

The implementation of sustainability measures within project development

A study in the national context of the Netherlands

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Abstract

This research investigated to what extent Dutch project developers are implementing sustainability measures within construction projects and what the implications are surrounding this process. Despite the current laws and regulations for the overarching term *sustainability*, there is little knowledge on the implications of actual implementation of sustainability measures. In this research, semi-structured in-depth interviews were carried out among thirteen project developers in the Netherlands. The results from the data collection were thoroughly examined to extract the patterns and remarkable findings. Several implications were made regarding the motives of project developers towards their implementation of sustainable measures in relation to the sustainability goals of the Dutch government. In addition, an exposition of the various challenges involved in the implementation of sustainable measures was made, touching upon the cooperation between municipalities and developers.



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Key concepts

Project development, Spatial planning, Sustainable development, Sustainability policies, Sustainability measures, Tenders, challenges, innovation, municipal cooperation

Information

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1. Introduction

The Netherlands is a small, yet densely populated country. A population that is growing at a rapid rate. This makes for a constant battle for space within the spatial planning processes. The limited availability of land zoned for construction makes spatial planning within the Netherlands a challenging proposition (Hajer & Zonneveld, 2000). One stringent goal regarding new buildings for the next decade is to suffice that all Dutch inhabitants have a home to live in. This means that there must be approximately 840.000 new houses built in the next ten years (Verheul & Hobma, 2022). One of the factors that makes this task even more challenging for real estate agencies, civil constructions firms and project developers is the targets for designing more sustainable buildings. With different policy domains and levels, the Dutch planning system is composed of various horizontal and vertical institutes involved in the planning of vacant Dutch land (Levkovich et al., 2018).

One of the important goals of spatial policies is to make the built environment in the Netherlands more sustainable. The Netherlands is a signatory of the Paris Climate Agreement (Adopted in 2015). This agreement promotes the delivery of buildings and infrastructures meeting certain requirements to mitigate their negative impact on natural resources, such as land, and the climate (Coninck, 2016; Martens, 2017; Lambrechts et al., 2021).

This is because the construction sector (processes involved in delivering buildings, infrastructure, industrial facilities, and associated activities) is a large contributor to the scarcity of natural resources and land degradation (Oliveira et al. 2018). As drafted in the climate agreement the construction and real estate sector accounts for 36% of all emissions, 40% of energy consumption and 50% of all resource extraction (World Green Building Council, 2011). The sector contributes to the impact on the environment, which is then aggravated by fast-paced urbanization to accommodate a growing population (Eberhardt, Birgisdottir, & Birkved, 2019; Backes & Treverso, 2021; Abuzeinab, 2018; Huang et al., 2018). This comes back to the real origin of the sustainability dilemmas that renewable resources should not be used faster than the regenerative rate of nature. Furthermore, non-renewable resources should be replaced by renewable resources to prevent waste formation and pollution from happening (Czarnecki & Kapron, 2010).

Sustainability policy in the construction sector is made by governmental actors and these policies are implemented in the regulation of the building sector. Sustainability policy is mostly ideological regarding the goals the government would wish to achieve when it comes to sustainability (Olkkonen et al., 2021). On the other hand, a central theme in the main goals of developers is making a profit. Sustainability measures are often more cost-intensive than traditional construction, causing revenue margins and the application of sustainability margins to be at odds. This influences the feasibility of projects and is therefore seen as a challenging proposition within the sector (Abuzeinab et al., 2018; Sgroi, 2018). This research aims to investigate the extent to which urban developers take sustainability measures into account when developing new projects in the Netherlands, despite this discrepancy. The main goal of these sustainability measures is to change the ecological impact of our built environment (Faber &



Hoppe, 2013). In doing so it is important to understand how such changes occur and what the role of the project developer is within this process. The prime research question is, therefore, as follows:

How do urban developers address sustainability-oriented policies and sustainability measures within their projects and what are the implications of adopting these policies and sustainability measures within project development?

To answer this research question this study first examines how new construction projects in the Netherlands come about and which parties and processes are involved. The corresponding sub-question is:

How does project development come about within the Dutch planning system?

Secondly, it is important to look at the appreciation of governmental sustainability ambitions. Sustainability ambitions are leading in the formation of laws and regulations for the construction sector. Therefore, this research tries to find out what the stance of the project developers is towards these ambitions:

What is the stance of the project developers towards the sustainability ambitions of the Dutch government?

The third question assesses the measures currently available for urban developers to make urban development projects more sustainable:

Which sustainability measures are currently available within the Dutch construction sector?

The fourth question focuses on the specific measures that developers use for their construction projects. The next sub-question therefore is:

How do developers respond to sustainability requirements in the development of new construction projects?

It is argued that the implementation of sustainability measures within building projects comes with challenges, for example, the reduction of financial feasibility (Sgroi, 2018). The final sub-question addresses challenges that developers might have to deal with when implementing sustainability measures into their building projects. The last connected sub-question is:

What are the challenges when it comes to sustainability measures for project developers when realizing projects?

These research questions are of scientific relevance because the expansion of sustainability measures within the construction sector is becoming an increasingly relevant research theme, due to the significant environmental impact related to the sector. This paper will contribute to the understanding of the role of sustainability within the sector and the implications regarding the implementation of practical measures toward more sustainable outcomes. Therefore, it will add to the existing literature on sustainability to give a clear description of the current situation within the construction and developers industry (Backes & Treverso, 2021; Abuzeinab, 2018; Huang et al., 2018).



It is of societal relevance too, because the construction sector consumes substantial amounts of natural resources as well as energy, mostly from fossil fuels (Hussin et al., 2013). Therefore, it is crucial to better understand how the sector adapts to sustainability standards and integrates sustainability-based policies into the design and implementation of buildings and infrastructures. Furthermore, this has become an important field of research to come up with measures and goals to improve the ecological footprint of this sector. The expected outcomes of this research will be mainly focused on an expanded understanding of the energy transition, circular buildings and climate adaptation and the improvement and expansion of green spaces within construction plans. This could provide insight into the extent to which there is a successful interrelationship between the various key actors involved in the project development sector in the Netherlands.

1.1 Readers Guide

Chapter 2 will account for all the different literature involved regarding these research questions. The third chapter will look at what methods were used to find out the answers to research questions. After which, Chapter 4 will look at the results of the research. The last part of this thesis will consist of a well-considered conclusion and a discussion.



2. Theoretical Framework

In order to find out to what extent project developers incorporate sustainability measures in the realization of new building projects, it is important to find out how projects are created in the Dutch planning system and what the role of the developers is in this process. First, an outline of the operational definitions of this research will be given. After this part, a review of the literature will be conducted to better understand the developers' sector in the Netherlands as well as the sustainability-oriented policies regulating the sector. In addition, a thorough literature review of existing research within the nexus of spatial planning, urban development and sustainability will support the theoretical background of the thesis (Snyder, 2019).

2.1 Operational definitions

Throughout this paper, we will define the executioners of new building projects as project developers. Project developers according to Steffen et al. (2018) are: "*Project developers are responsible for planning and overseeing various building projects for their companies*" (Steffen et al., 2018). This term includes companies that operate through the regular acquisition of land, tender procedures and other ways of project initiation. In this research, the term is overarching for companies who finance and manage the projects or companies who also execute the actual building activities.

Another term universally used in this paper is *Sustainability measures*. This is again an overarching term that refers to modifications within the paradigm of the construction sector towards more ecologically sustainable outcomes. The sense of sustainability is in line with the known quote on (ecological) sustainability, by the United Nations (2005): "*Sustainability means meeting our own needs without compromising the ability of future generations to meet their own needs*" (United Nations General Assembly, 2005). As will be further established in the theoretical framework regarding sustainability measures, a wide array of actual measures is defined within this meaning of sustainability (Hussin et al., 2013).

2.2 Spatial planning

The following section will explain how the planning system is regulated in the Netherlands and what different government agencies and other actors are involved. In addition, the various ways in which new projects are initiated within the spatial planning system are explained.

Spatial planners try to incorporate individual and communal interests in the organization of available living space. This is done through many rules, embedded in policy frameworks (Faludi, 2000). According to Wegener (1998), the aim of spatial planning is as follows: "*... to create a more rational territorial organization of land use and the linkages between them, to balance demands for development with the need to protect the environment, and to achieve social and economic objectives*". When reviewing the academic literature regarding spatial planning in the Netherlands, the Dutch planning system is internationally renowned. The Dutch planning system consists of a large scale of full-time spatial and urban professionals. These



professionals make for a well-organized yet complicated organizational structure. This format entails inner governmental coordination between different policy domains and different policy levels. The governmental institutions are paralleled by consultancy firms specialized, for example, in spatial and judicial-related issues (Hajer & Zonneveld, 2000; Levkovich et al., 2018).

The structured character of the Dutch planning system can be traced back to the nineteenth century. This was due to the persistent danger of water the Dutch people had to cope with. Because of the low-lying nature of the Dutch territory, the Dutch people had to plan their space thoughtfully. As a result, there were early incentives to ensure a structured planning system. In addition, the relatively small size of the country created challenges regarding the use of space (Hajer & Zonneveld, 2000). The Netherlands, therefore, has an extensive land-use plan in which, in principle, every parcel of land is owned by the state and every parcel of land has been assigned a specific function. The realization of new buildings must always be tested against this land use plan. Therefore, the municipality has an important role in spatial planning as it assesses new building plans for this land use plan (Tennekes, 2018).

The Dutch project planning approach links several sectors and governmental administration levels. This firstly means that the ministries, provinces and municipalities have a system of coordination regarding the planning towards permitting new development. Besides that, there is also co-operation between different public and (partly) private actors. Consultancy firms planning bureaus and agencies help create and establish new policy frameworks on matters such as sustainability where new developments should be aligned in order to receive an execution permit (Van Straalen et al., 2014). Therefore, the Dutch project planning is sustained through extensive vertical coordination. Horizontal coordination is established through different policy domains working together on making integral policy frameworks for new projects. These domains include all aspects relevant to new developments, in correspondence with the initial land-use plan (Shiferaw, 2013).

2.3 Tender procedures and permit allocation

There are two main ways in the Netherlands by which new projects are initiated. The Dutch project planning culture can be initiated by government or public authorities, which sustains a top-down-oriented project initiative. Different stakeholders influence the course of the planning process. This makes for a combination of top-down initiators and bottom-up stakeholders working towards a consensus in new projects (Shiferaw, 2013). This combination of top-down and bottom-up influences ensures that new projects or developments in the Netherlands can be initiated in diverse ways.

Firstly, there are developers or construction companies that are actively engaged in acquiring project land or project objects. Companies themselves take the initiative to acquire these lands for the purpose of development. For this development, an application is made to the relevant municipality, after which the municipality requests a comprehensive plan to see if this plan meets all the policy frameworks drawn up by the various government agencies and public-private companies, such as consulting firms and planning agencies. Depending on the plans and the size of the projects, higher government entities such as the provinces and the ministries can



also be asked to give their opinion on the desirability of the proposed plans. There are four main phases in the process of new developments. Firstly, the planning phase, which starts when the project developer initiates the development plan. Accordingly, the municipality appoints a project manager to coordinate the project from the municipal side. Then, the developer comes up with a draft of the project, which is evaluated by the project manager. After this is approved, specifications can be added to the design plan. When the complete design is granted the required permits, the construction or realization phase starts. In the end phase of realization, the project manager inspects if the project is in line with the permitted requirements. The last phase is the delivery phase, where the building is sold or rented (Carreon, 2015; IJzenga, 2022).

Secondly, there are governmental authorities who impose from above where a project should be located and for which a developer should be identified (Carreon, 2015). New projects which are initiated by governmental institutes often come about through tender procedures. As briefly touched upon, Dutch governments operate at various levels. There are the state, provinces and municipalities that can make decisions on different scales about where and how projects may be carried out. The national government (also referred to as ‘the state’) draws up a strategy for the provinces and municipalities, which in turn can apply this strategy or vision to their jurisdiction or their administrative territory. The state produces laws and guidelines for the planning process with construction standards, procurement aspects and financial subsidies and mortgages (Carreon, 2015). Provinces in turn make an environmental vision for their province to which municipalities must adhere in their plans for their urban areas (Meijer & Ernste, 2019). A portion of the spatial developments is being addressed to developers through tenders. These tenders are open applications, in which the municipality describes what kind of development should take place and what criteria this development should meet. Interested companies can then respond to these tenders by submitting an open offer. Afterward, the municipality looks at these bids and compares them to each other. A criterion for itself and for the tender assignment is settled to which it attaches significant importance. Developers must respond to these by drawing up the most suitable plan for the tender. This can include a plan that is as financially favourable for the municipality, whereby the developer overbids on the land. Moreover, sustainability and the social aspect usually weigh heavily in the assessment of a tender assignment (TenderNed, 2022).

The first step that a municipality takes when starting a tender procedure, is defining what type of tender procedure is adopted and what kind of developers are admitted. Based on this procedure, a time period is considered, in which interested companies have to prepare a plan. This plan is prepared, in order to convince the municipality of being the most suitable candidate to carry out the tender order. In the case of relatively large contracts, tender orders must meet certain requirements in terms of the period for which an order must be announced. Here the cost of the project under consideration is of leading importance, this arises from the principle of transparency (TenderNed, 2022). When the deadline for the Tender application has passed the municipality assesses the submitted plans using an assessment matrix. This matrix is composed of a point system within which the Municipality has assigned more value to certain aspects. After the Municipality has assessed all the plans, the developer with the highest score is awarded the project and the cooperation towards the realization of the project starts (TenderNed, 2022). As can be extracted from this explanation of the cooperation between



municipalities and project developers, the municipality plays a key role in assessing these permits or tender applications. The municipality has to review all the proposed plans or tender applications towards a decision of granting a permit or tender procedure (TenderNed, 2022). This means that when the municipality is not reaching the deadlines initially proposed, the entire process of the new developments can be delayed. These delays can result in additional financial setbacks.

2.4 Sustainability within the construction sector

In addition to explaining how projects emerge, this part focuses on the various available sustainability measures applicable to the development of new projects. The concentration of inhabitants in cities makes for higher environmental impacts. In a rapidly urbanizing world, a trend that is also taking place in the Netherlands, the emphasis on achieving sustainable outcomes is therefore primarily laid on urban areas (Coninck, 2016).

The way in which we design our cities, and shape public and private spaces, is of foremost importance in mitigating environmental impacts (Gustafsson, Hermelin & Smas, 2019). In order to ensure further developments toward the Paris Climate Agreement, goals and targets must be set to achieve sustainable outcomes (Cohen, 2017). The European Union has set several ambitious goals that emerged from the Paris Climate Agreement. Here, the three main goals include reducing greenhouse gas emissions, increasing the use of renewable sources and increasing energy efficiency. These goals established by the EU are leading to the creation of new Dutch policy frameworks (Verhagen, 2012). In the Netherlands, 20 percent of the total energy consumption is accounted for by the construction sector, therefore one of the main objectives is to ensure that all new buildings will be nearly zero-energy buildings (European Parliament, 2010; Czarnecki & Kapron, 2010).

Therefore, the Dutch government has set goals for its sustainability ambitions for the year 2050, to ensure that global warming is slowed down. These goals are primarily to ensure that the Netherlands is fully circular by 2050. Circularity means the reusing of materials in a cyclical way with the diminishment of negative impacts on the environment as a purpose (Kistenkas, 2018). The Dutch government is working *“together with the knowledge institutes, nature and environmental organizations, governments, unions, financial institutions and other civil society organizations to ensure innovations towards and more sustainable use of raw materials”* (Planbureau Voor De Leefomgeving, 2022-b). The three main themes to achieve this goal are listed in Table 1 below (Planbureau Voor De Leefomgeving, 2022-b).



Central Themes for circularity in 2050
<ul style="list-style-type: none"> ● <i>Existing production processes make more efficient use of raw materials, so that fewer raw materials are needed.</i>
<ul style="list-style-type: none"> ● <i>When new raw materials are needed, sustainably produced, renewable (inexhaustible) and generally available raw materials are used as much as possible. Such as biomass, which is raw material from plants, trees and food waste. This makes the Netherlands less dependent on fossil sources and it is better for the environment.</i>
<ul style="list-style-type: none"> ● <i>Develop new production methods and design new products in a circular way.</i>

Table 1: Planbureau Voor De Leefomgeving (2021)

2.4.1 EPG & MPG

In order to achieve the main themes for circularity, as referred to in Table 1, the government instated measures to track the energy performance and the environmental performance of buildings: The EPG and MPG.

The EPG, by which the energy-usage performance (hence referred to as EPG) of housing is calculated, represents the *Energy Performance Standard for Buildings* (Energieprestatienorm Voor Gebouwen). The EPG is a standard that all new buildings must meet for a chance of receiving a permit for realization (De Jong & Van Dijk, 2007). However, the importance of the EPG has lost importance in recent years. In contrast, the importance of a transition to more circular construction has become increasingly important. The policy of working towards circularity in projects is assessed using the MPG, which stands for the *Environmental Performance of Buildings* (Milieu Prestatie van gebouwen). This is a measure that determines the sustainability level of buildings. The MPG provides an overview of the overall environmental impact of all materials used in a building. This includes new construction of homes, offices of over one hundred square meters, civil construction and utility construction. The environmental score of buildings is expressed as one integral score of Euro per square meter per year. The final amount is called the shadow price of a building (Ecochain, N.D.) The lower the amount per square meter per year, the more sustainable a building is. A critical point to mention here is that a measure that is favourable for the EPG, may be unfavourable for the MPG. For example, it takes a lot of energy to produce solar panels, which has a negative effect on the MPG, but on the other hand, solar panels generate green electricity, which has a positive effect on the EPG. However, over the total lifetime of a solar panel, sufficient green power is generated to compensate for the environmental impact of production (Rijksdienst Voor Ondernemend Nederland, 2022-b).

2.4.2 BENG

As touched upon, EPG is losing its importance to the MPG norms. Instead of the EPG, there is a new requirement related to the energy performance of buildings. The new and current policy on energy consumption in the Netherlands is shaped by the BENG requirements. The BENG is a Dutch abbreviation that stands for: "*Nearly Energy Neutral Buildings*" (Bijna Energie Neutrale Gebouwen"). These requirements are in place for achieving the goals set out in the Paris Climate Agreement (Rijksdienst voor Ondernemend Nederland, 2022-a). Moreover, these



new rules must be observed according to certain requirements when it comes to the construction of new buildings. Included in these new rules is a distinguishment between the use of fossil fuels and the use of renewable energy. The practical measures involved are better insulation of buildings, the installation of energy-efficient installations and the use of renewable energy. Renewable energy can, for example, be generated using solar panels. These requirements were established by the “Energy Agreement for Sustainable Growth” and from the “European Energy Performance of Buildings Directive (EPBD)” (Rijdsdienst voor Ondernemend Nederland, 2022-a). The energy performance of buildings, according to the guidelines of the BENG is determined by three individually achievable requirement measures. The technical measures are shown in the following table 2:

Individually achievable requirements
The maximum energy requirement in kWh per m ² of usable area per year (kWh/m ² .yr);
The maximum primary fossil energy use, also in kWh per m ² usable area per year (kWh/m ² .yr);
The minimum share of renewable energy in percentages (%).

Table 2: Rijdsdienst voor Ondernemend Nederland (2022-a)

When it comes to enforcing the rules towards MPG and BENG, this is considered to be the responsibility of the municipalities. Municipalities must review new construction plans in both tenders and permit applications, the municipality must ensure that the standards and requirements of the BENG are met. This makes the developers dependent on the municipality in this assessment. Since it is a relatively complicated assessment, it can sometimes take a long time before the municipality can produce an assessment of the BENG (Rijdsdienst voor Ondernemend Nederland, 2022-a).

2.5 Environmental aspects

As touched upon before in section in the introduction the construction sector is a large contributor to environmental issues such as resource scarcity, pollution and waste. The edification of buildings requires substantial amounts of raw material and energy resources. After demolition large amounts of non-reusable materials remain, resulting in extensive waste production. These materials are either downcycled or completely set aside as waste. The building industry is not yet able to exploit significant parts of building materials inherent durability and economic value. This makes for a need for improved efficiency and sufficiency within the industry (Eberhardt, Birgisdottir, Birkved, 2019). In the light of the current population growth in the Netherlands, the demand for new buildings is growing rapidly. At the same time, sustainability policies and frameworks are being implemented by governments to ensure a sustainable transition to ensure a better and greener future for society (Coninck, 2016; Martens, 2017).

For the achievement of sustainable construction, it is considered important to balance the several aspects of sustainable construction: Environment, economic and social aspects. This research focusses on the environmental aspect in relation to the economic aspect. Hussin,



Rahman and Memon (2013) have created a list of sustainable approaches within the overarching environmental aspect:

Environmental Aspects
1. Increase material efficiency by reducing the material demand of non-renewable goods
2. Reduce the material intensity via substitution technologies
3. Enhance material recyclability
4. Reduce and control the use and dispersion of toxic materials
5. Reduce the energy required for transforming goods and supplying services
6. Support the instruments of international conventions and agreements
7. Maximize the sustainable use of biological and renewable resources
8. Consider the impact of planned projects on air, soil, water, flora, and fauna.

Table 3: Hussin, Rahman and Memon (2013)

The list provides a recommendation for the steps to follow towards more sustainable development and building sector. As can be seen from Table 3, there are many approaches that need to ensure the use of fewer resources with climatologically stressful characteristics. The list also entails the approach that more thought is given to biodiversity and ecology. All these aspects should be realized by better supporting the instruments of international conventions and agreements (Hussin et., 2013).

2.6 Practical measures

This list of environmental aspects discussed in the previous section can be connected to several practical measures seen in construction markets all over the world. In this next part, several principles or measures will be connected to the overarching environmental approaches posed by Hussin, Rahmon and Memon (2013).

2.6.1 Circular economy principles

Firstly, the circularity economy principles will be explained. These principles connect with the aspects: *“Increase material efficiency by reducing the material demand of non-renewable goods*, *“Reduce the material intensity via substitution technologies”*, *“Enhance material recyclability”*, *“Reduce and control the use and dispersion of toxic materials”* and *“Reduce the energy required for transforming goods and supplying services”*, by Hussin, Rahmon and Memon (2013). These principles can ensure a minimization of the previously mentioned pending issues deriving from the building industry. The circular economy principles move away from the linear approach, currently characterizing production, distribution and consumption, and a global economic landscape (Eberhardt, Birgisdottir & Birkved, 2019).

The mainstream economic model or the linear economy builds on the following four principles: Take, make, use and dispose of. This means that materials are produced for consumption and



after that, they are disposed of, resulting in waste and new production to meet the demand for new building projects (Akanbi, 2018). Circular economy principles entail regenerative systems in which there is as little resource output and input, emissions and waste generation as possible. This accounts for material and energy loops instead of a linear course (Geissdoerfer et al. 2017). Circular business models are being promoted within the principles of a circular economy. These are based on the principles of reduce, reuse, recycle and recover (Kylili & Fokaides, 2017). Circular business models are aimed at prolonging the service life of materials, including building materials, through reusing and recycling (Eberhardt, Birgisdottir & Birkved, 2019).

As a result of focussing on the short-term goals within the construction sector, many developments are based on the principles of the linear economic model. Even though the reusing of structural elements of buildings has much higher economic and environmental benefits. Therefore, new materials and business models are currently being adopted by the construction sector to deal with sustainability transitions (Eberhardt, Birgisdottir & Birkved, 2019; Leising, Quist & Bocken, 2018).

A central theme in circular business models is the choice of materials of the building. These should consist of as many recycled and reusable materials as possible with the goal that they can be easily reused or repurposed, also the materials should be easily adaptable so that buildings can be geared to lifecycle resistance (Loef, 2019). When it comes to the circular economy principles, there has been established a hierarchical order in the steps that should be undertaken toward more circularity, see table 4 below (Loef, 2019; Cramer, 2014a; Jonkeren, 2016):

The hierarchical order of circular steps
1: Refuse: prevent the use of raw materials
2: Reduce: reduction of raw materials
3: Re-use: product re-use
4: Repair: maintenance and repair
5: Refurbish: refurbish products
6: Remanufacture: make new products from old products
7: Re-Purpose: re-use of product for another purpose
8: Recycle: processing and reuse of material
9: Recover: energy recovery from materials

Table 4: Loef, (2019); Cramer, (2014a); Jonkeren, (2016)

When all of these steps are met, the building cycles are made fully circular, ending the linear life cycle of buildings and materials.

2.6.2 Use of wood

One innovative way of (sustainable) construction is the extensive use of wood in construction. The use of wood connects to the environmental aspect of: “*Maximize the sustainable use of biological and renewable resources*”. Besides this being the directly connected aspect, this measure also partly aligns with: “*Increased material efficiency by reducing the material*



demand of non-renewable goods and reduce the material intensity via substitution technologies.” Hussin, Rahmon & Memon (2013).

The use of wood as the main component of buildings can contribute to better CO₂ emission housekeeping. Wood is increasingly used in projects as a replacement for steel or concrete structures. However, the number of applications is still limited, and it seems to be a niche market for the time being (Hildebrandt et al., 2017). The use of wood can play a key role within the circular economy principles as it can tackle several of the established hierarchical steps towards circularity. This use of wood can even provide for carbon-positive balances regarding the carbon output of buildings. One characteristic of wood is that it can hold carbon dioxide even after it has been excavated. This means that when wood has extensively been used in construction, substantive quantities of carbon can be absorbed. Therefore, buildings constructed of wood can absorb more carbon than the building is putting out, which makes for a carbon positive balance (Hildebrandt et al., 2017). In terms of meeting policy, the use of wood contributes to lowering the MGP value of a building.

2.6.3 Sustainable waste management

A third sustainability measure that is in line with the environmental aspects posed by Hussin, Rahmon & Memon (2013) is waste management. Waste management aligns with the aspects: *“Reduce and control the use and dispersion of toxic materials”*. Construction and demolition waste is one of the main pollutants caused by the construction sector (Yuan, 2013). There are five main indicators of waste or pollution caused by construction and demolition, which are shown in table 5:

Waste indicators
● Land consumption due to waste landfilling
● Water pollution
● Noise emission
● Air pollution
● Environmental impacts of illegal waste dumping on public living environment.

Table 5: Yuan (2013)

The causes of this should be diminished to make the management of waste more sustainable. Construction and demolition waste is one of the fundamental issues in the construction industry. Around 35 percent of construction and demolition waste ends up on garbage dumps over the world. Therefore, it is crucial that waste management is implemented in order to reduce this impact. Waste flows need to be better processed to ensure greater recyclability and reusability (Kabirifar et al., 2020).

2.6.4 Energy consumption

The reduction of energy consumption is a measure that is in line with the environmental aspects discussed in section 2.5. It aligns with the aspect of Hussin, Rahmon & Memon (2013): *“Reduce the energy required for transforming goods and supplying services”*. There are several



ways in which the energy consumption of buildings can be reduced. The constant cooling and heating of buildings causes approximately 40 percent of the total energy consumption worldwide. This makes it an important proposition to reduce this large consuming sector (Monna et al., 2021).

One way energy consumption can be reduced is through better insulation of new and existing buildings. In this way, there is less climate control necessary in buildings due to the more constant temperature management. Consequently, there is less energy required to heat up or cool down buildings. This is beneficial for the saving of energy and the reduction of carbon emissions (Zhukov et al., 2014).

Another measure to assure less energy consumption is the use of an automation system. This system improves the efficiency of the energy that is used in a building. These *smart* automation systems regulate climate control and air filtering in a way in which there is the least over-use. This can lead to up to 30 percent in energy savings. Consequently, this means that the costs of running a building also reduce drastically (Colmenar-Santos et al., 2013).

These are measures used by developers in order to align with the Dutch policy regarding the use of energy in residential homes, also called the BENG. This abbreviation stands for “*nearly zero-energy buildings*”. As previously explained, all buildings both residential and non-residential must meet the requirements of BENG.

2.6.5 Nature inclusive and climate adaptive building

Nature inclusive and climate adaptive building is a measure that is linked to the aspect of Hussin, Rahmon & Memon (2013): “*Maximize the sustainable use of biological and renewable resources and Consider the impact of planned projects on air, soil, water, flora, and fauna*”. Nature-inclusive building means considering the preservation and expansion of biodiversity during the construction process and the use of the buildings. It considers which native plants and animals live in the area, to ensure that they are not affected by the new developments. This is achieved by placing greenery in the area development that matches the specific plant and animal species present in the area, in order to preserve and expand the existing biodiversity (Van Haaster-de Winter et al., 2020).

A prominent way in improving the amount of green in the surroundings of the built environment is the implementation of green roofs. There are several operational environmental benefits related to green roofs. Green roofs increase the amount of greenery in a residential area, thereby further increasing biodiversity within a neighbourhood. Green roofs can also contribute to the concept of climate adaptive construction. Climate-adaptive building involves issues such as retaining water during excess rainfall, improving air quality and reducing the heat-island effect (Middendorp, 2016; Dai et al., 2018). In literature, there is a discussion going on regarding the energy savings related to green roofs. Some research suggests that green roofs have an insulating effect on buildings, which means that they can have an energy-saving effect (Shafique et al., 2018; Hashemi et al., 2015). Other research suggests that this effect is neglectable. In this regard, the period it takes to recoup the investment was examined to determine what the benefit of saving energy is, expressed in monetary terms. This concluded



that the payback period is between 25 and 57 years, which is longer than the average time of use of a house by an end user (Refahi & Talkhabi, 2015).

To summarize the connection of the various sustainability measures to the overarching environmental aspects of Hussin, Rahman and Memon (2013), as discussed in this section, see Table 6:

Sustainability measures	Connected environmental aspects
<i>Circular economy principles</i>	<ul style="list-style-type: none"> • Increase material efficiency by reducing the material demand of non-renewable goods, “Reduce the material intensity via substitution technologies • Enhance material recyclability • Reduce and control the use and dispersion of toxic materials • Reduce the energy required for transforming goods and supplying services”,
<i>Use of wood</i>	<ul style="list-style-type: none"> • Maximize the sustainable use of biological and renewable resources • Increased material efficiency by reducing the material demand of non-renewable goods and reduce the material intensity via substitution technologies
<i>Sustainable waste management</i>	<ul style="list-style-type: none"> • Reduce and control the use and dispersion of toxic materials
<i>Energy consumption</i>	<ul style="list-style-type: none"> • Reduce the energy required for transforming goods and supplying services
<i>Nature inclusive and Climate adaptive</i>	<ul style="list-style-type: none"> • Maximize the sustainable use of biological and renewable resources and consider the impact of planned projects on air, soil, water, flora, and fauna

Table 6: Hussin, Rahman and Memon (2013)

2.7 Challenges within the construction sector

As briefly touched upon in the introduction, there are some frictions and some balances to be found when leveraging the cost and the benefits of sustainability measures within construction. This section will focus on the influence of sustainability measures on the feasibility of new construction.

In contrast to the positive environmental impact of sustainability measures, the budgetary impact of sustainability measures is often seen as negative. Construction is often more capital intensive when it comes to the production processes of sustainability measures (Saleh & Alalouch, 2015; Zhao et al., 2018; Zhou & Lowe, 2003). However, the Dutch government has established subsidies and other financial safety nets to ensure that sustainable investment financially pays off (Rijksdienst Voor Ondernemend Nederland, 2022-c). This section tries to



find out, based on the literature, whether sustainability measures have a positive or negative elaboration on the financial feasibility of building projects in the Netherlands.

Firstly, in many cases, the main objective for developing a project is the financial feasibility for the developers and builders. This means every project should deliver financial gains for developers. However, the implementation of sustainability measures is a costly process. Sustainable construction practices use newer and less profitable techniques as well as costlier materials. Green materials and equipment are less available on the market (Pitt et al., 2009). In addition, the performance and cost-effectiveness in the long run are still uncertain among industry stakeholders. Making for a financial challenge when it comes to the feasibility of new projects, under the influence of policy depicting more sustainable development (Saleh & Alalouch, 2015; Zhao et al., 2018; Zhou & Lowe, 2003).

A second challenge within this discussion is the capacity or professional challenge between different stakeholders within a project development process. This means the discrepancy between the different actors involved in the implementation of new sustainability matters and the financial motive. The discrepancy between the developers and the municipality comes from the different motives for the realisation of a project between municipalities and project developers. The motive of the municipality is often ideological, whereas the motive of the developer is often influenced by the search for financial revenue (Olkkonen, 2021; Abuzeinab et al., 2018).

However, there is not always agreement on this in the available literature. As Shen et al. (2002) state: *“In reference to the construction business, sustainability is about achieving a win-win outcome for contributing to the improved environment and the advanced society, and at the same time for gaining competitive advantages and economic benefits for construction companies”*. When we take a wide interpretation of the concept of sustainability, it might be possible to find a balance between environmental, societal and financial benefits when realising new projects. Sustainable construction refers to several methods in order to reduce the environmental impact of the built environment. As touched upon before this comes at a cost, therefore it can be conflicting between the short-term economic operational benefits and long-term environmental goals. However, some studies suggested that embracing sustainability principles in the process of implementing construction projects can contribute to profit making, especially when it comes to the granting of permits or the allocation of tenders. This gap in knowledge is something this research will try to investigate through further qualitative research (Shen et al., 2010; Shen et al., 2002; Begum, 2006).

The Dutch government has ways to assure that the implementation (of energy consumption reduction) of green or sustainability measures is not endangering the financial feasibility of new building projects. Taken into consideration in this is the excessive need for new housing in the Netherlands. In order to achieve this, there are more favourable financing opportunities for entrepreneurs when it comes to the realization of more energy efficient buildings. The so-called Energy Investment Deduction relates to a wide range of sustainability measures whereby the guiding principle is that energy consumption decreases, or CO₂ emissions are reduced. If this condition is met, then the investing party can deduct 45.5% of the investment costs from the profit, thus creating a tax advantage. The aim is to increase the financial feasibility of



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construction projects with sustainability solutions. Investments of more than 2.500,00 EU up to a maximum of 136 million EU are eligible for this tax benefit (Rijksdienst Voor Ondernemend Nederland, 2022-c). There is however a lack of literature regarding the cost-benefit ratio of sustainability measures on the long run as it is still a relatively new and ongoing change. This research seeks to find out how developers view the implementation of sustainability measures versus the feasibility of their projects.



3. Methodology

To answer the prime research question: *How do urban developers address sustainability-oriented policies and sustainability measures within their projects and what are the implications of adopting these policies and sustainability measures within project development?* Several research methods are required. This part will expand on the operational definitions and the used research methods.

3.1 Qualitative approach

The research questions will be answered using qualitative research. The purpose of the research is to find out how project developers implement sustainability measures in their projects and how they come about, through qualitative research (Rezapour, 2018). Qualitative research attempts to do a more in-depth analysis on a topic in order to find out what certain motivations and implications are for certain sustainability measures. Since these reasons are more interpretive, they fit better with qualitative research. In this way, a deeper understanding of the reasoning and understanding behind the implementation of sustainability measures in projects is created (Aspers, 2019). The primary data used in this research consisted of semi-structured in-depth interviews. The interviews provided insights into relevant contexts of the use of sustainability measures within project developments. In this case, it is about insights into the relationship between policy and project developers and what this means for sustainable construction connected to the feasibility of projects.

3.2 Research strategy and data collection

This qualitative research was conducted through semi-structured interviews. This type of interviewing provided open-ended questions with space for a free conversation on the research topic (Appendix A1). This way the interview flowed like a natural conversation. After having discussed one question the interviewer could adapt to previous answers and modify questions to benefit the conversation (DeJonckheere & Vaughn, 2019).

To lower the threshold for interviewees to take part in the interview, the option for online-participation was granted. In this way, the interview was less time consuming for the interviewee and the quality of the interview was sustained through online possibilities. The interviews lasted on average between 30 and 45 minutes within which the different sub-topics of the research were addressed. The interviewees were part of a group of large developers in the Netherlands and build many homes, offices and other retail buildings every year. The interviews were conducted in Dutch, for the benefit of communication with the interviewees. The main disadvantage of this kind of data collection is the risk of biases from the interviewees. Since the research is about the implementation of sustainability measures, companies would benefit from showing how progressive or sustainable they are within the market. In this way, the companies could see the research as a marketing opportunity. Therefore, the choice was made to anonymize the interviews and results. This ensures that the respondents will speak freely and honestly about their way of business formation because the data cannot refer to them.



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For this research, the combined findings of thirteen interviews were used. These interviewees consisted of project developers involved in the realisation of new building projects in the Netherlands. Several lists were consulted to see which companies were the biggest players in this market. These were the lists of the top fifty largest developers in the Netherlands and the list of the top fifty largest builders in the Netherlands. These lists were used to check whether these developers had a minimum annual turnover of approximately eighty million Euros or a minimum of three hundred homes. In this way, there is some guarantee that the developers take a significant part of the market and have a significant impact on the immediate surroundings of the realised projects. In order to place the findings into context it is important to understand the case descriptions. There are several differences in the size and the initiation of the projects these developers execute. In order to present a structured overview of the cases table 7 shows a scheme with the major differences regarding the function of the interviewee, the type of projects, the yearly revenue and/or the number of buildings realised every year.

Interviewee	Function interviewee	Type of projects	Yearly revenue In euros	Number of Buildings
<i>Respondent A</i>	Regional Manager	Housing	Unknown	500-600
<i>Respondent B</i>	Project manager and Sustainability manager	Housing	100 million	Approximately 500
<i>Respondent C</i>	Plan developer from initiation phase	Housing	Unknown	40 to 50 projects, with varying numbers from 10 to 120
<i>Respondent D</i>	Project executor	Logistics real estate (Core Business), housing and offices	300 million	Unknown
<i>Respondent E</i>	Sustainable concepts developer	Housing and renovations	300 million	Unknown
<i>Respondent F</i>	Head of strategy, sustainability and innovations	Housing and Health care real estate	110-120 million	Unknown
<i>Respondent G</i>	Project developer responsible for sustainability and innovations	Housing	Unknown	1000
<i>Respondent H</i>	Head of advisory board Energy and sustainability	Housing	1,645 billion	9000
<i>Respondent I</i>	Project developer	Housing, commercial properties and retail	Unknown	500
<i>Respondent J</i>	Project developer	Housing	300-350 Million	Unknown
<i>Respondent K</i>	Sustainability manager	Housing	Unknown	Approximately 700
<i>Respondent L</i>	Project developer	Housing	520 million	Unknown



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<i>Respondent M</i>	Senior Projectmanager	Housing and restructuring	80 million	400-500
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Table 7: Case characteristics

Within the thirteen interviews there was a variety of functions. For example, some indicated that their function was related to project development, where others were specifically focussing on sustainability. These job descriptions often entailed the innovation side and the sustainability side.

The core business of the majority of the cases is the realisation of housing projects. Some of the respondents also work on the restructuring or renovations of existing real estate or the realisation of offices and retail real estate, like respondents E and M. respondent I also does commercial properties and retail properties. Respondent F is specialised in health care real estate besides Housing. There is one exception in core-business with respondent D realising buildings in the logistical sector, besides some housing and retail buildings. The size of the companies where the interviewees work for also differed, looking at the number of buildings a company realizes in a year and at the annual turnover. Not all companies were aware of either the annual turnover or the annual realization numbers. The spectrum of turnover ranged from 80 million to 1,645 billion Euro. The annual number of homes realized ranged from 400 to 9000.

3.3 Data Analysis

In all interviews a protocol was used relying on the interview guidelines of Patton (2002). The interview started with questions about the working method of the developer in question and on what kind of developments they are realizing and in what way. It is important to find out whether they mainly work via tender procedures or via acquisition. After the working method and type of projects became clear, the second part consisted of questions about challenges within projects, to what extent the developer is concerned with sustainability and which sustainability measures this developer incorporates in the projects. The last part of the research tried to find out what role the different governmental bodies and domains play within this stance towards sustainability.

The use of a qualitative data analysis enabled this research to obtain new knowledge on the implementation of sustainability measures and add to existing literature (Gioia et al., 2013). The interviewees appeared to be knowledgeable agents with enough ability to express their experiences and related knowledge. After the interviews had taken place, the questions and answers were transcribed. After meticulously examining the transcripts, the answers have been classified for the various themes into codes. The encoding took place in NVIVO. The list of used codes can be seen in appendix A2. The responses from the interviews were then compared in order to make judgements regarding visible similarities and differences and to identify patterns in the responses in order to create the results chapter. In addition, in examining the transcripts we looked for salient features. Highlighting patterns and salient issues within the responses were used to shape the results chapter. The quotes used in the results section have been translated to English to extract the information from the collected data.



3.4 Strengths and weaknesses of the methods

The strength of this combination of methods is the complete information retracted from the interviews. Because our interviewees are knowledgeable agents, the information provided was relevant and detailed. The respondents are directly active within the market and within the area of research this paper aimed to investigate. Therefore, the validity of this research is of high quality. The weakness of this research is the external validity. External validity means that research findings can be applied to the total population of a study (Rezapour, 2018). Since this is qualitative research with limited capacity, it is challenging to make claims that are applicable or generalizable to the entire population. Additional research could quantify the findings in this research to establish generalizable answers to the whole of the research population.



4. Results

The results section consists of five main sub-chapters. The first section focusses on the various ways in which new projects are initiated, followed by the second section which considers the main motives for developers to execute building projects. After this has been elaborated, the third section reviews the stance of the project developers towards the sustainability goals of the Dutch government. The fourth section analysis the incorporation of several sustainability measures within the domain of project development. The fifth and final chapter focusses on the challenges related to the implementation of sustainability measures.

4.1 Project initiations

Having reviewed the results regarding the initiation of projects, it becomes clear (see table 8 below) that a majority of the projects are initiated through land or object acquisition, municipal tenders, or through demand from investors and/or clients. Besides, a significant part is initiated in cooperation with housing corporations. Furthermore, not many commercial tenders are issued according to the interviews. This is in accordance with the literature which showed that the tender procedures and land acquisitions, followed by permit procedures, are the main ways in which new projects come about ((De Roo, 2017; Shiferaw, 2013). Additionally, the interviews showed that a significant part of new developments is initiated by investors or clients, which has not been confirmed by the literature yet.



Case	Land Acquisition	Investors/ Clients	Municipal Tender	Commercial tender	Housing corporation collaboration
Respondent A	X				X
Respondent B	X	X			
Respondent C	X		X		
Respondent D		X		X	
Respondent E			X		X
Respondent F	X	X			
Respondent G		X	X		X
Respondent H	X		X	X	X
Respondent I	X	X	X		Unknown
Respondent J	X	X	X		X
Respondent K	X	X	X		X
Respondent L	X	X	X		X
Respondent M	X	X	X		X
Total	10	9	9	2	8

Table 8: Case Characteristic project Initiation

4.2 A balance between revenue and sustainability

Now there is established in what practical ways new projects are initiated, this part focuses on the elaboration of the answers regarding their motives to initiate new projects. The results show that there is a unified main goal for developers within their projects. The main goal of a developer is to make a profit in order to ensure the survival and prosperity of the company. For example, Respondent I quoted: *“The main goal, of course, is to achieve revenue.”* - Respondent I. After all, a company cannot survive if it is not financially healthy. This finding is in line with the literature and is viewed from a commercial point of view (Saleh & Alalouch, 2015).



However, many developers indicated that this profit can also contribute back to a better world. As respondent L mentioned:

Look, you can be only ideological, but without actually making money or being able to make a business case for it, you're not future proof. This also means that you cannot guarantee that sustainable developments will be done more often in the future. - Respondent L

Financially stable companies can function on thinner margins and thus invest more in sustainability measures. In addition, developers declared that it is important for a developer to safeguard its continuity in order to ensure that the accumulated knowledge regarding sustainability is not lost and that more projects can be developed in the future. Many respondents indicated that there should be a balance between profit maximization and the application of sustainability measures to ensure that the living environment is as pleasant as possible and that a contribution is made to achieving the climate objectives for the sector. respondent G declared:

We as a company think we should pursue a sustainable living environment. We do that within our profit motive. After all, we are a commercial company, and we have to keep the stove running. So yes, we also do it to create added value for our shareholders, but also for society: So that has to be in balance. - Respondent G

Often mentioned was that it is seen as a duty to leave the Netherlands for future generations in a better way and to ensure that the sector has less impact on the climate. There were no respondents in this research that indicated that they did not feel responsible for the sustainability of the built environment and people's living and working environment and were only looking for profit. This contrasts with the information from some literature that states that project developers have traditionally been known for their profit motive and for seeing project development merely as an investment object (Saleh & Alalouch, 2015), but this is in line with Shen et al. (2002) who stated that there can be a balance between long-term sustainability and short-term financial gains.

To conclude, most respondents stated that, in addition to making a profit, they work according to idealistic motives to make a positive contribution to society and to ensure that the Netherlands has a pleasant and more sustainable living environment.

4.3 Governmental sustainability goals

As elaborated in the previous section, most developers act in an ideological way combining the seek for revenue with sustainable intentions. The stance of the developers towards the Sustainability ambitions of the Dutch government is not as unified as the main goal of the respondents. The answers related to the appreciation for the sustainability ambitions set by the Government by project developers were diverse. Here, the questions were based on the Paris Climate Agreement goals aiming at a fully circular and energy neutral society in 2050 (Rijksdienst voor Ondernemend Nederland, 2021-a; 2021-b; 2021-c). The results show that



some of the developers find the sustainability ambitions of the Dutch government too ambitious. An example of this is respondent G, which doubts the feasibility of the ambitions:

Yes, that is also one of the biggest discussions at the moment: how are you going to ensure that you can link the speed of construction, the affordability and the sustainable ambitions, I just don't see it happen. - Respondent G

On the other hand, there is also a number of developers that stated the opinion that the ambitions fall short of actually having an affecting complying with the Paris Climate Agreement. In addition, it should be noted that more practical guidelines must be provided by the government to create more clarity on how the targets can actually be met. This would increase the incentives to participate in the entire transition to greater sustainability, according to respondent H:

For 2050, everyone has the Paris Climate Agreement in mind. (...). In other words, everything will be almost or completely energy neutral and CO2 neutral. That is clear, only the steps towards it are not yet clear. (...)Now we really have to continue to put the incentives in place in the system so that everyone wants to work towards that as well, if we go on like we are now we will not achieve the (Paris Climate agreement) goals. - Respondent H

4.3.1 Differences between the municipalities

A striking finding from the results linked to sustainability goals of the Dutch government is that there appear to be significant differences between the sustainability ambitions of different municipalities. The results show that without exception all developers noticed that there are significant differences between the municipalities in the Netherlands. According to them, this difference can be traced back mainly to their size. The large municipalities are considerably more ambitious than the smaller ones. The example of Amsterdam was often quoted, for example from respondent L: *“Yes, you generally see that big cities are much more ambitious, so for example municipality of Amsterdam and Metropolitan region of Amsterdam are really much more ambitious than a local municipality.” - Respondent L.* The largest city in the Netherlands is in great demand among developers when it comes to new projects, whenever there is new a tender issued it sparks the interest of many large developers. Because of this interest, the municipality can make high demands on the projects because there are many applications and there is a high degree of competition. The municipality can therefore be ambitious within the framework of the tenders to ensure the highest possible level of sustainability. Smaller municipalities often have much less interest from developers in tenders, so they can set fewer requirements as parties would drop out and ultimately no project would be initiated (Respondent G, personal communication, 13-06-2022).

4.3.2 Tender versus permits

Another result that emerged from the interviews is that developers experience a difference when it comes to sustainability requirements in a permit application or a tender process. The experience that sustainability plays a key role within tenders was mostly discussed. As explained in the theoretical framework, points are earned on several aspects (TenderNed, 2021). Sustainability often plays a leading role within these aspects, according to the developers. When this is the case, the more sustainable aspects that are incorporated, the more points a plan will receive, increasing the chance of winning the tender. Since sustainability plays such a vital role and there is a degree of competition, it provides the incentives to be as sustainable as possible



within the plan design. It was also noted by developers that it pays off to produce innovative sustainable ideas to differentiate yourself from the competition within tenders. An example of an answer in line with this explanation is respondent C:

When it comes to a tender(...) you have direct competition from other parties. So, it really pays to come up with innovative ideas in order to win the tender. When you start a project on your own initiative, you have no competition and, quite frankly, you have no reason to go much further than the laws and regulations (...). But that does hold back a bit of innovation, because you're just going to do it according to the rules. - Respondent C

On the contrary to tenders, the dominant view on permits is that the sustainability ambitions are not brought to the full potential. Permits are mainly a policy tool to check if all the minimum requirements are being met within a project plan. When the plans comply with the zoning plan and other laws and regulations, the Municipality has no choice than to grant a permit (Respondent D, Personal communication, 10-06-2022). Therefore, there are much less incentives to innovate or design a more sustainable plan for the developments. Most developers saw room for more stringent policy within permit processes to improve the sustainability within the construction and developer's sector, like respondent G:

The alternative could be that we just really continually incorporate those rules and those requirements ourselves. But the fact is now that with the exception of a few places, there are very few requirements on biodiversity on circularity and climate adaptation, because it is not yet legally anchored. - Respondent G

4.3.3 Conclusion

There were varying answers regarding the sustainability goals of the government, as became apparent from the results. A number of respondents believe that the sustainability goals are too ambitious and a number think that they are not ambitious enough. Another remarkable finding was that there appear to be significant differences between municipalities when it comes to sustainability ambitions. Large municipalities are often more ambitious within new tender procedures than smaller municipalities, according to the respondents. The results also showed that there is a substantial difference between the sustainability requirements within a tender procedure and a permit application procedure.

4.4 The availability and implementation of sustainability measures

When the results are reviewed regarding the implementation of practical sustainability measures, there are several implications regarding the measures. The mainly used sustainability measures are: circularity, use of wood, energy consumption, nature inclusivity, climate adaptivity and waste management. These measures and their implications will be discussed in this section.

4.4.1 Circularity

Looking at the results on the questions regarding circularity, ten out of thirteen cases have already applied circularity in completed projects or are currently working on circular projects. Nevertheless, it became clear that many developers still see circularity as a relatively new



concept. Therefore, there were varying answers when it came to the exact implementation of the circular principles in construction projects. Even though most companies are working towards more circular projects, there is no real framework or label for when a project can be called circular, which makes it complicated to determine at what threshold a project can actually be called circular. As respondent L suggests, there are many interpretations of this:

What actually is circular, is always the question. There are many gradations in the level of circularity. We also have projects where we are fully committed to circularity, in those projects there is more than 90% reusable after the end of its life cycle. There are also many developers who already call a building with a much lower circularity percentage, a circular building. - Respondent L

However, all interviewed cases foresaw that circularity will play an increasingly important role in the future. The developers took into account the government's sustainability goals of being fully circular by 2050. Despite the fact that circularity is currently not yet a solid requirement for obtaining permits for developments, ten developers had already incorporated far-reaching circular measures into their projects or were in the process of doing so. According to respondent A, measures towards circularity start when an existing building has to be demolished to make place for the new project. In this sense, it is not called demolition, but harvesting. The materials present in the existing buildings are harvested for renewed use in the next project. Careful consideration is given to which materials are tenable for reuse. When the new project is built, the life span and quality of the materials are taken into account. In addition, the way in which the materials are attached is considered. According to the circularity principle, this must be done in a detachable way. This means that materials are not bricked up or glued down. It is also important that the fittings are easily accessible to be disassembled for use in the next project (Respondent A, personal communication, 07-06-2022). Respondent K gave a similar answer regarding their circular way of construction:

Yes, we have broken down circular building into a number of things. From building more with biobased materials, including wood construction, for example. But also working more with reused materials, so how can we properly reuse the materials released from demolition. In addition, we are doing more in the way of detachable construction, so that in the future we can better disassemble the materials that we are now using. So that they can be better reassembled at another location or another project. Finally, the environmental performance of the materials we use is very important. Those are the things that we steer for. - Respondent K

The three developers with no circular developments to this date, indicated that they will be more involved with circularity in the future. Respondent C indicated that despite his educational background and expertise, no circular principles have been realised by the company, but that there are plans for the future (Respondent C, Personal communication, 09-06-2022).

Respondent F indicated that it did not have implemented Circularity in its projects mainly due to the demand being very dependent on the prices in the housing market. If the customer is willing to pay more, then the price will increase (Respondent F, Personal communication, 13-



06-2022). The answer of respondent F shows that in the vast majority of client assignments, ensuring the lowest possible cost price can preferred to sustainability by developers, so that the circular aspect fades more into the background. The other respondent that has not done circular construction so far is respondent D. This respondent is mainly active in the development of logistics real estate. Developments within the Logistics sector are mainly based on customer demand, as was indicated in the interview. For this sector there is much less stringent regulation when it comes to sustainability legislation. Hence the level of sustainability of the projects is entirely built on the degree of sustainability the customer is willing to pay for. Respondent D indicated that they see no incentive to further sustainability on their own initiative. However, his prediction for the sector is that legislation and making the sector more sustainable will create new incentives from the customers themselves to build more circular buildings (Respondent D, Personal communication, 10-06-2022).

4.4.2 Use of wood

When looking at the number of companies that use wood as the structural basis of buildings, there are only four companies among the respondents. These respondents use or have used wood as the leading material in the construction of their buildings. This involves the replacement of steel or concrete structures. For example, respondent H which has already incorporated wood several times and respondent J, which is starting to implement the material as the basis of their construction projects :

(...) We have completed about five projects in wood construction already. There we used strotec houses in (...). Strotec is a combination of wood and straw, which is very bio-based. We have also completed 50 completely wooden houses in (...). If we look at area developments, you see that yes, we in the (...)region have signed up to the scaling up for biobased construction, to realize a large number of homes. - Respondent H

We are also now working on the first two projects that will be built entirely from a base in wood, instead of concrete. - Respondent J

The results also showed that there are multiple possibilities when it comes to the use of biobased materials versus traditional materials. There are also hybrid options between the varied materials, where a base of concrete is still used but all other components consist of biobased material. This can have a saving effect on the capital intensity, the amount of material and ultimately also the environmental impact, according to respondent L:

You also see, for example, hybrid constructions. Where you have a concrete core, especially in high-rise buildings, because that saves a lot of material. We have done calculations and if the core is in concrete and the rest is in wood or other biobased materials, then your total environmental impact is usually lower than if you were to do it entirely in wood. But there are still a lot of developments and innovations going on. - Respondent L

The main reason for the respondents who have not yet implemented wood was that the use of wood as the basis of a building - with which it would replace the traditional concrete structures - is very capital intensive. However, they all foresee wood playing a leading role within the market in the near future. A significant portion of the respondents indicated that they are working on research and innovation towards using wood or other biobased materials in their



projects. For example, there are respondents that recently bought innovative start-ups that work with wood construction. Others have established research teams to advance the process towards wood construction. Therefore, the prevailing answer about the future of wood construction is that it will play an important role in the market, in accordance with the answers of respondents A and B:

(...)We have also taken over a company that constructs buildings entirely of wood. We are busy developing a wood lab where we will do research into new developments in this area. So, we're going to sit down with our cluster companies in that new office to look at, in particular, how wood construction can be stimulated. - Respondent A

(...) We are investigating how we can make wood the basis for a new standard house. For us that is still really in the research phase because there are still a lot of pros and cons, and you have to see if that benefits sustainability. You see that especially the big developers are taking big steps in this respect, we as a relatively smaller family business are having a bit more trouble with it.- Respondent B

Respondent D, which mostly builds logistical structures, pointed out that wooden constructions are technically possible in logistical buildings, but that it is still too capital-intensive for the company to apply. However, the respondent does indicate that it expects wood to play a larger role in the future of building structures (Respondent D, personal communication, 10-06-2022).

4.4.3 Energy Preservation

The BENG (nearly energy neutral buildings) requirements are leading when it comes to saving energy within the development and construction sector. A project can only qualify for a permit if it meets these standards. All interviewed respondents indicated that they comply with these requirements in all their projects since the beginning of this year (2022), after BENG became leading. Two respondents indicated that only the legal requirements are met in their projects in order to obtain a permit, respectively respondent C and respondent M:

Yes, I must honestly say that when we purchase land then we always just build there according to the requirements. Sometimes if the municipality asks for more energy saving measures, we do that but not on our own initiative. There are no groundbreaking ideas or whatever. - Respondent C

Yes, I must say it is already quite difficult to get all the requirements for the BENG standards done. What we do is look at energy generation with heat pumps. But in doing so we do look at the trade-off between the final Energy cost for the residents and the energy we use for construction. - Respondent M

However, many of the respondents indicated that they go beyond these legal requirements with an ideological vision for more sustainable projects. In doing so, they go further than the BENG norms and ensure that the buildings are delivered completely energy neutral. This is established through the use of insulation, solar-panels and other renewable energy sources. In addition, they also try to deliver the houses in a CO₂ neutral way, this is related to the choice of materials for the houses. The production processes of the materials used in the projects must be CO₂ neutral in order to achieve that:



All our houses are energy neutral. By this I mean that they are CO2 neutral in the usage phase. We are now taking the next step and that is making sure that the homes are also CO2 neutral in the production phase. - Respondent G

We go a lot further than the legal BENG. We have the ambition to go for BENG 2. Whereby we ensure that the actual CO2 emissions go to zero. In addition, we also create energy-neutral homes, whereby our aim is to be at least 20 percent better than the law, but often we are still considerably better than that. - Respondent H

4.4.4 Nature inclusive and climate adaptive construction

Another frequently mentioned measure that in most of the researched cases was incorporated was the use of measures towards more nature-inclusive and climate adaptive buildings, both in terms of the use of greenery on facades or roofs and the use in the larger area developments. The use of green roofs is used by the vast majority of interviewed cases. Green roofs were seen by all the developers as something that really is at the base of sustainability measures that have a positive impact. Green is seen as the one measure that delivers a lot in terms of nature-inclusive and climate-adaptive building, as stated by respondent C:

For all flat roofs we use green roofs anyway, they also work very well within tenders. This is especially good for biodiversity, but it is also very good for water management. The slowing effect on water runoff is of course becoming increasingly important with the changing climate. - Respondent C

A frequently given answer was the positive effect on the biodiversity in the surrounding of the built environment. Here the developers take the flora and fauna in the area into consideration in order to play a complementary role and to ensure that the construction activities and the final use of the homes have the least possible impact on existing nature. The application of insect boxes and nesting boxes for birds is a practical example of maintaining and expanding biodiversity in an area, which has high ecological benefits for low financial investments. Some parties even looked at planting certain woods and shrubs to provide adequate food and shelter for the animals in the area. Another practical measure by respondent L for preservation of the native animals is to provide passageways under fences for hedgehogs. Several developing parties indicated that they have little or no expertise in this area and that they hire ecologists to consult with them:

(...) All of our barns and flat roofs have green roofs. Some projects have more green facades and green roofs and all our homes always have nest boxes or insect boxes. We also take into account the hedgehogs that need to be able to get under yard fences, we do that kind of thing in cooperation with ecologists because we don't have that knowledge ourselves. - Respondent L

(...) There we look at native species of animals, among other things for the planting. Also, as much as possible, we look at how can you design everything so that trees are well placed in front of homes. So that trees provide shade on the homes, well that's one of such measure for example that can't be accounted for in the BENG. Shading a facade with a lot of glass surface is very nice because then the house cools down less quickly. We also apply nesting box facilities, but we also try to take into account that you not only hang a nesting box facility



but also ensure that there is food in the surrounding nature and hiding places in certain bushes. We don't have all that knowledge and expertise ourselves, so we do that together with ecologists who help us with that. - Respondent K

Green roofs also play a vital role in the salvage of rainwater, especially when it comes to more extreme weather situations. These are reasons developers are implementing green roofs as it creates more pleasant and sustainable projects for the end-users. An additional measure towards the storage of water that is separate from green roofs is to add wadis to the area to provide even more water storage, according to respondent L:

We do a number of things for climate adaptive building. When we do an area development, we look at the minimum water storage. To make more of an impact, sometimes we put down wadis. – Respondent L

A challenge regarding the placement of greenery on roofs is sometimes difficult in combination with the installation of solar panels as renewable energy, nevertheless, this challenge can be solved by choosing specific plant species:

Yes, we do that, not everywhere, but we do that and particularly also when you talk about roof greenery for water buffering and to prevent heat stress. Although on most flat roofs you have to install solar panel, so that makes for an interesting choice, but nowadays you also have vegetation that does well in the shade, so that you can reasonably solve that problem. - Respondent M

There was one exception regarding the implementation of green roofs. This is respondent D, due to the fact that this respondent mainly focusses on logistical buildings where there is much less focus on the implementation of green roofs due to the large scale of the projects. Also, the currently used steel structures are not capable of supporting the heavy green roofs (Respondent D, personal communication, 10-06-2022).

As consistent with the literature, the majority of developers apply nature-inclusive construction in their projects. This is implemented in diverse ways. For example, a number of developers included greening in the area development. Here the spaces between the parcels of houses are also filled in with greenery which involves parks or greenery along roads, bicycle paths and footpaths. Including green space in area development is conducive to a pleasant living environment. People appreciate their environment more if there is a high presence of greenery, according to many respondents. In addition, it has a moderating effect on heat stress, making it an attractive measure for tender procedures as municipalities are actively trying to reduce the heat-island effect within their urban areas, according to literature (Middendorp, 2016). Respondents A and D are examples of respondents who incorporate greenery in wider area developments:

(...)On the one hand you apply that to greening up your plan, on the other hand it promotes a bit of social cohesion, so that people can meet each other. So that's where we really apply it in the communal area, in addition to that, in the facades and on the roofs of the houses and apartments. The aim is to bring a lot of green into the plan, to create places where people can meet, and that greenery is also good for reducing heat stress, of course, you see that it's



really coming to the fore in all the plans at the moment. - Respondent A

From the BREEAM certification we have to take that into account. We then bring in an ecologist who actually maps out the situation at the beginning of the project. We look at the native plant and animal species, based on that we write a plan of how we take care of those plants during construction. But also, a plan of how the building will be decorated with greenery, for example with insect houses and bat boxes. In order to disrupt the current biodiversity as little as possible. - Respondent D

A remarkable finding is that the use of green is seen as the sustainability measure with the fewest drawbacks against its benefits, in terms of sustainability benefits. There is no carbon intensive production necessary, like with solar panels, or other drawbacks when it comes to emissions or energy usage. Apart from the fact that it is a capital-intensive measure that can also take up a lot of time in the process of developing a project. As extensively explained in this quote by Respondent G:

Our sustainability themes are really all about being a medicine for a that sick earth, which needs to heal. We have for decades been bleeding and squeezing the earth and allowing profit to be profiled over planet and people. We have only recently become aware that we need to bring more harmony back into the system and we are taking the steps to make that happen. Unfortunately, it is often the case that we are only fighting symptoms, instead of the actual disease. Added to this is the fact that every medicine has a side effect. The only medicine that currently has no side effects, is adding greenery. Greenery helps in meeting people, it helps against heat, it provides a healthier living environment and it enhances biodiversity. The only thing is that greenery is expensive and can slow down project processes. - Respondent G

4.4.5 Waste Management

The interviews revealed that most respondents (eleven out of thirteen) are actively managing their waste-flows. As established in literature, waste is a prominent polluter within the construction sector, it is therefore important that the distinct types of material that are released as waste during demolition or construction are processed in a specific way in order to ensure the lowest possible emissions from waste treatment (Kabirifar et al., 2020). Most developers spoke of several waste streams, in order to recycle or reuse materials as effective as possible:

We are very actively working on that at the moment. We have several working groups within our company. A special working group has been set up to investigate the waste policy in particular. Of course, you will always have some (waste) material, but we try to keep that to a minimum. We also have agreements with certain suppliers that the remaining streams can simply be returned one by one to the factory so that they can be used again. This is a very important issue for us, but it is still in its infancy. - Respondent A

Not all respondents Are actively managing their waste streams. Respondent J and respondent F do not do this, they only comply with the requirements imposed by the municipality but are not actively involved: “*We are not particularly active in waste management, we have partners who take care of that.* ” - Respondent J.

There are also respondents that have seen opportunities for innovation in their waste management, to be more circular or more recyclable, in order to ensure less environmental



impact from demolition or construction waste. It emerged that in Tenders it is becoming increasingly important to include the piece of sustainable waste management in the plans made for a new project because points can be earned for this which can be used to award a tender. Respondent E and Respondent M have made innovative progress towards this goal:

Yes, often sees that it (waste management) plays a role in tenders. That there is also asked to do something with the demolition material. If it is really a demolition project, then it is important to demolish as circularly as possible. That's why we then take a critical look together with circular demolition companies at what is still usable. (...) On the construction site we try to separate our construction and demolition waste as much as possible. First, 80% was unmixed demolition and construction waste and we have reduced that to 20%. -Respondent E

What we did on a 330-home project was to reuse the concrete from the existing buildings in the area development. We finely ground the concrete on site and used it again as foundation for the construction roads and the final roads. It's not too completely circular but it is making sure you can use waste again, and therefore manage it better. - Respondent

4.4.6 Innovative measures

The interviews revealed that there are companies that have developed far-reaching innovative ideas or concepts to ensure even greater sustainability within their projects. For example, respondent A, in collaboration with a sister company, has developed a technique to return concrete to its original components. This gives concrete a recyclable characteristic.

We have as an innovation that we can reuse concrete. Concrete is not really seen as a material that can be recycled, but it is possible. Concrete is, of course, very CO2-intensive and our sister company has developed a technique that can take concrete apart and bring it back to its three original components: sand, cement and gravel. This makes it completely recyclable. - Respondent A

Another innovation was created by respondent A. This company has found a way to reuse plastic window frames, making them 100% recyclable and therefore circular. The glass used in these frames also comes from a special workshop where the glass is made ready for reuse.

We made the first recycled plastic window frames in the world. (...) Our technicians first said it wouldn't be possible, but in the end, we succeeded by using a special film (...) These are actually the first 100% recycled plastic window frames made. We are now also in the process of making renewable wood window frames. As I said, the glass in the frames is also already made from recycled glass in our special workshop. - Respondent E.

Lastly, respondent F is working on a method to reduce emissions from large building equipment. This technique uses telematics and big data to track the emissions of their equipment in order to find ways to minimize the trips per machine. This is especially important in pre-fabrication construction projects as they work according to a set pattern.

We are currently working with a party that has developed something that allows you to equip all construction machines with a kind of telematics device. They then calculate the emissions of the machines and, based on artificial intelligence and deep learning, they give



advice on the best way to move them. This is done by means of big data and then it is indicated how you can best or most efficiently move your machines. That makes your own construction process much cleaner, especially when it is prefab construction. - Respondent F

4.4.7 Conclusion

The results showed that project developers use a selection of available sustainability measures in the realization of new projects. A considerable proportion of developers are actively implementing measures to make projects more circular. In addition, wood is already being used as the basis of new buildings, although this is the case in a minority of the interviewed respondents. However, all developers see wood as a material that will be playing a prominent role in the future. Regarding the energy performance of buildings, the policy currently entails an obligation to comply with the BENG requirements, which all developers currently meet. However, there are also developers who go beyond these minimum requirements and take measures to deliver buildings that are (almost) energy neutral. In addition, developers are working on making buildings CO₂ neutral, both when it comes to the production of the building, the choice of materials and during the use of the buildings. Moreover, almost all the developers are implementing green roofs or applying greenery in the area developments surrounding their projects. In doing so, they are connecting to nature-inclusive building and climate adaptive building. The developers do this mainly in collaboration with ecologists. Finally, developers are continuing to innovate in the market to strive for even greater sustainability within their projects and the entire sector.

4.5 Sustainability implementation challenges

After having established the stance of project developers towards the sustainability goals of the Dutch government and to what extent project developers incorporate sustainability measures, this sub-chapter of the result section focusses on the challenges regarding this implementation.

The results showed that there are several challenges when it comes to implementing sustainability measures in projects. First and mainly, financial feasibility is an issue. This aligns with the available literature (Saleh & Alalouch, 2015; Zhao et al., 2018; Zhou & Lowe, 2003). Just about all developers indicated that sustainable materials and techniques are much more cost-intensive than regular construction. As a result, the profit margins of projects are much smaller and there is a greater risk that projects will not turn out to be profitable. In some cases, this can jeopardize the continuity of businesses in the long term, according to respondent C and respondent F:

(...) you just see that profit margin getting less and less. Certainly, if in the future interest rates rise sharply again, if the market collapses, we'll really have a big problem. I think that is also the problem with the circular economy, it all costs so much money. - Respondent C

The problem is that the construction industry is just about the most traditional industry there is. All the innovations are just still very expensive (...). When you talk about awareness it does play, but especially the larger companies have the budgets to actually apply innovations in their projects. There are still many traditional thinkers who occupy a large part of the construction market, there may be some changes. - Respondent F



Secondly, for the end-users this can be problematic. Due to sustainability requirements in combination with the inflated costs of the measures, developers sometimes have to reduce the surface area or equipment level of houses in order to keep the project budget balanced. This gives the consumer a smaller or less luxurious house for the same money or a more expensive house for the same surface area or level of equipment. Answers in line with this explanation were heard from several respondents:

There's a ratio of affordable to more expensive, but those affordable homes are all capped and right now with the rising cost of construction that means we're actually in the home just having to make it a few feet smaller each day. That means at some point your house is going to decrease in desirability for the end user. So, we actually have to think now about new financing modules and new financing structures. A completely different market is then created, whereby owner-occupied houses might disappear altogether, those are pretty exciting things. - Respondent G

Because yes sustainability left or right is cost-increasing for projects, in the base that's not a bad thing. Only those costs have to be covered by someone somewhere since the current material prices. We also have to build more and more socially, but with these higher sustainability ambitions, the cost price does go up. If you start tomorrow by replacing concrete with wood, you will have an immediate environmental impact. Only at the moment wood is still a lot pricier than concrete, so there is always a trade-off. - Respondent K

Thirdly, the availability of resources is problematic. This applies to projects in general, but also when it comes to the use of sustainable materials techniques. For example, there is a scarcity of wood as a sustainable material. This involves a scarcity of materials that also results in price increases, respondent A states:

Especially the availability of materials is a big challenge though. We are, of course, used to building with bricks and concrete. Sustainable materials are naturally more expensive, so that's all-additional costs. We want to continue to produce affordable products, so this sometimes causes problems with the plans. – Respondent A

A fourth challenge is the more intense usage of (green) electricity instead of fossil fuels, which increases the pressure on the electricity network in the Netherlands. Despite the fact that there is more electricity being generated there is no real possibility of storing this energy. Therefore, the network needs to be expanded in order to account for the increasing use. This is already causing problems in the sector, as brought up by respondent B:

You see, for example, that the energy networks are starting to become full (...). We are also developing apartment complexes with high connections, partly because they generate a lot of energy. We just can't store this energy yet, of course, it costs a lot of money, it's just not profitable. So, what you see there is that the more you generate, the larger the connection has to be. So that raises the question of whether we should generate so much. Despite the fact that it is of course a good thing that there is so much renewable energy these days, it does bring challenges in addition to the positive things. - Respondent B



Another challenge for implementing sustainability measures in projects is the many different labels certificates and labels in circulation. As already explained in the theoretical framework there are several certificates that governments see as leading (BENG, EPG and MPG) in awarding tenders or granting permits. There are in fact more of these classifications so the overview of the value of these labels has become unclear, a number of developers indicated that more clarity is needed and that in the future there should be more integral measurements, according to Respondent F.

Of course, there are a lot of measures and indexes that determine how sustainable something is. The problem with that is that there is not really one index that is leading. (...). But there is not one index that is really recognized by everybody and takes all sustainability measures into account. - Respondent F

In addition, it is difficult for new innovations that have not yet been linked to such a label to enter the market with new sustainability measures. This takes a lot of time and effort which is slowing down the sustainable transition as a whole. Like this example by respondent M:

Well so I heard from a colleague that there is an exotic insulation material, (...). People at a company in (...) who are working on a fungus to let grow so you get a high-quality insulation. That's super interesting, of course, but before it can be applied in practice it takes a long time. First it has to be tested and then a certificate has to be issued. The fact that innovative products take a long time to become mainstream, I think that this is also a major challenge. - Respondent M

The cooperation with municipalities was in some situations seen as a prominent challenge. This is not a challenge that is solely related to the implementation of sustainability measures but related to the execution of construction projects in general. Almost all interviewed respondents mentioned the occurring delays in the processes of granting a permit or awarding tenders. This is often due to the seemingly inefficient system, as implied by the project developers:

What we, like all developers, are up against is that the decision-making process of municipalities takes a very long time, also many objection procedures that you run into. Then there are the provinces and the Nature Protection Act and so on, all these procedures take so much time. - Respondent B

Besides, municipalities suffer from staff shortages according to the developers:

In principle the cooperation is good. I only notice now, especially in the last 1.5 years, that the municipality is struggling with undercapacity, so that the response time is slower. Sometimes they don't even have a project leader, we've already experienced that for 3/4 of a year there is no project leader. (...) - Respondent C

Related to the under-capacity of many municipalities is the lack of knowledge. Many municipalities do not have enough experts in staff to bear the knowledge involved in complex sustainability measures and targets, according to the experiences of the developing parties. Many developers indicated that they often feel that they have more knowledge to contribute than the government body that must oversee the implementation of the sustainability measures (Respondent M, personal communication, 21-06-2022).



Besides that, the complexity of the current rules and regulation is something most project developers are struggling with. An improvement in this could provide for a more efficient development process on the developer's side: *"I would advise government to reduce complexity. Since the BENG, the complexity has only increased. We need to get back to the core namely and not think at such a level of detail as we do now."* - Respondent H

A further negative side note regarding the cooperation between municipalities and project developers is the conservative attitude of the welfare committee. This committee still has a traditional view when it comes to the appearance and layout of residential areas. This involves brick houses with conventional tiles on the roofs. However, more sustainable homes are often constructed from alternative materials such as wood and other bio-based materials. Also, roof tiles are in many cases replaced with solar panels or green roofs in sustainable housing concepts. With this, the goals of the welfare committee do not match the municipality's sustainability goals in general (Respondent H, personal communication, 14-06-2022). In addition, the municipality still weighs heavily on laws and regulations based on a traditional way of living, an example of this, given by respondent K, is parking permits. These are still of significant importance in the process of permitting grants or awarding tenders. These traditional permits often come at the expense of more far-reaching sustainability measures.

Yes, and sometimes we also need to be able to deviate from very heavy standards that are already very old, in order to interpret them somewhat differently. For example, the old parking standards that are still very important, while we have to focus more on partial transport. Such a parking permit can weigh very heavily against sustainability standards or vice versa. Then too many things have to be met, because it also still has to be affordable etcetera. Stacking too many ambitions is a thing at the municipality though. - Respondent K

A final negative point about the cooperation with the municipality, that was mentioned by respondent L, is the not uncommon mistrust by the municipality towards the project developers. Here the developers are treated as a party who only wants to make money, this stance corresponds to literature (Saleh & Alalouch, 2015). The developers do not agree with this and they indicate that they always act from sustainable and responsible convictions. Sometimes higher profit margins are set aside in order to make room for more sustainability measures, according to respondent L:

There is sometimes some distrust of the big bad capitalist property developer who only wants to make money and who doesn't interfere with the welfare, I find that attitude very unfortunate. When I look at our company and really look at other developers, there is so much motivation to do well. Sometimes we don't even want to make money, but we just want to do something good. - Respondent L

4.5.1 Conclusion

The biggest challenge in implementing sustainability measures is the financial feasibility of the projects. This is due to the fact that they are more capital intensive than traditional construction and thus homes must be made smaller or more expensive. With this, it is also a disadvantage for the end user of the project as reduces the liveability levels of their dwelling. In addition, there is a shortage of sustainable materials such as wood. Another challenge is the web of different certificates and labels mentioned, making it unclear to which labels and what amount of authority can be granted. The conclusion that can be made regarding the cooperation between



municipalities and developers is that there are often delays on the part of the Municipality. In addition, there is too little knowledge in municipalities about complex sustainability issues. Besides, the substantial number of laws and regulations create unnecessary complexity, which decreases efficiency on the developer's side. Another implication about the municipal cooperation is the conservative attitude of the welfare committee; a more progressive and sustainable attitude is required to improve innovation. Finally, a number of developers experience distrust from the municipality regarding their motives for developing projects. In summary:

General challenges
<ul style="list-style-type: none"> • Financial feasibility
<ul style="list-style-type: none"> • Less luxurious house for the same money, or a more expensive house for the same surface area or level of equipment.
<ul style="list-style-type: none"> • The availability of the resources
<ul style="list-style-type: none"> • Many different labels certificates and labels in circulation
Municipal cooperation challenges
<ul style="list-style-type: none"> • Delays in tender and permit procedures
<ul style="list-style-type: none"> • Municipal lack of sustainability knowledge
<ul style="list-style-type: none"> • Conservative welfare committee
<ul style="list-style-type: none"> • Mistrust towards the motives of project-developers

Table 9: Sustainability measure implementation challenges



5. Conclusion

This study has addressed the research question: *How do urban developers address sustainability-oriented policies and sustainability measures within their projects and what are the implications of adopting these policies and sustainability measures within project development?*

First of all, in line with literature, the results showed that projects are mainly initiated through acquisitions and tender procedures. Besides that, it has become clear that a significant part of new developments come about through the initiation by an investor or customer.

Secondly, most respondents indicated that, in addition to making a profit, they intend to make a positive contribution to society and to ensure that the Netherlands has a pleasant living environment and therefore implement sustainability measures also from an ideological motive. Despite this fact, the interviewed project developers gave varying answers regarding the sustainability ambitions and goals of the Dutch government in the interviews. Some respondents believe that the goals are unrealistic and not feasible, while others find the goals not ambitious enough to realistically make a positive impact on the climate challenges. When we take a closer look at the municipal level, there appear to be significant differences between municipalities when it comes to their sustainability ambitions, according to the project developers. This has mainly to do with their size and location.

Thirdly, as established in the literature, circular construction, the use of wood, nature inclusive and climate adaptive building, the use of green, energy preservation and waste management are the sustainability measures currently available on the Dutch construction sector. This is also mostly in line with the current regulations new projects have to comply with. A considerable proportion of developers are actively implementing measures to make projects more circular, although there are varying perceptions on when a project is actually circular. Besides, the use of wood as the main construction material is being used as the basis of new buildings, albeit by the minority of the respondents. However, without exception, all developers see wood and other biobased materials as the replacement for steel and concrete structures in the future.

As a fourth conclusion, in line with current policy, all project developers follow the BENG standards in their projects. However, a significant part of the developers goes beyond these requirements in order to make buildings even more energy neutral. In addition, many respondents are taking steps towards CO₂ neutral buildings, by also taking the production process of the materials into consideration. The majority of the respondents interviewed are implementing green roofs or green area-developments in their projects. This contributes to nature-inclusive and climate adaptive building principles. Often this is done in collaboration with ecologists, by, for example, applying insect boxes and nesting boxes for more biodiversity. Also, the incorporation of wadis in order to increase water retention and to reduce heat-stress was a measure mentioned by several developers. Finally, developers are continuously innovating in order to make the sector more sustainable.

Lastly, these implementations come with several challenges. The main challenge is the financial feasibility of the projects. This is due to the fact that these sustainability techniques and materials are financially more demanding, also due to the scarcity of sustainable materials. This



also means drawbacks for the end-users of the buildings, because projects-sizes or luxury standards need to be decreased in order to be budgetary feasible. Another challenge mentioned is the confounding number of certificates and labels, making it unclear what value or authority can be assigned to them. A separate challenge that came to the fore from the empirical data is the sometimes inefficient cooperation between municipalities and developers. The understaffing of municipalities, and therefore lack of knowledge on sustainability issues, can cause great delays in the process towards the realization of new projects. In addition, the laws and regulations can account for too much complexity for an efficient planning process. Also, the municipalities should be more adapted to the ongoing sustainability transition when it comes to older regulations, not in line with innovation. The final challenge: a number of developers experience distrust from the municipality regarding their motives for developing projects.

In summary, in most cases the Dutch project developers are taking several available measures towards more sustainability within the developers and construction sector, in line with the sustainability requirements. Sometimes, project developers go beyond these requirements in order to produce even more sustainability. This is done from a balanced commercial and ideological standpoint, in most cases. Nevertheless, these implementations do not come without the connected challenges.



6. Discussion

With the theoretical implications considered, this research offers contributions to existing literature, while at the same time invoking reasons for further research.

6.1 Theoretical implications

As established in the literature there are clear examples of measures in line with the circular economy principles (Eberhardt, Birgisdottir & Birkved, 2019). As was elaborated in the theoretical framework, circularity is as an important sustainability measure in relation to the environmental aspects posed by Hussin, Rahmon & Memon (2013). Despite this fact, it appeared that there is no real framework or guideline which accounts for an integral definition on whether a project can be called circular. There are developers who incorporate high percentages of circularity in their projects, but also developers with less far-reaching measures implied still called their projects circular. As this research outlined, it should be investigated what measure can be used to specify the level of circularity of a building project.

Another interesting aspect covered within this research is related to tender procedures. This way of project initiation by the municipality has been extensively discussed in this research. The results showed that certain factors influence how a tender procedure is carried out. As indicated in literature, these are the frameworks set by the municipality within a tender application in which points are granted to various aspects, resulting in an overall score. The distribution of points is important for the level of sustainability of the tender (TenderNed, 2022). Besides that, the competition among the developers who apply for a tender influence the incentives for further sustainability within the application (Carreon, 2015; Meijer & Ernste, 2019). However, other aspects that are important in a tender that have not yet been highlighted in this study, such as the land bid. This is a financial factor that is at odds with sustainability, making it an interesting friction point to investigate in further research.

Since sustainability measures are usually more cost-intensive than regular construction, this brings a challenge related to the financial feasibility of projects (Saleh & Alalouch, 2015; Zhao et al., 2018; Zhou & Lowe, 2003; Rijksdienst Voor Ondernemend Nederland, 2022-c). Although it was mentioned that sustainability measures can have a positive influence on being awarded a tender, the respondents did not discuss subsidies for sustainability measures. The literature showed that certain subsidies are possible when it comes to sustainability measures, with the aim of increasing the financial feasibility of projects. The goal is even to ensure more sustainable construction as it must become more financially attractive than traditional construction in the future (Rijksdienst Voor Ondernemend Nederland, 2022-c). Examining whether these subsidies are indeed achieving the government's desired goal may help to revise the subsidies in place so they can be adapted to work more sufficiently, if implied necessary.

Lastly, as became apparent from the results, there have been made implications regarding the challenges related to the cooperation between municipalities and project developers. This was a result, not accounted for in the theoretical framework and is therefore notable for this research. However, this research only interviewed the side of the developers, so it would be interesting to also review the side of the municipalities. Research from this side can provide insights into the opinion on the cooperation from both perspectives. Besides implications



regarding their view upon the strengths and weaknesses of the cooperation.

6.2 Practical implications

This study implied that there are several developers who state the opinion that there should be more ambitious sustainability goals coming from the government. Despite this not being an unanimous answer from the interviewees, it would be interesting for further research to investigate if developers would be open to more strict sustainability laws and regulations. If further research would suggest that there is room or possibility towards more stringent frameworks, this could increase the probability of achieving the government's goals towards the Paris climate agreement. This would be beneficial for the overall sustainability transition within the Netherlands.

One takeaway from the cooperation between municipalities and developers is that developers sometimes felt that they have more knowledge regarding sustainability than some municipalities. A practical implication regarding this takeaway could be a more intensive cooperation between the parties in order to increase the overall knowledge in this alliance. Another benefit would be the possibility to decrease the delays often present in tender allocation processes or the granting of permits, due to the increased knowledge on the part of the municipality.

6.3 Limitations

This qualitative research has given insights into the implementation of sustainability measures by project developers and implications surrounding this process. However, the number of respondents interviewed is not sufficient to make statements about the entire construction and development sector. Research on a larger scale could offer a solution here and provide insight into an integrated response to the entire sector. In addition, it would be interesting for follow-up research to quantify the implementation of sustainability measures by conducting a quantitative study. This would allow even more robust statements to be made about the current state of affairs when it comes to the sustainability measures that are being implemented in the current construction and development sector.

This ties in with the second limitation of this research. Despite the fact that the interview was conducted in an anonymous manner, the theme of the survey, namely sustainability, could only attract a certain type of developer. Project developers who do not feel a connection to this theme could, despite the anonymous nature, see no added value in participating in this research.

The third limitation is the length of the data collection period. This makes it impossible to make implications regarding the long-term developments on the project development and construction market. This would be an interesting research domain for further research in order to have an overview of the developments going on within the sector and at what rate the amount of implemented sustainability measures are evolving.

The fourth and final limitation is the researcher's bias. There is a risk that a researcher will describe the results that are expected to be found by the researcher. In this research, this was



tried to diminish by using existing literature in comparison with the results from the empirical data.

To summarize the discussion section, firstly, there should be further research for possibilities towards an integral measurement towards circularity. Secondly, tender procedures are an interesting research proposition as there are some frictions between financial factors and sustainability gains. Thirdly, there were no real answers regarding subsidies, despite literature implying their influence on the feasibility of projects. This can increase the sufficiency of the currently implemented subsidies. Regarding the cooperation with municipalities, this was often seen as a challenge, adding to literature, which makes it an interesting subject for further investigation. Adding to this, is the lack of sustainability knowledge at the municipalities, which can be exploited by the developers for better overall knowledge within the cooperation. Further limitations of this research entailed the insufficient number of interviews, the interview bias, the researcher's bias and the limited data collection period which made it unable to make implications regarding long-term developments.



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Appendices

A1. Interview Protocol Thesis

English

The interview guide

First of all, I'd like to ask you if you give permission to record this interview, for the sole purpose of thematic analysis. All answers are confidential, anonymous and will not be shared in a way they can be traced back to you as an individual or company. The interview will last approximately 35 to 45 minutes.

Do you give permission to record this interview?

1. About you and your job/company

(Goal for interviewer: Identify background information to understand the job)

- a. What is your name?
- b. What is your education and function?
- c. How long have you been working for *company*?
- d. Can you explain what your job is about and a short introduction into your project development enterprise?

2. Working Method

- a. Could you tell me more about your way of working?
 - What kind of developments does your company do?
 - What is the scale of these developments?
 - Are these projects public/private?
 - How many people are employed in your company?
- b. Do you make developments on the Tender bases, or more on land exploitation?
- c. What is the most important goal in your developments?

3. Sustainable Measures

- a. To what extent is your company working on sustainability in your projects?
 - Circularity principle
 - Energy savings
 - Waste management



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- Incorporation of green
 - Use of wood
 - Other?
- b. How do you incorporate these sustainable measures?
 - c. What are the benefits by implementing sustainable measures in your projects?
 - d. What are challenges by implementing sustainable measures in your projects?
 - e. What is the impact of the usage of these measures for getting permits/getting allocated the tenders?
 - f. Can you give examples of sustainable measures incorporated in your projects?

4. Cooperation Governmental institutes

- a. What is your view on your cooperation with municipalities?
- b. Is there a big difference between the municipalities? And in terms of sustainability ambitions
- c. Wat vindt u van de duurzaamheidsambities van de overheid?
- d. Zou u iets veranderd willen zien aan de samenwerking met gemeenten?

5. To conclude

- a. Looking back at all the questions asked, are there any things you still want to add or things that are unsaid?
- b. I would like to thank you very much for this interview and your time!
 - One last question: what did you think of this interview?
 - Is there anything I can do better for a next interview?

For when the interviewee wants to stay updated about the results. Refer to the possibility of sending the final thesis to him or her and that he/she can call or email me if he/she has any questions.



A2. Coding scheme NVIVO

- Recommendation for the future
- Waste Management
- Ambition Municipality
 - Not ambitious enough*
 - Too ambitious*
- Other sustainable measures
- Circularity
- Main goal of developments
- Sustainability Tenders
- Materials selection (MPG)
- Nature inclusive
- Area development
- energy conservation
 - Meeting BENG*
 - Does something extra*
- Function interviewee
- Use of greenery
- Use wooden structures
 - No use*
 - Use in the future*
- Size of firm
- Climate adaptive
- Company motto
- Reason for implementing sustainability
- Collaboration with municipality
 - Example Negative*
 - Example positive*
- Situation of projects
- Type of projects
- Tender versus permits
- Future of policy
- Sustainability challenges
- Differences between municipalities

