as well. So, in a sense, feel free to elaborate as much as you can on the answers that you wish. But if you choose to just say simple yes or no, we would like to have your comment on it. Just so we can understand the purpose of this yes or no question. And of course, this whole interview is conducted in English. But if you or I have some difficulties getting the right words, it is allowed to just go to Danish and then back to English again, simply because we're doing this project in English. And of course, for Daniel's understanding as well. So that is basically it. Daniel, do you have anything to add?

Daniel 03:02

Nice, okay, we can go. Okay.

Frederik 03:05

Cool. So I'm not quite sure if you've already seen the questions, but we have a total of eight, with a few subquestions as well. We've deemed it to be around an hour. But if it lasts a bit longer, we hope it's okay with you,

Peter Boltau 03:24

Then I'll have to call you back because I have a meeting at 11. I don't think that meeting will be that long. We're just talking about a specific project. So I need to leave at 11, and then I can call you back.

Frederik 03:37

Okay, that's okay. Either way, we thank you just for time for this. And so the first question is more about a general introduction of who you are and your background and expertise. So the first question is really, what is your organization working with right now concerning environmental solutions and for how long have you been doing it?

Q.1.1 What are you work with now concerning environmental solutions? And for how long?

Peter Boltau 04:04

Right now, I'm the CEO of TLBYG. I've been here for almost two years now. And we have a vision of we want to be that construction company in the northern part of Jutland having the most sustainable construction sites. So, my aim is to focus on the construction site because that's where I have hands-on. I can't choose the materials by myself, that's typically the architect and the engineers. So we can choose how the building has to be built and which materials are chosen. We can affect it in the discussions with the architect and the engineers, but they usually work for the customer. But I have completely hands on the construction site. So that's where I have my Focus. We know how to... and that's the, what do you call the sustainability? The verdensmål? What do you call that in English, the goals?

Frederik 05:12

The United Nations world goals?

Peter Boltau 05:15

Yes. So we work on that the goal number 12, where we, we have the responsible consumption in focus. So, we have a lot of initiatives on how we reuse materials or how we recycle materials. We work with a lot of nudging where we have several different container solutions, where we have smaller containers as close to the workforce as possible. So, we make sure that we reduce the waste and we can recycle and reuse a lot of the materials.

Frederik 05:50

For you specific, how long have you been working within this range of sustainability?

Peter Boltau 05:57

I started here two years ago. So we started approximately one year ago with this very focused initiatives

Frederik 06:08

Okay. And the next question we have is in relation to your approach from a collective viewpoint. So, the question is really what are the benefits to the construction industry from work developed by your organization? So, in this case, it will mean your work with sustainability number 12.

Q.2 What are the benefits to the CI from work developed by your organisation?

Peter Boltau 06:37

Yes, we collect a lot of data from... at the moment I think we are around eight or 10 between eight and 10 different sites. And we can now see that on several of these construction sites, we can reuse or recycle more than 90% of all the, what do you call this? the waste. So, this is very high for the industry.

Frederik 07:07

Well, that was a short and good answer. And the next question we have is, what is your perception about these United Nations sustainability goals for the construction industry as a general.

Q.3 What is your perception about the UN's sustainable development goals in the Construction Industry as a general/comprehensive view?

Peter Boltau 07:24

As a general, I think it's a good idea. What we did was we went through all 17 goals, and we picked out four goals that make sense for us as a construction company. We are focusing on goal number 4, which is quality in education. We need to make sure that all our people are well educated and also that we make sure that we get all the young guys while they are studying for carpenter, or as a bricklayer or whatever. Make sure that we have them in house, so when they are done with education, we can then hire them, then they know the company, they know the culture, and they know what we stand for. So, goal number 4 is very important for us. We also work with goal number 8, which is decent work. But here, it's more than the social responsibility that we are focusing on. We are part of a task force in Danish is called a small job with a meaning in English, that would be smaller jobs with a purpose. And here we try to help with people who are under limits to, to get into all on the border to get into to get a real job, they might be down with some kind of diagnose. They might be struggling with depression or they've been down with stress, and they have a hard time getting a job, then it's possible for me to use them on a construction site for maybe five hours a week. And this way, we take a huge social responsibility. And then we focus on goal number 12, which is responsible for consumption. And to make all this happen, we do focus a lot on this goal number 17. With this... the partnerships, we can do this by ourselves. So, we work a lot together with a lot of different... could be schools, it could be the university, other suppliers, whoever wants to join in, we make a partnership.

Frederik 09:26 Okay,

Peter Boltau 09:27

So we put all in 4, 8, 12 and 17. That's the main goal for us because it makes sense.

Daniel 09:35

Okay, I was about to ask that. If you are involved with some schools or some universities, and to which level? And what has been the outcome, I know it's a new project, you're saying it's roughly for one to two years, but do you have some feedback, some outcome on that?

Peter Boltau 10:00

With the schools, we're educating our workers. We have more than 10% of our workforce actually come from school at the moment. What do you call that? It's the "praktik", the internship. And the schools are always asking companies to take these interns, and therefore we have a focus that more than 10% of our workforce has to be these young people in internships. And then we also work with the university if I have some projects where I can use people like you where they can work on a project either it could be a project within supply chain management, where we combine it with sustainability. We also have "dimittender", what do you call that in English? Graduates. Where they've been educated through what they call "Det Grønne Rejsehold" (the green travel team)... And we had three of these students or graduates joining the company for four weeks. And actually, we prolong one of the one of the graduates for four months. And then after that, we actually hired her to be our project manager for sustainable solutions. Unfortunately, she just left the company because she was headhunted by another company. So, this is how we work with the universities and schools, try to involve them because then we get the newest theory and we can develop faster that way.

Daniel 11:48

Okay. With those partnerships, are you getting on board also the architects or is just related to the turnkey project or how it works?

Peter Boltau 12:03

All related to the turnkey project, yes. But it's on my strategy plan that this year I want to get a lot closer to architects and engineers.

Daniel 12:13 Consultant companies?

Peter Boltau 12:15 Yeah.

Frederik 12:25

The next question we have is more related to a broader sense of the industry as a whole. And it's really based on your opinion that we want on your sense of the industry as a whole. So what is your view about the current development in the adoption of these sustainability goals regarding...

Q4.1 What is your view about the current development in the adoption of the SDG's regarding the Construction Industry in Denmark?

Peter Boltau 12:48

In general, it's growing very, very, very slow, because in the industry there's a very ... it's almost only a price focus. We're all construction companies are focusing on building as cheap as possible. And therefore they, most companies, and I say most not all, but most companies, they think that it's more expensive to build sustainable. And I do the opposite. I can see that by focusing on how can you reduce waste, for example, I can see that we actually increase our efficiency on the construction site, because we work smarter. We need to find better solutions for the workers in order for them, so it's easier for them to get rid of the waste so we can recycle or reuse. And while we develop these new possibilities, we actually get more efficient on the construction site. So it's a win-win. But in general, construction companies don't see this as an opportunity.

Frederik 13:59

I know, I know that the general argument for investing in green transition is often that by doing this, you are also increasing the value of a given project. Isn't that a bit? Well, I know it's kind of contradicting what you're saying, at the trying to keep the price on low. I don't know what you think about that?

Peter Boltau 14:26

Oh, I don't know. It's too early for me to say I don't have any data that actually state one or the other.

Frederik 14:35

And we also would like to hear about your view about the different roles from different actors, meaning the landlords, for the architects for contractors, others, if you can.

Peter Boltau 14:52

If you start with the contractors, I think they don't, they don't... they all also focusing more on money than on sustainable solutions. So, they need to have a change in their mindset if we really want to change the footprint. But the architects, they really would build more sustainable buildings. But again, it's more or less always about the money. Again, also the engineering companies, they all they have all the solutions, but sometimes they are more focusing on winning the... I don't know what is called an English... "udbuddet"? the tendering. Yeah, and if the tender is based on the lowest price, then everyone is focusing on that price, and then it's on a compromise that you can build as sustainable as we actually want to. Don't know if that makes sense to you?

Frederik 15:50 Oh, no, it does. It does.

Daniel 15:52

I have a question here, Peter, by your experience, based on your experience: Do you receive, or have you received any tender process, incorporating sustainability as a differentiator?

Peter Boltau 16:07

Yes, we see more and more of this and hopefully is going in that direction. We see tender processes now where 50% is the price, and 50% is sustainability combined with how you want to organize the project. So we see more of this. And we actually bidding on one project at the moment called a circle, circle house in Aarhus. And yet 20% is the price. And then more than 50% is or actually more than more as small as 80% is, how will you build the most sustainable building ever built in Denmark? Building... it's, what do you call it? circular, it's, we build a building where we can actually tear down the building and move it afterwards.

Daniel 16:59

The dismantling of the building.

Peter Boltau 17:04

This is my first project, like this in Denmark. So we're going in the right direction. What I would like to challenge in this process, is take out the price just say, that the price is fixed and then make sure that the tender is more or less only based on how well you organize it was the function and the design of the building, and then 50% has to be sustainable solutions.

Frederik 17:32

Just to understand this fully: You think that by having the tendering process as a fixed price could accelerate the green transition?

Peter Boltau 17:45

Because then it's not the price that's in focus. If you say this building, you will have to build this building you have 50 million danish kroner then all the people all the construction companies who want to bid on it. We know we have to to be able to deliver a building that cost 50 million danish kroner then the price is out of the calculation, then the way you can win the tender is by showing that you can make the best building the most sustainable building the best design and the best organization, then the price is out of the equation.

Frederik 18:26

What is your view about the regulations are currently from the authorities?

Q.4.3 And the level of regulations by authorities?

Peter Boltau 18:32 I don't know enough about that.

Frederik 18:35 Okay,

Peter Boltau 18:35

Well, maybe you can be more specific. Which kind of regulations?

Frederik 18:41

With regards to sustainability, the public or the government could, of course, pursue more tougher or harder agenda when it comes to regulations.

Peter Boltau 18:55

Actually, I don't feel that there are that many regulations but again, don't regulate. Make, make it, make... we need to make the construction business make the entire change into sustainable solutions. And that's why I actually think that the tender process where if you can fix the price and make us come up with the great ideas, then you have it. That for me, that would be a game-changer.

Frederik 19:21

Okay. And the reason for this question is also related to the building regulations. Because if you didn't know this or know, these goals ... the goal for this is by 2050 all these goals is supposed to be fulfilled if you will.

So, by having the authorities pursuing this, then they might want to, at a slower or faster pace, increase the regulations to achieve these goals. So, the question is really what you're thinking of? Like, is it at the right pace right now?

Peter Boltau 20:10

Yeah. I would say yes, that's the right pace.

Daniel 20:16

Let me just get back a little bit. The previous question, because you're saying that tenders more and more are 50/50 either price and sustainability. And you feel this for more the private sector or the public clients? Who are pushing more?

Peter Boltau 20:34

The private sector is not pushing. Public Sector that's pushing because they actually have the possibility of doing it. The private sector is always focusing more on price.

Frederik 20:55

So, the next question is also again, from a previous perspective. And we would like to know that if you have noticed any changes in companies or entities stimulated by focusing on sustainability and especially and specifically on the SDGs?

Q.5.1 Have you noticed any changes in companies or entities stimulated by focus on sustainability and specifically on the SDG's?

Peter Boltau 21:17

Actually don't know if it's based on SDGs, but I can see that more companies like TL BYG, are focusing on the SDGs. But just because it makes sense, if you but... they are, most of them also only focusing on maybe three or four goals like we are, because we are picking the goals that make sense to to, to, to change the mindset of our people, because it is an old industry and it's an old culture, and it's difficult to change this culture. So, we need to find the goals where we can change the culture in small steps, but I can feed in more and more companies. Hustømrerne in Aalborg are also doing it. You can see that in Enemærke & Pedersen (Company) are making, they make huge changes at the moment. They actually, they actually have a guy who's only working on I think they call it a [karma process] of the company, which I think is really cool. So someday there are different companies where they are using the SDGs to change the culture. And I think that's, that's, that's a good way to do it.

Frederik 22:31

You just right now, you just said, changing the culture specifically. Meaning that while you are referring to that, it's mainly focusing on the people's viewpoint of the matter or is it also related to how the work of how they perceived things?

Peter Boltau 22:54

It's because then the construction industry is more or less... in special on huge projects - I don't know the word in English - but you work on "Akkord". I don't know what the word is in English, I think it's the same issue. But, but with working on a "Akkord" is that it's a price negotiation, you want a work, you want some work done, and you negotiate a price. And the workers, they just want to earn as much as possible. So, I would like my guys to... they are allowed to work and earn as much as possible. But I also want to introduce sustainable solutions. And the first thing they look at is if I make a sustainable suggestion, they look: "will this make me work faster or slower?" Yeah. So if I make something that makes them work slower, they want more money. So this is the this is where we need to change the culture, that it's not always about earning enough money for them personally. It's also with TL BYG to be here in the long term. Because I actually believe that TL BYG will be here in the long term because we are going to be one of the most sustainable companies in the northern part of Jutland. So this is my dilemma. I need them to make sure... I need to make

sure that they earn enough, so they stay. But I also want them to change the mindset into a sustainable mindset.

Daniel 24:24

That's why you are working with schools and education? Because people will probably use their skills to work and to do the work as usual with some new innovations if sustainability is related with innovation, but is the mentality to embrace new solutions and do it differently than they are doing for the experienced or if you are new people as they are educated?

Peter Boltau 24:52 Yes.

Frederik 24:55

And the next question is more related to the future, per se. Because right now we've talked about more of the current status in the industry, both from your side, but also on a bigger scale. And the next question is therefore about Yeah, going to future. And, and we would like your opinion about, do the actors from the industry understand or recognize either the need opportunity in adopting solutions aligned with the SDGs?

Q.6.1 Do the actors from the Industry understand or recognise either the need or the opportunity in adopting solutions aligned with the SDG's?

Peter Boltau 25:27

I can say, from my own, where I seat, I hope that they don't see the opportunity because that's going to get me a heads up on the competition. But because I don't see that many construction companies actually see this as an opportunity. I saw this for more than a year ago, and that's why we've been focusing a lot on it, and I can see now that people are contacting me because of they... "Oh, we can have this very sustainable construction site where we reuse recycle more than 90% of all the waste." So, this, so... I hope that people, and also the industry can see that what we're doing is actually we are trying to change the game plan. And hopefully they will copy because then we can get the entire industry they needed looking at the resources that we know we won't have resources forever. So hopefully we can change the industry.

Frederik 26:28

And what do you think is necessary for reaching the United Nations goals with regards to the Danish construction industry as a whole? We actually have a few suggestions of what that could be. But we really want your opinion on it. But we suggested that could maybe be a political incentive, harder or easier regulations word ethic tools, education. But in general, we would like to know what you believe is necessary for actually reaching these goals?

Q.6.2 What do you believe is necessary for reaching SDGs with regard to the Danish construction industry? For instance, at this different level: Political / Regulations / Work ethics / Tools / Education?

Peter Boltau 27:08

Actually, I think that someone is leading by example. Because there's a lot of looking... we're always looking at each other at the moment to see some, some of our colleagues, "are they doing something that we are not doing? And they can we copy it?" So, I think that if we are a handful of companies where we can lead by example, I think the rest will follow very quickly. I also think that there could be some incentives, but it's just for me, it's difficult to see how to make these incentives so they will work.

Daniel 27:43

Okay. Can you point some?

Peter Boltau 27:46

It could be the tender process; you could make that... you could get extra for building more sustainable thinking out of the box. And again, they expect the tender process because the entire industry based on the tender process.

Daniel 28:05

Do you think that the owners that have more capacity, like the... I mean the financial capacity, like the house associations and so on? Because I hear I hear, if they want something and they point a certain direction, everybody tries to follow that. When you say followed by example or look at others are doing, they can be those leaders to push the agenda for more sustainable solutions.?

Peter Boltau 28:43 Yes. Also, yes.

Frederik 28:47

The next question we have is a rather big one because it builds on your knowledge of BIM. Are you familiar with this term?

Peter Boltau 28:59

I know what It is, but I'm not working with it myself. But I'm very focused on it because I think that's one of the that's where we actually can also make big changes.

Frederik 29:10

Okay? Because our question is because you can argue that SDGs can be used as a tool for companies and other industries to kind of understand the process and the scope of the sustainability issues. But it can be argued that BIM is also a tool that would bring about a paradigm shift. But when it emerged back in 2000, it wasn't that successful as expected. And so the question is, how can the adoption of sustainability practice and in particular using the SDGs become successful compared to the implementation of BIM?

Q.6.3 So, compared to the implementation of BIM, how can the adoption of a permanent sustainable practice and in particular the SDGs become successful, if BIM was not?

Peter Boltau 30:01

Well, he can if you focus, especially on goal number 12. And I'm working very close with Ramboll because Ramboll, they've been a bit... they have built their own what they call a green BIM. They can build a model, and then they can say in what degree of sustainable solution would you like. So they can make a BIM. This is how we usually do, but if you want to build in, in more sustainable material, they can change it in the green BIM, and then show how it will affect the building with respect to sustainability, and also is it more or is it less expensive. So they are really... they have really been focusing on this for the last three, four years. And I can give you the name of the girl who's been building this green BIM for the last couple of years. And that's really, really interesting because that can also be a game-changer.

Frederik 31:00

Is the person you're speaking of is it by any chance Jeanette?

Peter Boltau 31:07

Oh, yeah, I think its Jeanette. I don't remember her name, but I can find it.

Frederik 31:13

Well, I used to work with her. Both me and Daniel have just been from an internship. I've been at Ramboll and Daniel I've been at COWI. And I now Jeanette because he's DGN certified.

Peter Boltau 31:30

Jeanette Sørensen. She is DGNB consultant.

Frederik 31:41

Okay. The purpose of the next question we have is to understand the challenges of adopting these sustainability goals. So We'd like to hear what you recognize as challenges implementing the SDGs in the construction industry, and also why you see them as challenges? And if you can, from the client side, or supply side, or the industry as a whole.

Q.7.1 What do you recognise as challenges implementing SDGs in the CI, and why do you see them as challenges? From Clients' side, Suppliers or in the Industry as a whole.

Peter Boltau 32:19

The challenge is that you have someone... you need to have a person or a function that's that is living, the sustainable vision 24/7. You need someone to push, push, push. Because if you think that you can just go and say now I want to be sustainable, I want you to, to make sure that we recycle and reuse the waste. You can say it, but it's not just going to happen by yourself. You need someone to live the dream. And as soon as you loosen the grip, they'll just go back to do what they did before. So the way to change this, you need to have a person or function that's working on the sustainable solutions all the time. And this is both on the construction side, but also on the supplier side, because the suppliers will always just... Also, if you ask for a price, they will give you the lowest price. And if you don't ask well, they said, Oh, is it also sustainable material? They say we don't know, but we can find out for you. So you need someone who looks both at the construction side, but also on the supply side. Then you have all the subcontractors. You need to get close to them. Because some of them it might be a small company with 10 guys, and they don't work with sustainable solutions. They just have to make money. And you need to have a person or function that works 24/7 always finding the most stable subcontractor solution.

Daniel 34:03

Peter, I can make an analogy with the past when safety was introduced to the construction sites, hardly. People know about, I don't know, around 90s or beginning, the reference, my experience back in Portugal, in the 90s. People were aware of the safety, but until it was mandatory, and there were fines and put everybody in the same mentality, the results were not coming. And so, at a certain point, I think is what you were saying you need to have someone dedicated to that process and to push as safety was introduced in the construction sites as the main concern. And with the power also to stop the construction sites at once. But with sustainability, how to do it, how to deal with it? Is it pushing the... I know I'm getting back to something that you talked about, the regulations. Because you talked about something that we don't usually hear: "let us do the work". But with regulations, don't you think you put everybody in the same pace in the same boat and doing the same thing towards sustainability?

Peter Boltau 35:41

Even in safety, we have all the regulations on safety, but I still need to have... I have my own consultant, a safety consultant, travelling all the time on all my construction sites to make sure that we follow the regulations. As if as soon as he stops, I can tell you then people will try to - what you call it? - Do as little as possible. Even with regulations. But for me, I, I invest in a safety consultant. And what he does is he travels around on all the construction sites, and he coaches them and makes sure that we are always on top of the situation. So, we go out there, and we talk to the guy, so they know that we mean this. And that's even when we have the regulations. On the on the sustainability agenda, I don't have regulations, but I'm doing exactly the same thing. I need to have a sustainability project manager who works on all the construction sites to make sure that we find the best sustainable solutions that fits all. I could do that without regulations.

Frederik 36:54

You kind of identified some of the challenges so far. But would you say more? Some of them are more significant than others due to external barriers? Or internal barriers?

Q.7.2 Can you identify if the challenges are more significant due to some barriers?

Peter Boltau 37:17

I think... I don't know if it's if external barriers are bigger than internal barriers, I can just see that it's not part of the mindset of the people yet. It's still something that they have to, I need to remind them all the time. I think this you know... it just goes in your own apartment or your own house where you live. Why do I need to do something because I'm just one person out of 6 million Danish people, the world doesn't matter. It doesn't really matter if I make a change, but it actually just start by yourself. If we don't start some, if we don't all start at the some point, nothing will ever happen. And I think people in TL BYG, the workers are still where they think, well, it's not gonna matter if TL BYG is the only construction company doing this. But we need to make the.. we need to take the lead and show by example. And actually I, I, can hear now that more and more about workers they actually think this is... this is really cool.

Daniel 38:26

So, we can say that is the sum of the parts. Yes, not individually, but is the sum. Isn't it? The concept that you're explaining?

Peter Boltau 38:34

Yeah. Again, you need to understand I'm the CEO of the company, and it stuck with me. So I need to make sure... it's not, it's not an option for me to say, Okay, we'll, we'll relax for a couple of months. As soon as I do that, everyone will say then it's not important anymore. So I keep the focus that every single day we talk about sustainability.

Frederik 38:57

The barriers that are already identified have you found any solutions to these that to overcome them? Because you already mentioned a lot about their mentality and culture. But, well, not only that but are there some barriers that you already overcome with regards to sustainability?

Q.7.3 There are already some barriers identified as well as solutions to overcome them?

Peter Boltau 39:27

So, say we've overcome this, is this just something that we are trying for a short period? No. Now, people, they know this is this is it's part of our strategy now. So, people, they know that we were working on this and it's a very, very important focus for us. So that's actually the first barrier. So now I have all the project managers they know this is this has to be part of the construction site, so they're working on it, but I still need to have this project manager with the only gold To make sure that we have the most sustainable construction site in the northern part of Jutland.

Frederik 40:12

How can an organization, in general, overcome these barriers and challenges? What should organizations basically do?

Q.7.4 How can organisations overcome barriers and challenges?

Peter Boltau 40:22

But what we do is once a month, kind of once a month, we have these internal alpha meetings were, where we where we tell about the experiences we have on the different construction sites, what's going well, and what, what didn't work, and then we have this we have discussions about what to do from here. And that works because then they also the people they can come with, with with what they have on top of mind and we go into all discussions also under construction site. But this way we challenge all the time. How can we improve?

Frederik 41:05

Based on the other interviews we've had the kind of suggests that there needs to be some sort of a strategy based on a base of knowledge education, but also a framework to work off. Would you agree?

Peter Boltau 41:22

Yes. Building a framework, make it as simple as possible, we are making this very simple, we are saying that we want to make sure that the construction site is sustainable as possible. And that means choosing simple container solutions, making sure that we pick the right solutions for the right tools where it's possible to survive materials. So, we try to make it very, very simple, and that works.

Frederik 42:00

Okay. And the last question we have is: can it be said that the adoption of solution compliant with SDGs would be a question of business survival in the long term?

Q.8 So, can be said that the adoption of solutions compliant with the SDG's will be a question of business survival in the long term?

Peter Boltau 42:30

Actually, I think yes. But that's because I have a very big focus on on the goal number 17, which is partnerships, and you can't do anything yourself. You need to partner up with the right companies in order to to move forward. And I think if you see that as an opportunity, there are so many solutions in working sustainable, that will make you a lot more efficient. So, so yes, it might actually be a matter of survival if you do or if you don't? It's a tough question because yeah, and sometimes I think that the 17 SDGs it's also just common sense. And if you don't have common then you won't survive!

Daniel 43:21

That is the concept of, I think you have already said that because it's... if you don't do and if you stare to the side, someone will do it? So is the business survival in this question is in the sense that it's unquestionable that sustainable solutions should be part of the mindset. So, if you don't do it, your business was going to suffer. Can we say like that?

Peter Boltau 43:58 Yeah.

Frederik 44:03

And well, that was actually the last question that we had. So if you have anything as a last note, please feel free to say so.

Peter Boltau 44:17

You know, I can send you a very, very simple illustration I've made. So it was which I showed the company here. So, people, they understand what our focus is because it is a variable, one-page illustration that just shows how we are focusing on and if I could send that to you, and then you can, you can just throw it away, but it's very much how simple you can actually look at how you want to work with the SDGs.

Frederik 44:50

Okay. Well, both me and Daniel will say thank you for both for your time and contribution. When we are done with the project, we will, if you want to, we will, of course, share the outcome of it. But we, based on on the process that we currently have, we might need, maybe a follow up some kind. It could be either a small interview or maybe a small questionnaire. We don't know yet simply because of this whole current status of the country. But yes, if there will be okay then. But again, thank you for joining so much.

Peter Boltau 45:40 Okay. Bye, bye.

B.4 22-04-2020, Lau Raffnsøe

Area of Expertise: Specialised in building energy and climate. Auditor and Technical Director in Green Building Council Denmark, DK-GBC,

Content: Deep knowledge in the area of DGNB construction certification system.

SUMMARY KEYWORDS

SDGs, sustainability, sustainable, Denmark, certification, BIM, indicators, construction industry, goals, organisation, understand, owners

SPEAKERS

Lau, Daniel, Frederik

Frederik 00:04

Our project aims to understand the progression of sustainability development in construction in Denmark. And we are trying to look into the... how the Industry is adopting these with respect to the SDGs. But also, kind of understand the limitations and challenges are there currently. And as Daniel mentioned, we would also like to record it with your permission, of course. The whole interview has eight questions, and we have a few sub-questions. In our experience so far, it takes around an hour, depending on how much we talk. And so I hope that's okay with you.

Lau 00:54 Yeah, that's good.

Frederik 01:16

I will keep track of it and make sure we don't exceed. Okay. Just to give a short presentation of the way: you can divide it by first understanding your background, giving an understanding of you, but also the work that you've been doing in the organisation you're part of. Then we will like your view of the Danish Industry with regards to development goals. And lastly, we would like to have your point of view on how to maybe advance forward in general in the Danish Industry concerning the sustainable goals. So, the first question is then a general introduction, and we would like to ask you, what are you work with now concerning the environmental solutions at GBC-DK.

Q.1.1 What are you work with now concerning environmental solutions? And for how long?

Lau 02:34

Yeah. I'm an engineer by education from the Danish Technical University, where I specialised in the building's energy and indoor climate. And then I worked for a number of years as a consultant engineer with low energy buildings and as sustainability-focused on energy and indoor climate. So passive houses and low energy class houses and stuff like that.

Frederik 03:14

And how long have you been with the GBC as well?

Lau 03:19

Seven years. Since I started at the GBC, I was the first technical person at the GBC. So I came on board, maybe early. We have the 10th anniversary this year as an organisation. The Green Building Council was started up in 2010 - in April, actually - by some of the larger firms in Denmark like the engineering, architectural firms and construction firms and some building owners. I wasn't part of it, so it's only by hearsay. But the main point is that it was the building industry that got together and said: "we want to have a building certification scheme as a sustainability certification scheme, because we need some kind of driving force for sustainability." And we, we want to have it... So we have one system in Denmark. And they spent the first couple of years exploring whether it should be the BREEAM or the LEED system. And then the DGNB was quite new at the time from Germany. And to my surprise, and I guess most of the industry surprise is the decision was made to base the Danish certification scheme on the German one. But it was much more, I think it was a newer system and was much more based on European norms. And it was a much more comprehensive approach to sustainability as it takes into account the economic sustainability

and social sustainability in a much more throwaway, than the leader the BREEAM systems did at that time. And also, it was based on lifecycle analysis, which was very new and unknown as a field of expertise at the time.

Frederik 05:37

Okay. What would you say is the main goal of your organisation?

Lau 05:48

The main goal is to promote sustainability in the building environment. So, it's a very broad goal, but the main tool in the toolbox is certification. Because that's it a really effective driver. So it's not that... So, basically, it doesn't say it in our main goal of the organisation, but it is effectively the main purpose of the organisation. So, we are a member organisation. So our academy is based on member fees and then of course, our teaching programs. We make a lot of different courses from which we make some money.

Frederik 06:40

Based on the fact that this was your main goal. I'm expecting that this might involve meaning that your goal today might be different?

Lau 06:51

No, I think it's quite the same actually. Of course, we have a much firmer technical background today and developed the specifics, but the overall goal is exactly the same: to promote sustainability in the built environment and do it by certification because it sets an effective driver because it's a carrot, it's not the stick, so it's a positive force. And we have been quite successful as it is really taking off doing certifications in Denmark and, we have a lot of impact also on the buildings that are not being certified, and that is maybe the primary indicator of success. We are also implementing how you design and build buildings, even if they're not being certified.

Frederik 07:53

You wouldn't say it might have been prompted by anything because again, like for example, the STDs very centred at the current moment. So you can you argue that, that your goal is also to perhaps achieve these SDGs through your certification system.

Lau 08:18

The certification was way before the SDGs. And, and of course, they're very much aligned. But the SDGs they're just... very... idealistic topics that you are supposed to, to work on. It is not the tool to implement. And so the SDGs is interesting, as a tool as, yeah, it's a tool to get to talk to people, because a lot of people that are very, very interested in the SDGs at least They talk a lot about it. But it doesn't really... it doesn't matter if it doesn't have any consequences if it doesn't move the organisation if it doesn't change anything. And that's much easier with the certification scheme because as a both because we have indicators. So, we are measuring all the time. So we can see if this so we can measure it if there are changes in how we built.

Daniel 09:31

Can you confirm that the DGNB is construction industry centred? Probably people from the construction industry that are involved, they know. But the SDGs is more worldwide known because it's not industry-specific, it aggregates all of the industries. Is that what you are explaining? As that is idealistic is something that humanity needs to achieve, and every part plays a specific role to achieve it.

Lau 10:08

Yeah, the SDGs are in a line of a lot of similar projects where you have put these goals, these ideas up on a pedestal, and then you want to promote them. You want to say: "Well, this is the goals that we should work towards". But if you don't include specific, measurable indicators and goals for how far you should get it won't change anything. Have you ever heard about the Scandinavian as in the Nordic countries, they had these large projects a couple of years ago called... sustainable... I think... no.... how is that called? I don't I just get the mind but is where the Nordic countries together spent like 150 million kroner on this project and

made this manifest. Thousands of people and companies as assigned a name on the charter, and it didn't change shit... it was... it didn't make any difference at all. But we spent a lot of money on it. It had a really, really nice home page. And I have this... it's not that I'm against the SDGs. I think they're really interesting, and it's a really nice tool to get to talk to people, but they won't change anything on their own. Because the judge (?) goes and everybody can say yeah, of course, we like it, it's really good, but it is only if you transform it into something that you can measure and track that didn't make changes.

Frederik 12:11

And because you mentioned this project... I understand you can't remember it, but if it's possible, like if you have any information about it, maybe a webpage about it. Could you possibly share with us afterwards you would like to take a look at it?

Lau 12:49

Yeah. I get back to the pop up sometime, as I remember.

Frederik 12:54

Thank you. And the next question we have is about what are the benefits to the construction industry from the work that GBC are developing?

Q.2 What are the benefits to the CI from work developed in the organisation / by you?

Lau 13:22

Yeah. We are formed by partners in the Industry that wanted and could see there was a need for change in the Industry. And so the companies, whether it's construction firms, engineering firms or whatever, there's a lot of people who are very invested in this agenda of change and sustainability, and they wanted to have some kind of driving force that could make it ... that could make building owners and other parties in the building industry see an advantage by doing sustainable buildings. And certification is really good for that. Because it makes it much easier to communicate that you are doing something positive, something sustainable. And it's because before we had this certification and we still see it, people will take this building and they will promote it as sustainable. And they want to explain why it is sustainable. And they'll maybe point to some solar PVs on the roof and say, well, it's sustainable because it has solar cells, it says a PVS... or it has a skylight or something very specific, that might not actually be very sustainable. Because it's really difficult to say what is the sustainable building because it doesn't show on the surface, you can take two buildings that look exactly the same. One of them can maybe have like, three, four or five times higher environmental footprint than the other. And you won't notice that you can see it. It's hidden beneath the surface. So, certification makes it easy to communicate well, we are sustainable because we are following this, this accepted scheme, these measurements, these indicators, and we are performing, so and so, compared to the rest. And for building owners, it gives them a possibility to talk about sustainability on a much firmer ground without being in the risk of being told they're greenwashing.

Frederik 15:54

Yeah, that's what this concept about taking the image of being sustainable without really knowing how.

Lau 16:06

A couple of years ago I read this article about a building ... they're really promoting it as sustainable building and probably was, but in the article as the arguments for why it was sustainable was the head and possible to charge you an electric vehicle in the parking lot. So the charging stations and the maybe also some solar cells on the PVS on the rooftop, something like that. I said but, so sustainability was as a simplified down to being "Can you charge an electric vehicle? I have PVS and on the rooftop." And, based on that it would be as my whenever the article that was like, wow, is that their definition of sustainability? Wow, that is really low. But I don't know it might be a very sustainable building. But it was really you can't communicate it because they don't have any metrics for how to communicate and how to measure it.

Frederik 17:17

The way that it is presented it was really simplified?

Lau 17:24

Yes, exactly. One point that makes the building owners in a position where they communicate their sustainable effort, but it also makes the building industry as a whole has a single... you can say... like a language, for how to measure and how to build sustainable. So, between firms and different kind of parts in the value chain, you have the same metrics for what it is sustainability. And that makes it much easier for the Industry to change. Now we have this same standard for what do you care about! And what is better! What is worse!

Frederik 18:17

Okay. So, in really essence you have the same baseline to work off?

Lau 18:23 Exactly.

Frederik 18:26

The next question we have is more related to sustainability goals. We would like to know, what is your perception about the UN sustainability goals in the construction industry? In a maybe general or comprehensive viewpoint? And I can also make a note about the book your organisation made about the SDGs and the DGNB?

Q.3 What is your perception about the UN's sustainable development goals in the Construction Industry as a general/comprehensive view?

Lau 18:56

Yeah. And this set is quite superficial. How the actually the booklet just say well these criteria in the DGNB system, they are more or less aligned with these SDGs indicators. And in the next one, we are working on we are going to have a specific and say which of which as indicators are we aligned with and in how much as in what degree is it very much aligned just a little bit. Just to give an overview of saying, well, if you want to work with these indicators in the SDG system, then you should work these criteria in the DGNB system. And as it turns out, maybe many of the indicators are represented in the DGNB system in some fashion... I think the indicators, the SDGs are quite good as putting some... putting a frame that it is complicated. The sustainability is not only a long life or as a low environmental impact as a climate change impact is a lot of things. And we cannot have a sustainable future if we don't achieve sustainability in a broad sense. It's not sustainable to have a very low environmental change impact if we, on the other hand, have a very undemocratic, maybe unjust society. But my point of view, most specifically in the building industry is that the main obstacle is climate change. If you don't solve how to move the country construction industry into a "Passive City", a much less... we have a much less environmental footprint, all the other indicators of sustainability have no meaning. So that is the great one because that's also the most difficult one.

Frederik 21:24

Okay. The next question we have is, well, you might have already said it, but since you argue that the SDGs are really in line with how the certification system works, we would like to understand what your view is about the current development in adapting these SDGs on the construction industry.

Q.4.1 What is your view about the current development in the adoption of the SDG's regarding the Construction Industry in Denmark?

Lau 21:53

Yeah, I don't know much about it, and I haven't followed the work I see it when started up, and I said, "well, good luck". I don't think much will come of it except a lot of meetings and maybe a report. And I have a profound dislike of reports that are being made and then put on the shelf. It's because I haven't seen any thought on how to implement it in the Industry as a tool or as an agenda that will change anything.

Frederik 22:37

Yeah. I can maybe just add something here, because from me and Daniel's research so far we can tell that the SDGs are a bit broad of course, but they also are really specific but to the degree that they allow each country to take these and make their own adaption to how they're going to reach their individual goals. And currently, from what we can understand, they are following and not all the SDGs, meaning how they are studying the progression of each goal by indicators. So, my point is that since you are working with this, both in your own work but also within the Industry, if you had any feeling or understanding of that, that the progression in the Danish society is really far...

Lau 23:50

Denmark has a huge environmental impact. Is really huge. Depending on how you, of course, you measured but, the overall environmental impact is large because we have... we import a lot of stuff built. So we import pollution actually if you can see it like that. What do you call it? The embedded energy use in products. So, so when we include not only what is being produced in Denmark but also all the things we buy, we have a huge environmental impact because we are so rich. And I think this national approach to say well, we want to improve is, is.... of course, it's good as we are improving in our own backyard, but we shouldn't forget the larger picture doesn't really matter if you just export the polluting industries to other countries. Therefore, I have been working with this "*clima partnerskab*" this industry partnerships with the government. And we are working with how to how to as to two ideas for how can the Industry lower the CO2 emissions. And one of the boundaries, as stated by the government, was that we should only count the Danish CO2 emissions because of course, their goal is to lower the Danish CO2 emissions. But in the building industry, we import products from all over the world, mainly from EU, of course, but from all over the world. So, the easiest way would just be to say, well, we just close down the Aalborg Portland cement production facility and just buy from Germany. So is Germany who has the CO2, and then we are in the clear.

Frederik 26:10

You are saying that the government is really disregarding the whole holistic view?

Lau 26:17

Yeah, it's easy to as... of course, didn't say it outright, as because of course, we should also take international emissions into account. But the way we counted is through the National Board. And when we come to the building industry, we said, we don't want to do that we want to measure counted on the building level, independent of where the products come from, because we never know. We never know where the brick was produced as a not initially at least other cement or the glue or whatever it is. So we want to count it on the building level and say, well, we want to make... to count it and we want to make demands in the building code for what is the limit for how much CO2 can be embedded in the building products used to make this building.

Frederik 27:16

Just to round off this question, we would also like to hear your point about the role of being played by different actors like landlord architects, contractors or maybe as authorities? In regarding this matter.

4.2 And about the role played by the different actors: Landlords, Architects, Contractors, others ?

Lau 27:33

Yeah. I think the parties that I'm most impressed by is actually some of the pension funds and the social housing organisations in Denmark at least, who have really... both of the parties have been, on this sustainable agenda in a long time, and are really taking a step further in the last couple of years by doing certification and other actions that are working really ambitious with the sustainability agenda. The consulting firms' engineers and architects also have a future role but a much more personally involved in the agenda so it's a base much on and specific people with who wants to do sustainable buildings but they can only do so with the building owners actually want to... as demands it because they're picking up the tab.

Daniel 28:48

But don't you think that they have that role informing the owners or to push for a greener agenda the ambitious agenda?

Lau 29:02

Very true, very true. So, in Denmark in the Green Building Council, as the first many, many years, the primary actors were the consulting engineers and architects. And they put all the hours and all the work into it. But, but it's only because the building owners actually have a demand for certification and for sustainability that it is being implemented in actual projects as an actual building. And some parties we don't see on this agenda, as the state as a building owner, totally absent. We see some of the municipalities and some of the regions... that the public as a driver for sustainable buildings is present but it's not from some central, from the government, from the state level.

Frederik 31:08

Okay. And the next question we have is, is by really broadening the view because we would like to understand if you've maybe noticed any changes in companies or entities stimulated by this focus on sustainability and specifically the SDGs?

5.1 Have you noticed any changes in companies or entities stimulated by focus on sustainability and specifically on the SDG's?

Lau 30:31

Yeah. I don't know so much about the SDGs, but I can see that the building component producers as the production companies, they have changed the attitude has changed quite remarkably in the last couple of years. Because they consider that sustainability is a driving force. It's a competition parameter so, if you can prove that your product is more sustainable than the competition, you have the upper hand. And we've seen more and more companies being focused on the agenda and making EPDS [Environmental Product Declaration] and optimising their production facilities. Some of them have been doing this for many many years. And but we see it in a new larger scale.

Frederik 31:35

Could you just elaborate what an EPD is? [LOST RECORDING]

Lau 31:37

I see people with very busy schedules taking days and days of the schedule to work on it with almost no notice. I was really impressed by it. And it is because people see that this is necessary and said follows society and for their companies. If you don't embrace this agenda of change, then they're probably not existent in 10 years.

Daniel 31:37

Actually, we have a question at the end about it, but yeah, but we can come back to that subject. But let's follow the framework.

Lau 32:20

A good example is the concrete Industry. With Aalborg Portland and the concrete producers in Denmark. They as an organisation as a combined organisation, but also individual firms have taken this agenda and said: "well, we can see that our product has a huge environmental impact. But still, we need to make concrete for buildings and for other purposes, more sustainable". Of course, they don't want it because, of course, it is, it is that purpose. But also because we can't make buildings without concrete. It is really difficult to make a lot of different kinds of buildings without concrete. So, instead of saying, well, it doesn't matter, they have said: "well, of course, it matters, and we must make it as sustainable as possible". And other firms like the brick industry, they have said: "Well, we don't need to change because our product is very sustainable because it has a long lifespan." And that is a different kind of approach that I don't think will be aged very well. So, in 10 years, people will look at them and say: "Oh, you dinosaurs; Why didn't you start changing 10 years ago, where all the rest of the industry had changed?"

Frederik 33:53

Could you argue that the change could be addressed by, let's say, newly educated people? Within the Industry?

Lau 34:03

Yeah, and we have educated like 700 DGNB consultants in the last 7 to 8 years something like that. And I think that is maybe the biggest change we have made to the Industry that is as all consulting engineering and architectural firms and many, many, other different kinds of firms as companies in the value chain in the building industry today has somebody who has an understanding of sustainability and certification and what are the main topics that are supposed to... and they can change in their companies. I think that makes a huge difference and we have educated people in the Industry.

Frederik 34:54

The next question we have is kind of related to this question as well because we want to ask is: What do you believe is necessary for reaching these sustainability goals, with regard to the Danish Industry? And to maybe help you a bit? We've also made some suggestions on what that could be: It could be a political action needed or maybe some regulations, it could be addressing the worth ethics. Maybe the tools available or the current education?

6.2 What do you believe is necessary for reaching SDGs with regard to the Danish construction industry? For instance, at this different level: Political / Regulations / Work ethics / Tools / Education?

Lau 35:30

So first off, I will say, I have no idea if it's even possible to get to the actual sustainable Industry because all buildings have an environmental impact and so, I don't think it's the end goal, I have no idea how to get there, but I have some ideas on how to get on the right path, how can we change today and become more sustainable, but, but how to get absolutely sustainable, I think that is for future generations to figure out. So how to get more sustainable? I think the past has been set up being implemented, now that have been proposed now about this sustainability class in the building code, and make it make it mandatory in 2023. I think it was... to make a... to make LCA calculations and then put a limit on it and say how much... I think that is the right path. Because as the, the energy usage in buildings, of course, needs to be more and more effective, as a lower level, but the main change is in energy systems. But the main environmental impact from building products the buildings materials, and by... to build more in wood for example or in other materials that have a much lower environmental impact than concrete and steel. So, I think that is the right path to say, and that is also what we do with a certification to say, if you want to, to really change how the environmental impact of the building industry we need to change the materials and the production of the materials.

Daniel 37:47

So, can we say that it is step by step, not doing everything at the same? But the United Nations agenda have put some deadlines... How to deal with it? Even though Denmark is a leader in adopting solutions. How can the Industry go step by step? Do you see it at a slow pace?

Lau 38:19

Oh, this is a 70% reduction. I said so of course, it's ambitious, and it's difficult, but, but that is nowhere near sustainable. So we need to get much, much, lower, as a society, both nationally and internationally. So that is only the first step of many steps that we need to get to below CO2 neutral if we need to offset the climate change. And that is the point that nobody knows how to do. And I have never heard about any realistic projections on how to do that.

Frederik 39:16

We have around 20 minutes or so. The next question we have is maybe a bit back, but can I presume you understand the concept of BIM?

Lau 39:30 Yeah.

Frederik 39:32

Because it can be argued that BIM was considered a tool that could bring an industry paradigm shift, but it wasn't as successful as suspected, probably due to its maybe conservativeness characteristics. So, compared to the implementation of BIM, how can the adoption of a permanent, sustainable practice in particular with the SDGs become successful?

Q.6.3 So, compared to the implementation of BIM, how can the adoption of a permanent sustainable practice and in particular the SDGs become successful?

Lau 40:15

As BIM is only a tool that makes it easier to do more complicated planning, designing of buildings. If you go 100 years back, you could, you could design a building by making maybe two or three drawings. And then you knew all the different... how to make all the different details in the building. And then we discovered CAD, like computer-aided design, and then you could not make more detailed buildings but what you get is just more difficult as more detailed designs, more different designs, you didn't really get a huge increase in the production of buildings effectiveness. And now you see the same with BIM, that, of course, you can make it so you can use it as a tool, but it is mainly being used to produce more and more complicated buildings. So, I haven't... I've never seen the really good explanation for why it should produce more sustainable buildings that you can use BIM, as a necessity seen anywhere the link between those two topics!

Frederik 41:42

It's because that the reason why we're asking this is because BIM is in the sense of understanding the building's materials, where they come from, what kind of methods they've been implemented in, etc.

Lau 41:56

But now, just to make a point here... The most important decisions you do when you make designs are in the very early ones, and you don't have to need BIM for that. The main... the very early design decision is the layout, the overall volume of the building, and what is the load bearing construction systems. Are you going to make it of concrete, are you going to make it on wood, on steel and BIM doesn't change that, because that is on a much earlier abstract level. So, okay, you can use BIM to say: "well, if I change this gypsum wall to this other different kind of wall, what is the change and you can do that quite fast. But it doesn't really change the dynamic of making the design choices. It just takes away as it makes it to a black box where the people doing the design doesn't really need to know it because just looking at the result.

Frederik 43:13

The next question we have is what you recognise as challenges in implementing these SDGs in the construction industry, and perhaps also why you see them as challenges.

Q.7.1 What do you recognise as challenges implementing SDGs in the CI, and why do you see them as challenges? From Clients' side, Suppliers or in the Industry as a whole.

Lau 43:39

One of, one of the main challenges is the building, and the construction industry is a very conservative industry and with good reasons. As a couple of years ago, we had this huge scandal of using these different kinds of power boards, magnesium oxide power boards. And the problem was that we took a product that is really good in some circumstances and used it in another circumstance where it resulted in a lot of problems in Denmark. And we have many of those kinds of experiences in the Industry. So, we are as an industry very conservative and wants to see proven solutions. Because it is so expensive to be wrong. But that's also... that's good, I think! It's very good that we are conservative, but on the other hand, it makes really, really slow and difficult to make changes.
Frederik 44:45

Could you perhaps also maybe give some insight, or it could be from a client-side or suppliers or?

Lau 44:52

As a client as the building owner, you need to be a really, really big firm, construction firm or a pension fund or whatever, if you want to take on the responsibility of new construction method, new materials, because it's so expensive. And therefore, I think it would be really prudent if the national, the government would take on the responsibility of being the risk investor and say: "well, okay, we need to try these materials this production technologists in maybe in a small scale, but it's okay because we can, we can carry the risk and we don't need it to be the individual building owner who wants to make a single-family house or the social housing, a company that have a very, very strict economy, to build for...

Frederik 46:06

By having this understanding, could you perhaps identify which challenges are more significant than others? Perhaps due to some? [LOST RECORDING] Could it be said that the adoption of solution compliant with the SDGs or would be a question of business survival in the long term?

Q.8 So, can be said that the adoption of solutions compliant with the SDG's will be a question of business survival in the long term?

Lau 46:31

Yeah, it is very, it's definitely a matter of business survival in the long term. And in the long term, I believe it's only like 10 or 20 years we are talking about because there's such a huge change in the perspective of the need for changes in the society. Just to give you an example, we have in Denmark, we have this large installation Material Producer Rockwool, they make Rockwool, a mineral-based on rock. Insulation materials, of course, are a very good product for doing energy-efficient buildings. But the process of melting rocks is quite energy-intensive. So, when we change from only looking at the energy use in the buildings as the heating requirements to what is the life cycle perspective of what is the energy use, then Rockwool has a huge barrier because they are very energy-intensive in the production. So, it changes the parameters of what is an environmental product. And I'm not sure that Rockwool will is going to exist as a dominant partner in twenty years.

Frederik 48:01

Simply because if they don't adapt to these, they simply can be competitive?

Lau 48:06

Yeah, exactly. They can't be competitive because the competitors they have, have technologies that are much less energy-intensive.

Daniel 48:18

But on the other hand, do you believe that some materials could be banned from the Industry? Because of their overcharged over the environment?

Lau 48:31

No. Of course, it could, but I don't think it's a prudent way to go. Because what we see when we look at the building level is that maybe you have this product that has a huge environmental impact it might as have like aluminium for example, but maybe you only use it in very small quantities. And then it doesn't, register on the building level. The only place where I think should ban products is the use of chemicals because they have such enormous local environmental impact. So it could be so what you put in more chemical, like building foam insulation as well it is much more as a polluting of the people in the building or makes it impossible to reuse the building when it is after this afterwards. Yeah.

Frederik 49:39

Well, this was actually the last question we have. We're, again really happy that you wanted to do this with us. We will thank you for the timer and contribution. And if you want, we can share the outcome of what we've discovered, if you will, or the report that we can produce if you want that.

Lau 50:07

Yeah. Nice. I would like to see it when you when you're finished with your thesis.

Frederik 50:13

If there's anything that you deem is that needs to be sanctioned in, like, you know, classified or something, we can actually put like... I don't know what to call it... a secrecy stamp on it. So only a certain amount of people can actually see it.

Lau 50:31

No, I don't think so. And I think I don't think it has said anything that I couldn't see on print. Either that's fine. And as it is my personal opinions and not necessarily the opinions of the organisation, as long is that clear.

Frederik 50:57

We will, of course, evaluate on this, and again, we don't know this, but in the case that we have some follow up questions, we hope then we can write you again.

Lau 51:08 Yeah, you're welcome.

Frederik 51:10 Thank you. So again, on that note, thank you. And thank you for the interview.

Lau 51:19 And good luck with your project.

Daniel 51:21 Thank you so much. Bye-bye

APPENDIX



ANT status quo score

At the end of the actors' network analysis, in order to be able to visualise and understand the differences in power, a graph is drawn up. This graph results from a score attributed to each of the actors based on the power found in the interviews and the literature review. A five-level scale is used, from "very low" to "very high", each sub-divided in two, since in each level there may be differences in power. The result is a scale of 1 to 10. In this way, it is possible to observe the relative power of each of the actors. This project consider it as the construction industry *status quo*.



Figure C.1. Actors Score as found

ANT future score

Hence, after the complete analysis of the actors, where a possible solution is pointed out to change and maintain the current mindset is the intention to show how the actors of the sector should interact and the power necessary for the change to be permanent. Again, a scale is elaborated following the same principle previously pointed. In it, it is possible to observe the relative power, as well as the "movements" along the scale to produce the desired effect.



Figure C.2. Actors Score for the future