Master Thesis

The creation of a sustainable business model framework to foster the use of nature-based solutions in the Dutch building sector

Léon B.T. Collenteur

Delft University of Technology

TU Delft

square wise

Master Thesis

The creation of a sustainable business model framework to foster the use of nature-based solutions in the Dutch building sector

by

Léon B.T. Collenteur

to obtain the degree of

Master of Science
in Management of Technology
at the Delft University of Technology,

to be defended publicly on Wednesday August 31, 2022 at 13:00 PM.

Thesis committee:	Chair:	Dr. R.M. Verburg
	First supervisor:	Dr. H.K. Khodaei
	Second supervisor:	Dr. R.M. Verburg
	Advisor:	F. Delgado Medina
	Company supervisor:	J.L. Zonneveld
Student:	L.B.T. Collenteur	
Student number:	4459989	
Project duration:	February 22, 2022 – August 31, 2022	

This thesis is confidential and cannot be made public until January 1, 2025.

Preface

This research is conducted by me, L.B.T. Collenteur, master student of Management of Technology at the TU Delft, under supervision of the TU Delft and the company Squarewise. This research thesis is performed as the final assignment for the study Management of Technology. Squarewise is a consultancy company based in Amsterdam operating in different sustainability transitions. They advise among others governments, municipalities and companies. The company is steward-owned, and is thus self-steering. The company was very interesting for the research due to its expertise, but also for me personal because of the characteristics of the organisation, such as the way the organisation is managed.

There are a few persons I would like to thank for their (direct) contributions to the research. The first ones I would like to thank is my committee, existing of two supervisors from the faculty, one advisor from the faculty, and one supervisor from Squarewise. I would like to thank Robert Verburg for his work as the chairman of my committee, and the guidance he offered in that position. Secondly I would like to thank Hanieh Khodaei, my first supervisor, and Fatima Medina Delgado, my advisor from the faculty. Both of you were of great value to my research and kept steering me in the right direction. Especially you helped me alot with making it an academic worthy research, rather than a practical one. This was not always easy for me, but your positive and optimistic feedback worked great for me. You both contributed highly in my research and complemented each other for sure! On top of that I would like to thank Jeske Zonneveld, my supervisor of Squarewise, for the guidance throughout this thesis. You especially helped me with creating a good timeline and process (methodology), and with organising my focus group meeting. Your positivity regarding my thesis helped me feeling confident when necessary.

The second group that I would like to thank are all the participants of my focus group meeting. I would like to thank you for your willingness to participate, but on top of that for the time and effort you put into the meeting. The feedback and practical insights were of great value to this research, and the research and especially it outcomes wouldn't have been the same without you! Therefore, a big thank you is in order!

The last group I would like to thank are my relatives. Both my family as my friends as my girlfriend. I would especially like to thank my parents for their support, and pressure, during my academical period. I do not only owe them a thanks for during my period at the university, but also before that. They are the ones who made it possible for me to get the education that I got throughout my life. Thank you! The last ones I would like to thank are my friends, who gave me the needed distraction during my thesis, and especially in the end on our holiday.

Léon B.T. Collenteur
Delft, August 2022

Executive Summary

Nature-based solutions are solutions that (partly) consist of, or contribute to, living nature, which can provide economical, social and environmental benefits. Especially in the building sector they can have huge benefits over conventional (grey) solution as this sector uses a lot of resources and energy. The benefits that nature-based solutions can offer range from air purification to carbon sequestration to insulation. Even though nature-based solutions are known to have these benefits, large scale diffusion of nature-based solutions has not yet happened. This is because not all building blocks, and their influencing conditions, for large scale diffusion are yet met. 'Resources' is one of the building blocks which is not met, specifically the financial resources are not allocated. Partly the financial resources are not met because there is a lack of business models, and the EU states that in "order for NbS to be implemented effective new business and partnership models should be created". Business model dynamics show the need for an appropriate business model framework, which will lead to the creation of more business models for nature-based solutions. Through the business models for nature-based solutions more financial resources will be allocated. Therefore, the purpose of this thesis was to create a novel sustainable business model framework for nature-based solutions in the Dutch building sector. The main research question reads as follows:

How can a novel sustainable business model framework foster the use of nature-based solutions in the Dutch building sector?

To come to a new framework first a literature study is performed, in which was found that there is a lot of relevant work, but not a suitable framework. The main findings, and most useful for this purpose, were the triple layered business model (canvas) and the nature-based solutions business model (canvas). These two models were taken as the starting point and through a creation process this resulted in a novel preliminary framework. Even though the two models were the foundation of the novel framework, other findings in the literature review were incorporated in these. This preliminary framework was then improved with the use a focus group, consisting of seven experts from the Dutch building sector. The experts came from two different start-ups, from an architectural firm, from a research group, from a consultancy, from a housing corporation and at last from a company working on re-framing business models of organisations. All these experts work with, or have experience with working, nature-based solutions (in their organisation). This mix of participants is a good reflection of the ecosystem of nature-based solutions in the Dutch building sector.

This process resulted in a novel framework, which consists not only of a canvas as tool, but also of a guide, a workflow and on top of that additional supporting sections. These supporting sections are a list of nature-based solutions examples and a list of value proposition and their potential beneficiaries. The framework is built around the canvas, and are thus mainly created to support the use of the canvas. For the creation of the novel canvas the triple layered business model canvas and the nature-based solutions business model canvas are used as the starting point. Through a creation process these were reduced, restructured, and merged into one canvas. On top of that, new important aspects were added to the canvas. The new aspects that were added to the novel canvas are: key beneficiaries, environmental & social propositions, governance, regulations, cost reduction, capital expenditure costs, sources of capital investment, enablers & barriers, subsidies, societal/environmental benefits & downsides, ecosystem services and resources impact.

The results are obtained through the focus group meeting and through comparing the business model framework to the alternatives. Firstly, compared to the alternatives the framework is compact but also comprehensive. Compared to the triple layered business model canvas this novel canvas is way more compact, and thus more user friendly. While compared to the other alternative the canvas is comprehensive and adds aspects which are important, or even necessary, for nature-based solutions in the Dutch building sector. Thirdly, the framework offers the possibility for organisations to perform a proper impact assessment, both on the end-user as on the society and environment in whole. The fourth benefit of this novel framework is that is is created to overcome the identified barriers to nature-based solutions. This is important since there are many barriers for the roll-out of nature-based solutions, and thus a proper framework which helps overcoming these is beneficial. The fifth benefit is that the framework is specifically created for, and with, the

Dutch building sector. This implies that the framework is adjusted to the needs and wishes for this sector, where other frameworks are way more general. At last, the framework is very much stimulating creativity and offers inspiration by the supporting sections. This could help with the creation of creative business models.

The implications on practice are partly determined with the use of the focus group meeting. It is determined that the novel framework should not be used for ideation, but rather for giving an overview of a business or organisation. However, it could be incorporated in a workflow where there is also room for creativity and ideation, but in that case the canvas should not be used for brainstorming. The framework should be used by organisations working with nature-based solutions and/or are impact driven and care about their 'raison d'être'. On top of that it is of value for startups and young organisations. At last it can be used for consultancy work, where it then should be incorporated in the workflow of the consultant.

Even though the results show that the framework has many benefits already, future research is always possible and advised. Future research should be done in expressing the (co-)benefits of nature-based solutions in monetary values. On top of that the ecosystem as a whole should be better understood, and more evidence on the impact of these solutions would be preferred. At last, research on the dynamics of the business model should be included in the framework, as organisations and their business models are constantly changing.

For the use in practice there are a few recommendations. First of all open innovation should be incorporated in the process to stimulate (stakeholder) partnerships. On top of that, as mentioned before, the framework should be used correctly, and thus for creating an overview, instead of ideation. On top of that, there is the opportunity to make the framework more user friendly by creating a structure in which just simple questions are asked, which will automatically create a filled in canvas. At last when working with this framework, it is preferred to make use of experienced facilitators, as research shows that the facilitator has a big influence on the outcome.

It can be concluded that a novel sustainable business model framework for nature-based solutions in the Dutch building sector is created, which has many benefits over the alternatives. However, it should be noted that the framework should be used correctly, and that there is still room for improvements and future research.

Contents

Nomenclature

Abbreviations

Abbreviation	Definition
Bm	Business model
Bms	Business models
Bmc	Business model canvas
Dbs	Dutch building sector
Nas	Natural assurance schemes
Nbs	Nature-based solutions
Nbs Bm	Nature-based solutions business model
Nbs Bms	Nature-based solutions business models
Nbs bmc	Nature-based solutions business model canvas
Sbm	Sustainable business model
Sbms	Sustainable business models
Sbmf	Sustainable business model framework
Sbmfs	Sustainble business model frameworks
Tlbm	Triple layered business model
Tlmbc	Triple layered business model canvas

1 Introduction

A large part of the human population is living in cities, especially in Europe the majority is living in rural areas. It is currently estimated that approximately 73% lives in cities, and it is forecasted that in 2050 around 84% lives in cities(Bertino et al., 2019). In the Netherlands there are even more people living in cities. Currently around 92% of the citizens in the Netherlands already is living in cities, which is going to rise to 97% in 2050, according to forecasts by the United Nations (Bertino et al., 2019). Therefore, the way we live in the cities determines the majority of the impact of humans overall. Because of this it is important to evaluate the way we find solutions for the problems we are facing. The way we find solutions for our problems in urban areas is currently shifting. Most often when we are facing a problem, a technological and engineered (grey) solution is preferred and chosen. However, these solutions require more and more resources, and cause environmental problems, or at least do not contribute to solving these. The environmental problems we face in urban areas range from poor air quality to heat islands (due to global warming and petrifaction) to flash floods. Especially global warming which is primarily caused by carbon emissions has a big impact on urban environments. The building and construction sector uses 36% of all energy used worldwide. The sector also accounts for 39% of the emitted carbon emissions, of which 11% is from manufacturing and building materials (IEA, 2019). The other part is from energy consumption by buildings, both residential and commercial. Thus, the sector on one hand contributes highly to the carbon emissions, but is also facing the problems from the high amount of carbon emissions.

A new concept is trying to contribute to solving these problems, namely nature-based solutions (Nbs). This term and concept was first introduced by the EU back in 2015. (Escobedo et al., 2019)(European Commission, 2015). A few examples of Nbs are green roofs, mangrove forests for coastal protection, green corridors in cities, or urban gardening (Short et al., 2019) (European Commission, 2015)(Morris et al., 2018) Nbs are known to not only provide one specific solution, but also provide many co-benefits for the health of individuals, the economy, the society and especially the environment and nature (European Commission, 2015). For the environmental Nbs help with air purification, cooling cities, water purification, surface water regulation, biodiversity increase and climate regulation(Mok et al., 2021). On top of that there is strong evidence that urban nature has a large effect on the affect state of human. Furthermore, since it also reduces urban heat, it leads has a positive effect on mortality (rates)(van den Bosch & Ode Sang, 2017). At last, Nbs offer socio-cultural services, such as tourism or education. (Mok et al., 2021)

As part of the Horzion 2020 project an expert group released a report on 'Nature-Based Solutions and Re-Naturing Cities'. The expert group describes Nbs as "Nature-based solutions aim to help societies address a variety of environmental, social and economic challenges in sustainable ways. They are inspired by, supported by, or copied from nature". Since Nbs is a term, different people have different understanding and definitions for Nbs. Another definition is proposed by Raymond et al. in 2017: "Nature-based solutions (Nbs) are solutions to societal challenges that are inspired and supported by nature." (Raymond et al., 2017) Another definition of Nbs is presented by Dorst et al. in 2019, which reads as follows: "Nature-Based Solutions (NBS) are interventions that address social, economic and environmental sustainability issues simultaneously, thereby presenting a multi functional, solution-oriented approach to increasing urban sustainability." (Dorst et al., 2019).

Even though there are different definitions, there is a common understanding of Nbs and what they embed. Nbs is a term used for solutions that use nature as base, or as a complement to tackle problems

and offer economic, social, and environmental benefits. An underlying idea of Nbs is that the solution does not fight against nature but works together with and complements nature. On top of that Nbs can be seen as an umbrella concept for different concepts such as: Ecosystem Services (ES), Green Infrastructure (GI), Ecosystem-based Adaption (EBA) and Eco-engineering (Dorst et al., 2019). However, the definition of Nbs that will be used in the thesis is as follows:

"Nature-based solutions are solutions that (partly) consist of, or contribute to, living nature, which can provide economical, social and environmental benefits.

On top of understanding what a Nbs is, it is also important to know what a (sustainable) business model is, and what it implies. Business models are used for reflecting a organisation, determining a strategy, placing a new product/service in the market or assessing parts of a project. In general, writing out the business model gives a deeper understanding and helps business people, policy-makers, governmental institutions and other decision-makers. What a business model is, and what its definition is, is not exactly agreed upon by many scholars (Zott et al., 2011). However, in this report the definition proposed by Osterwalder et al. in 2010 will be used:

"A business model is the rationale of how an organization creates, delivers and captures value" (Osterwalder & Pigneur, 2010).

A Bm thus consists of three main elements: value creation, value delivery and value capture (Henry et al., 2020) (Beattie & Smith, 2013). On top of this Bm, there are sustainable Bms (Sbms). A Sbm consists of the same three elements (value creation, delivery & capture) while also contributing to the environmental or societal sustainability. (Henry et al., 2020)(N. M. P. Bocken et al., 2014) (Lüdeke-Freund et al., 2018) (Boons & Lüdeke-Freund, 2013). Thus, regular business models and sustainable business models are the two main categories of business models. Within these two categories many more types of business models can be found. These are more specific business models serving a more specific case. These often have a specific application and thus can not be used by each firm, organization or governmental (institution). In chapter 3 the relevant (sustainable) business model and theories will be discussed.

1.1. Problem definition

As shown there are many (potential) benefits to Nbs in urban areas. An uptake of Nbs could have a huge positive impact on the world, making the way we live more sustainable and future proof. However, there are still various barriers to large scale diffusion of Nbs. Ortt et al. in 2022 defined seven building blocks which should all be met in order to facilitate large scale diffusion (Ortt & Kamp, 2022). The seven essential blocks can be seen in table 1.1. On top of these seven building blocks, there are seven conditions which influence these blocks. These conditions have an influence on the blocks and whether the building blocks are met, or will be met in the future (Ortt & Kamp, 2022). These can also be seen in table 1.1.

Table 1.1: Technological Innovation System status for Nbs (White = not met, light grey = partly met, dark grey = met

Influencing Conditions	TIS Building Blocks
Knowledge of Tech.	Performance
Knowledge of Appl.	Price
Resources	Production
Competition	Complements
Macro-economics	Supply Network
Socio-cultural	Customers
Accidents	Institutions

As can be seen there are still various barriers to large scale diffusion for Nbs. These conditions should first be met, in order to let Nbs diffuse on a large scale. The blocks which still have to be met are the 'product price', while the 'product performance and quality' and the 'customers' are just partly met. For the influencing conditions the 'knowledge and awareness of application and market', the 'macro-economic and strategic aspects' and 'socio-cultural aspects' are not met, while for the resources only the financial resources are not yet met.

One of the barriers is thus the lack of financial resources allocated to nature-based solutions. This is underlined by Sarabi et al. in 2019, who "highlights the critical need for additional exploration of economic opportunities related to Nbs in order to encourage private investment". (Sarabi et al., 2019) This is also recognised by Toxopeus & Polzin, in their article they state that the challenges that Nbs face to obtain long term (private) financing is due to the inability to capture value, in other words, there is a lack of a successful business model (Toxopeus & Polzin, 2017) At last, the EU states that in order for Nbs to be implemented effective new business and partnership models should be created, which involve the private sector as well (European Commission, 2015). They define one of the approaches to let Nbs diffuse is by "developing business models that enable economic growth through sustainable urbanisation, whilst providing health and social and economic progress for citizens and businesses" (European Commission, 2015).

In order to create a good Bm an appropriate Bm framework is necessary, otherwise not all aspects of the organisation can be presented in the framework. As a model is always a simplified story of the reality, a better model, hands a better reflection of the reality. As Bms are not static it is important to understand the dynamics of a Bms. As Bms for Nbs are rather new and also drastically differentiating from other Bms, Khodaei et al. in 2019 propose that, due to the high level of dynamics, it requires change in the framework itself(Khodaei & Ortt, 2019). Otherwise "Assumptions can become invalid when the framework is applied in different contexts", and the "framework itself needs to be adapted" (Khodaei & Ortt, 2019). By changing the framework it is meant for example that the aspects that are covered in the framework are changed. By thus changing the sustainable business model framework for Nature-based Solutions in the Dutch building sector, the Sbms of Nbs can be better represented by a model, which will lead to more financial resources for Nbs, and thereby potentially meeting one of the influencing conditions for large scale diffusion of Nbs. Therefore the problem definition is determined as follows:

The lack of an appropriate sustainable business model framework for Nature-based solutions hampers the large scale diffusion of nature-based solutions in the Dutch building sector.

1.2. Objectives

Since the importance of Nbs, and the knowledge and research gaps are known, the objectives of the thesis will be presented. The objectives are the link between the research gaps and the research questions. The research questions will be derived from the objectives, in order to fulfill the purpose of the thesis. The overall objective is to contribute to the assessment of Nbs in the Dutch building sector, leading to a larger diffusion of Nbs. The objective is that when a building owner considers Nbs, the thesis will help with assessing Nbs as a solution.

The objectives of the thesis are divided into 3 objectives.

1. Explore (suitable) Nbs for the Dutch building sector
2. Identify and apply (sustainable) business models applicable for Nbs in the dutch building sector
3. Creation of sustainable business model framework including accounting framework for Nbs in the dutch urban building sector

The first objective is to identify and explore Nbs for the dutch urban building sector. Nbs is a wide, and sometimes vague, concept used for solutions in various sectors and geographical domains. To make the thesis more practical, and to have a clear focus on which Nbs the thesis embeds, the identification of Nbs for dutch urban buildings is the first objective. On top of knowing which Nbs are present for dutch urban buildings, it is also necessary to select the ones that are the most suitable. Secondly, the thesis will focus on currently used (sustainable) business models and the underlying framework. The current business models will give a better understanding in what aspects are important for analysing Nbs in a project. On top of that, it will become clear what the (potential) short comings are from the current business models and frameworks, and thus what should be changed in order to be useful for analysing Nbs. At last, it is time to create a new sustainable business model framework. This framework will be better and more applicable for Nbs, or similar solutions. This framework will be better in assessing the benefits and downsides of Nbs, making it a more holistic approach. The new framework will be tested on three cases, which will be three projects in the building sector in which Nbs can be applied. This will give more insights in Nbs in the dutch building sector, but also in the new framework. This results can be used for the implications of the research, and potentially an iteration of the framework.

The objectives will be translated into clear research questions in the following chapter, after which the methodology will be presented.

1.3. Research question

In this part of the introduction first the research questions will be presented, which when answered will contribute to achieving the objectives of the thesis. To reach the objectives, stated in the previous chapter, a main research question and sub-research questions are proposed. The main research question reads as follows:

"How can a novel sustainable business model framework foster the use of nature-based solutions in the Dutch building sector?"

1.4. Sub questions

The following sub-research questions (SRQ) are set up to answer the main question:

- What are the existing nature-based solutions which can be used in the Dutch building sector?
- What are the current sustainable business model frameworks?
- How can current sustainable business model frameworks be improved to enable the use of nature-based solutions?
- How should the novel sustainable business model framework for nature-based solutions in the Dutch building sector be used?

As the research, and sub-research questions are now known, the methodology for this research will be presented in the next chapter.

2

Methodology

In this part of the report the methodology for the complete project will be presented. The four sub-research questions all require a different methodology which will be further explained in this chapter. An overview of the methodology per sub research question is presented in table 2.1. This table also provides the desired deliverable for the sub research question. This helps to understand what is needed to answer the sub-research question and to keep a focus during the research.

Table 2.1: Methodology and deliverables per sub-research question (SRQ)

	Methodology	Deliverable
SRQ1	Secondary Research	Database of Nbs for the Dbs
SRQ2	Literature research	Literature study on (S)Bm
SRQ3	Creation	New Sbm and tool
SRQ4	Focus Group	Iterations on Work & Implications on Practice

As mentioned before the project consisted of four SRQs with each a different methodology. In the following chapter the four different methodologies will be explained. For answering the first SRQ secondary research, in the current Nature-based Solutions suitable for the Dutch building sector, is performed. The second SRQ is answered with the use of a literature research in useful (sustainable) business models, which are partly applicable for Nbs. For answering the third SRQ a creation phase was needed to create a new sustainable business model while for the fourth and last SRQ a focus group is used to find answers to the SRQ. In the following sections of the chapter the methodologies per SRQ will be explained in detail.

2.1. Secondary Research

In order to create a good business model for Nbs in the Dbs it is important to also understand the Nbs itself. By knowing which Nbs are available and what they embed a deeper understanding of Nbs is achieved. This also gives insights in what is important or needed for implementing Nbs, but also what value(s) it has to the customer, what impacts it has or how financing Nbs should be arranged. These are just a few examples of what is learnt by performing an exploratory research in Nbs, but in general it helps creating a better business model for Nbs.

The exploratory research in Nbs is performed with the use of secondary research, meaning that the data acquiring and research is done by others. Secondary research is used since literature research itself was not yet sufficient. As can be seen in table 2.2 just one useful result was found after searching. This is probably caused by the fact that Nbs is still a relatively new term and concept, and thus there is not yet many research done on this topic. On top of that, there are still not many different Nbs available, and especially not generally known and accepted Nbs. The development and creation of Nbs is still in an early phase. The secondary research is done with various methods, which will be described below table 2.2.

Table 2.2: Table with search terms and number of generated results by scopus

Search Term		# of Results	Useful
Existing Nature-based Solutions		284	
AND	List	3	1
AND	Catalogue	1	0
AND	Database	11	0

The secondary research consisted of searches on the internet, through different catalogues and databases, and through existing literature on Nbs. At last also more knowledge was gained through events, like the 'Klimaatkwartier Opening'. The web searches led to websites of companies, organisations and institutions which were working with Nbs in one way or the other. But also to a variety of Youtube videos about Nbs and which Nbs are currently available and implemented. Through both the videos as the websites new solutions were discovered, but also more knowledge about these solutions was gained.

Various catalogues and databases were found which stated examples of Nbs, for example the Nbs Explorer, designed by Nature4Cities (Malys, n.d.). These databases and catalogues were very useful for finding various Nbs, especially since they were often categorised. This helped with distinguishing the Nbs which were suitable for the Dbs, which are just a minor part of all the Nbs. On top of that these databases and catalogues were very useful since they are very structured and straightforward, which made it a fast approach. Through literature research one useful article was found with a list of existing Nbs, which is the one proposed by Castellar et al. in 2021(Castellar et al., 2021). Even though literature was not the most convenient way to perform this exploratory research on the existing Nbs for the Dbs, it was an useful extra possibility. Especially since the published article was substantiated with thoroughly research, making it a trusted source. The article included a list of 32 Nbs of which 9 solutions were applicable in the Dbs. At last, events like the 'Klimaatkwartier opening' were used to find Nbs which were not yet mentioned in any literature, databases, videos or sites. One of the Nbs that was found through this way is the Bioreceptive concrete by Respyre (Respyre, n.d.). Even though this method did not bring many new Nbs on top of the other performed secondary research, it was an useful, inspiring and exciting method. Especially through the personal interaction possible at the events a lot more is learnt about Nbs, its advantages and its downsides.

2.2. Literature Research

To be able to create a new business model for Nbs it is important to have a good understanding of the existing (sustainable) business models. Therefore a literature research in the applicable (sustainable) business models is performed.

This is first done by understanding what a business model exactly is and what it means. This is done by looking into the established business model literature and other research, such as lectures and online videos. When a clear understanding of business models was acquired, further research in the relevant business models was needed. Relevant business models were found by looking into similar concepts and relating topics. This included looking into sustainable business models, nature-based business models and circular business models. On top of that terms/concepts close to Nbs were identified to find other relevant business models.

These include Nbs Bms, sustainable Bms, green infrastructure (GI) Bms, ecosystem services (ES) Bms, circular Bms or disaster risk reduction Bms (Babí Almenar et al., 2021)(Escobedo et al., 2019). The first two are very logic to include in the search and not so surprising. However, after extensive research it was noticed that terms like GI and ES are very much relating the concept of Nbs and thus could also be very important for the creation of a Sbmf for Nbs. On top of that, also circular Bms are researched since the close proximity of both topics. Even though the concept itself is very different, the implications of the concept are relating. In the sense that circularity and Nbs both strive to tackle economical, social and environmental problems. On top of that, both topics are dealing with the misalignment of benefits and costs per stakeholder. Thus, the one who is paying for the solution, is not necessarily the main beneficiary. The main literature research is performed through 'Scopus' and 'Google Scholar', which provided enough results, both articles as studies as reports. On top of that, also the reference list of most documents were scanned to find relevant articles, resulting in more found useful articles. At last it was found that many articles and reports were created by research groups from the 'Horizon 2020' project, by the European Union. As the term nature-based solutions was also introduced by the European Union (European Commission, 2015), and is still mostly only

used in Europe (Escobedo et al., 2019). In 'Horizon 2020' various research groups were established aiming to contribute to the research in and implementation of Nbs. The following project groups were identified to be performing research on Nbs: CONNECTING Nature, GROW GREEN, URBAN GreenUP, NATURVATION, UNALAB, Nature4cities, ThinkNature's, NAIAD and MERCES (Europe, 2018). A research in all the work done by these groups was performed. This gave a good understanding of the research done, and how all the research is related to each other. At last, through all the findings and results it seemed necessary and interesting for the research to also look into the value proposition of Nbs, the catalogues with existing Nbs, the financing part of Nbs and the handbooks guiding Bm theories. Not all of these findings will be included in this report, but it gave a better overall understanding of the topic.

In the research the following business models are identified: the regular business model(Osterwalder & Pigneur, 2010)(Coes, 2014), the triple layer Bm(Joyce & Paquin, 2016), the sustainable Bm(N. M. P. Bocken et al., 2014)(Boons & Lüdeke-Freund, 2013), the circular Bm(Lewandowski, 2016), the Nbs Bm (McQuaid, 2019)(Egusquiza et al., 2021), the extended Bm (Dewulf, 2010)(Pek et al., 2017)(Walkiewicz et al., 2020), and the private-public partnership(PPP) Bm (Agthoven, n.d.). On top of all these business model a Natural assurance schemes (Nas) framework(Mayor, Zorrilla-Miras, et al., 2021), including a Nas canvas, and the Edible city solutions (ECS) Bm were researched(Bischof, 2021). As can be seen there are various frameworks existing for working with Sbms. These will be presented in chapter 3.

2.3. Creation

As it was found, both in the research prior to this thesis project as in the literature review, that there is currently not an appropriate Sbm for Nbs in the Dbs, a new Sbm including a tool is created. It was found in the study that there was need of a new Sbm as it is one of the barriers hampering the diffusion of Nbs. A novel Sbm theory and tool can be used for creating new business opportunities, but also for attracting financing as the organisations can be better represented, and thus understood, by the Bm. On top of that, for the organisations themselves it also important to have a Sbm which is appropriate for their organisation. With the use of an appropriate Sbm, organisations are better able to reflect upon their own organisation and see where improvement (in any way) is possible. The novel Sbm is created by first performing an extensive literature research which is then used as basis for the creation of the novel Sbm. The literature research consisted of a study in the existing Nbs (in the Dbs). This resulted in a deeper understanding of Nbs, for example in what their value is, but also what it takes to implement Nbs. In conclusion, this gave insights in what aspects play a roll in Nbs.

After this step, a literature research in the existing Sbm and then in the existing Sbm for Nbs was performed. This helped understanding what is currently available and what (dis)advantages this offers. All the Sbm and their tools were investigated to get a good understanding of how they were built up. From each (S)Bm there were some take-aways which helped creating a novel improved Sbm. On top of that, by having a look at all the different Bms it helped understanding the structure of (S)Bms, and thus creating a good structure for the new Sbm.

The novel Sbm for Nbs in the Dbs consists of a canvas, a guide for working with the canvas, and two sections which (can) help filling in the canvas. The first section consists of a list of 14 examples of suitable Nbs for the Dbs with general information, but also with their (dis)advantages. This part will help organisations with the ideation of their product, but also in projects where they would like to offer or use Nbs, as they are easily able to see what solutions are available and what that means for the project. The second section is a list of value propositions that Nbs can offer combined with a list of potential stakeholders/beneficiaries. In this list you can find what value proposition is important to who, and how much it influences her. This can help organisations help understanding what value proposition (economic, environmental or societal) they can offer through their product/service, and for who. By having a good understanding in this, it is also easier to attract finance from the right stakeholder.

The canvas is created through starting with the triple layered business model canvas (Tlbmc) (Joyce & Paquin, 2016) and the general Nature-based solutions business model canvas (Nbs Bmc) (McQuaid, 2019). The reason is that the Tlbmc is the most extensive Bmc covering all possible aspects in the three perspectives: economic, environmental and societal. On the other hand the Nbs Bmc is currently the most specific canvas for Nbs in the Dbs, but far from perfect. These two canvasses were taken as the starting point, by various steps this canvasses were melted into one canvas. The phases for performing this were a reducing phase, a restructuring phase, a combining phase, an addition phase and a second restructuring phase. In the reducing phase it was key to delete blocks, especially from the Tlbmc, which were not of importance for

this situation. On top of that, working with the Tlbmc is very time consuming and difficult, as it consists of 27 different blocks. This can definitely be a barrier for using this extensive canvas. By selecting only the most important blocks of the Tlbmc 9 blocks were removed. On top of that three blocks were combined into one block. In the first restructuring phase everything was ordered and replaced into one layer, making it a more clear and structured canvas. After the restructuring phase both canvasses were combined into one canvas. As the reduced Tlbmc covered almost all blocks of the Nbs Bmc, only a few blocks had to be added to the reduced Tlbmc. To this reduced canvas then new blocks were added, which were found, in the literature review, to be important for Nbs in the Dbs. At last, a second restructuring was done. After the canvas was created a guide was created for working with this canvas. This consisted of an introduction to the canvas, why it was created, and what the purpose is of the canvas. On top of that a flow of how to go through the canvas was included. At last a small legend was added for helping understand various colors in the canvas.

2.4. Focus Group

A focus group is a qualitative research method for gathering feedback on a product or service by your target/focus group(Stancanelli, 2010). The focus group should resemble the larger group as good as possible. This means that the group is often relatively small (6-10 persons) while still covering all various persons (and thus needs) having interest in the product or service. With the focus group it is possible to gather various feedback and proof, for example tacit knowledge or someone's view (Ryan et al., 2014). Ryan et al. (2014) argue that the use of a focus group leads to an higher empirical value in your research (Ryan et al., 2014).
For this research it is very important that the created Bm is co-created with all the stakeholders, as this is one of the enablers for Nbs (Sarabi et al., 2019)(Giordano et al., 2020)(Ferreira et al., 2020). By involving all stakeholders in the process for Nbs implementation, everyone's needs and wishes are taken into account. This is especially important for Nbs since the financing is often done by governmental institutions or municipalities. As these have the duty to represent the needs of the society it is desired to involve the society in the process. As this is an important factor for the success of implementing Nbs(Ferreira et al., 2020), it is also an important factor for creating a novel Sbm for Nbs in the Dbs. Because of these reasons, it is chosen to reflect upon the created Sbm with the use of a focus group. The focus group consisted of various experts, which will be discussed in the following section. In the last section the methodology of the focus group will be highlighted.

2.4.1. Participants

As mentioned before the focus group consisted of seven professional experts with various backgrounds. Firstly, the process of the recruitment of the participants will be given, whereafter the participants will be introduced and also their connection to Nbs will be elaborated upon. At last, their value to this focus group will be highlighted.

Selection Process

The process of the recruitment is started with the use of a stakeholder analysis. This was performed to find out the important actors and stakeholders in this ecosystem of Nbs in the Dbs. This stakeholder analysis can be found in figure A.1 in Appendix A. This was created with the use of literature findings, web searches and own work and understanding. After all stakeholders were identified, the values of each stakeholder were determined. What are they striving for, what are they trying to reach. With the use of the identified values per stakeholder, the interest in Nbs in the Dbs could be determined. Each stakeholder was given an estimated score from 1 to 5, with 1 meaning a very low interest in Nbs, and 5 with a very high interest in Nbs. On top of that, the decision power was scored in the same way. The decision power means the power they have to influence decisions regarding the Nbs. For example, the government has a very high decision power (score 5) as they have the ability to create new laws and regulations, which can immediately obligate, or prohibit, Nbs in Dutch buildings. With the use of these two scores mapped out, important stakeholders were mapped out. The stakeholders are mapped out on a power interest grid, which can be found in figure 2.1. The stakeholders which were interesting for the focus group meeting were the ones with a high decision power & high interest, with a medium decision power & high interest and at last with a high decision power & a low-medium interest. As can be seen in figure 2.1 the power-interest grid is divided into four parts, from 'lowest priority' to 'highest priority'. This power-interest grid gave insight in what participants were the most

important to include in the focus group, and which were less important. It is of importance to understand the decision power and interest one has. Stakeholders with a high decision power can have a big impact, while stakeholders with a large interest will benefit or suffer the most from the decisions made. By selecting the participants with the highest priority as possible, the end product of this research will have a bigger impact. Thus, the outcome of this research is directly influenced by the selection for the focus group. As will be shown in the next part all stakeholders from the 'highest priority' were included, expect from the municipalities.

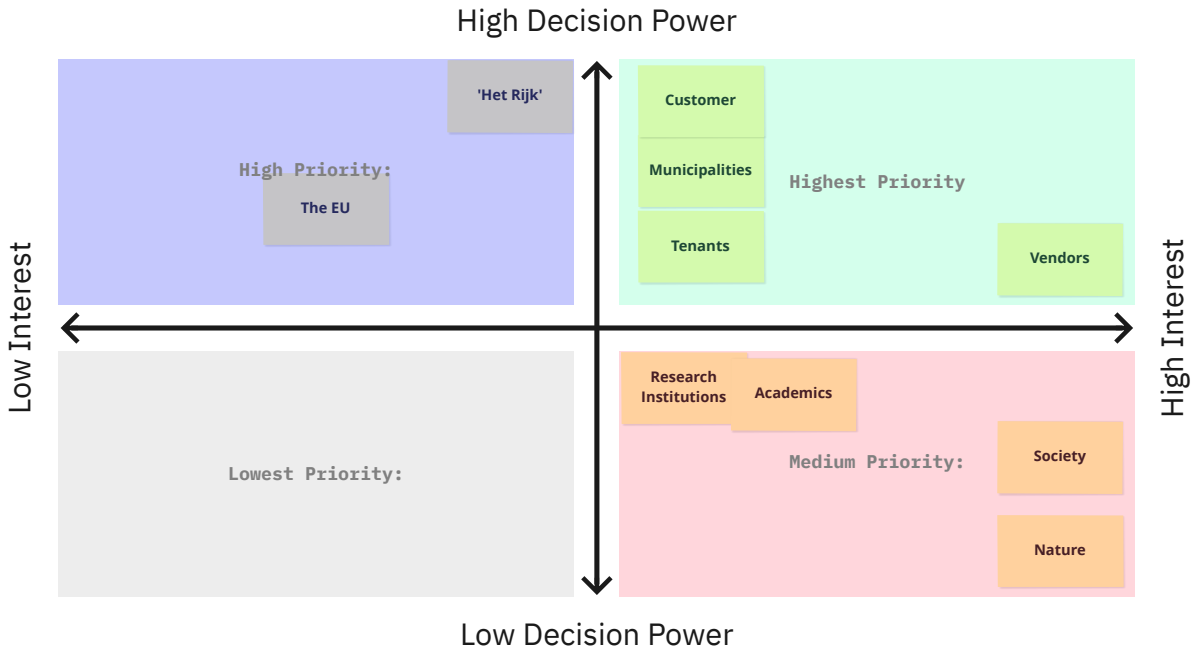


Figure 2.1: The power-interest grid of the ecosystem of nature-based solutions in the Dutch building sector

Introduction of the Participants

In the next step the precise stakeholders had to be identified, in order to invite them to the focus group meeting. This was done through connections of 'Squarewise', through connections of the supervisors, through events, through finding names in literature and at last through searches on 'LinkedIn'. Unfortunately it was not possible to include all the preferred stakeholders in the focus group meeting, due to the availability of people. Especially it would've been preferred to include someone from the municipality and/or government. However, still 7 valuable stakeholders participated in the focus group meeting which will now be highlighted. The setup of the focus group meeting with the participants can seen in figure 2.2.

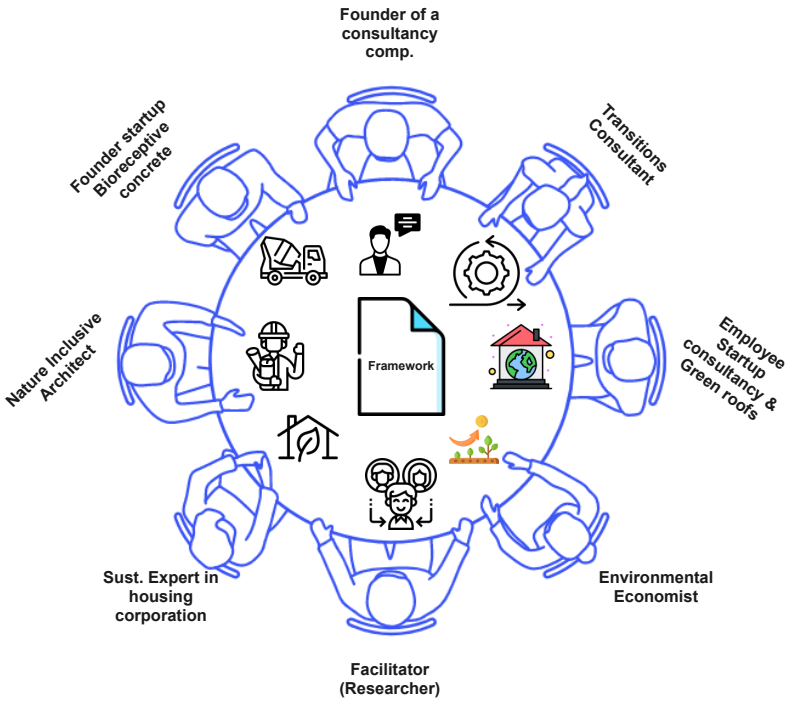


Figure 2.2: The seven participants of the focus group meeting

The first participant is a senior researcher on climate and sustainability at JIN Climate and Sustainability. JIN Climate and sustainability is a small research unit, which is a spinn-off of the university of Groningen. (S)he has mainly participated in EU funded research projects in Bio-economy and land based mitigation technologies. On top of that (s)he is co-leading an EU funded project which also involves Nbs. (S)he is thus connected to Nbs through research.

The second participant is one of the owners of an architectural firm focussing on designing and building nature-inclusive environments. On top of that (s)he is (project) advisor on this theme and thus has expert knowledge in nature-inclusive solutions. The firm designs habitats for animals, such as birds, into various buildings. On top of that they give advise in projects where there is the wish (or need) to make it more nature-inclusive. (S)he has a great connection with Nbs as (s)he designs Nbs and is also trying to facilitate habitats for nature. (S)he represent the architectural perspective on this theme.

The third participant is an employee of an Amsterdam based start-up. The startup consists of three employees and is focused on advising home-owners and homeowners associations on how to go through the energy transition step wise. Step wise in the means that they first implement easy and small interventions, before coming to big interventions like solar panels. on top of that the startup is designing a green roof, in collaboration with the TU Delft, which they would like to bring on the market soon. In this way the start-up, and thus the participant, is working with Nbs for the Dbs. On top of that, through the work at a start-up (s)he has broad experience with Bms and Bmcs.

The fourth participant is working at a steward-owned consultancy firm advising on different transitions. The firm gives advise on the energy transition, the agricultural transition, the material transition and the value transition. Most of the customers are municipalities and governmental institutions. (S)he works mainly on the energy transition, but also has experience with creating templates and other tools. Through the company (s)he is connected with the theme of Nbs, and especially his/her experience with templates and tools is of great value in this focus group. On top of that (s)he represents the consultancy sector, and is able to think out of their perspective.

The fifth participant has a background in social innovation and social entrepreneurship. On top of that (s)he has founded a consultancy company which is helping small-medium enterprises to become more social and environmental enterprises, which thus are striving for impact rather than for economic profit. (S)he helps businesses with (regenerative) business model development to achieve a net positive impact. (S)he also embeds system thinking into the consultancy, which is especially needed for transitions. At the other hand, (s)he is recently more involved in the theme of Nbs, and participated in an EU research project

in which they investigated the barriers and enablers to scaling Nbs. Through his/her work on the Bm innovation and research on the barriers and enablers of Nbs (s)he is a great addition to the focus group, both representing consultancy work on Bm innovation as the more academic world in research.

The sixth participant is an employee of one of the biggest housing corporations in the Netherlands. With a background in architecture, (S)he currently is (one of the persons) responsible for the sustainability of their portfolio, consisting of around 60,000 houses. (S)he is involved in creating a good strategy of making these assets (sustainable) future proof. Within this big housing corporation there was not someone more specifically responsible for Nbs or nature-inclusivity, and therefore (s)he is a good representative of the housing corporation as her/his working field is the most related. (S)he is able to understand and represent the perspective of the housing corporations in the Netherlands, which often deal with (complete) other problems than regular house owners for instance.

The last and seventh participant is the founder of a young start-up which is creating bio-receptive concrete, on which moss can grow. With this they try to make cities, and buildings in particular, more nature friendly and a green environment. The startup is thus offering Nbs, but the product is still in the development phase. As it is a (very) young start-up the Bm of the company is still very much innovated. For start-ups it is known that Bms can be a very important theory and tool to making the business a success, therefore (s)he had a good connection with both Nbs as Sbms. On top of that, since Nbs is quite a novel concept, a lot of innovation is done by start-ups which are able to innovate more easy and thus it is important to include the perspective of the start-up environment as well.

As can be seen from the variety of background the focus group represents a lot of perspectives in the ecosystem of Nbs in the Dbs. The focus group did not cover all perspectives, but is still of great value to add (practical) insights and for receiving feedback on the created Sbm and tool. In the next section the methodology will be presented in more detail.

2.4.2. Methodology of Focus Group

The focus group meeting was an one-time meeting of around two hours. The meeting was held online due to the convenience of not having to travel (as participants were from across the country). As mentioned above the focus group consisted of seven participants, excluding the facilitator (the writer of this research). As the meeting was online, it was, with permission, recorded and transcribed. The transcriptions can be found in Appendix B. To be able to have an online meeting, 'MS Teams' was used, as this deems to be the most privacy safe way, while also being very practical. In the meeting two breakout rooms were created to work on a case, which will be elaborated further upon later in this chapter. To be able to work on a case, 'Miro' was used. Through 'Miro' it was possible to create work spaces which could be shared and worked on simultaneously. On these work spaces the novel Sbm was put, and created in such a way that through sticky notes the Bmc could be filled in. 'Miro' was very useful as this made it possible to collaborate and co-create all together online, and work on the same case. An example of how this looked can be seen in figure 2.3, while a complete overview of the 'Miro' session can be found in Appendix E.

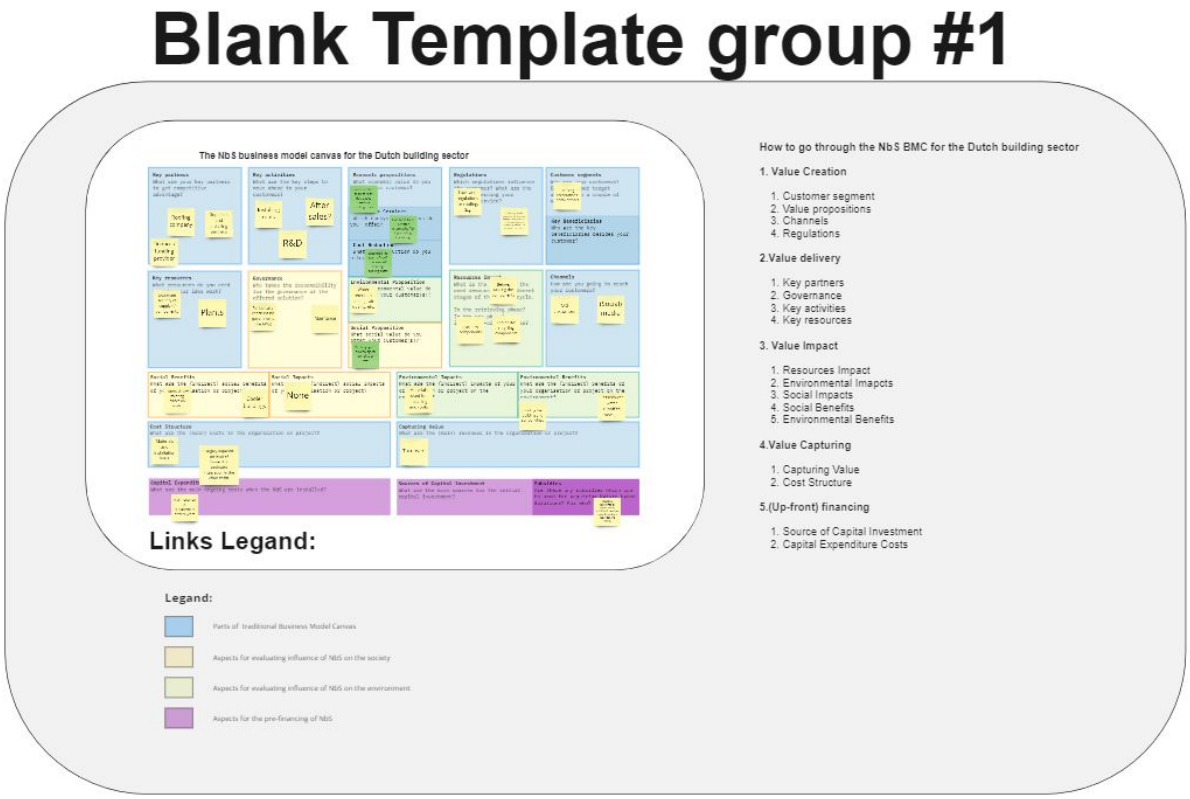


Figure 2.3: Example figure of how the 'Miro' board session went

The goal of the focus group was to get practical feedback, and insights, on the novel Sbm. Feedback was desired on three different aspects. The first aspect on which feedback was desired on, was how the novel Sbm could be improved. The second aspect was whether the Sbm was practical to work with and the last aspect was how practical this Sbm was in their work. This last aspect helped understanding for whom the Sbm is developed, and what the needs of them are.

In order to receive this feedback the focus group worked with the Bm during the meeting, after which they were able to give feedback on various ways. The participants worked during the meeting on a case with the use of the Sbm. For this case they had to fill in the canvas. As it was the goal to receive practical insights it was preferred to have a practical case, rather than an imaginary one. The participants were therefore asked prior to the meeting to send a practical case if they had one. This let to a practical case in which a start-up was working on a new Nbs, namely a green roof. The full case description can be found Appendix C. During the case the participants were split into two pre-defined groups in order to stimulate that everyone was able to help and participate in the case. This would not have been possible with seven participants, online, in one group.

The feedback was received through four different ways. Two ways were feedback during the case, while two feedback moments were after the case in a general session. On the Miro board a part was created in which the participants could add sticky notes with comments and feedback on the Sbm. This was especially useful since the participants could this way put done the feedback immediately when it popped up in their minds. This created a total of 16 comments, of which some were really small while others were quite extensive feedback. On top of that, feedback was gathered during the case through paying attention to the discussion in the breakout rooms. These discussions were often vibrant, but not directly related to my Sbm in particular, but rather on the case. However, this gave insights on how the Sbm worked in practice. The third way feedback was gathered, after the case, was through open questions which the participants had to answer personally. This was also achieved through Miro, as this was the most convenient way (for the participants). The questions were open questions which were prepared in advance. The questions were based on pitching questions and tuned to the desired outcomes of the meeting. The questions can be found in Appendix D. The last method that was used to receive feedback was with the use of an open discussion after the case. In this discussion the participants had the opportunity to mention things they didn't have the

opportunity for yet. This led to a living discussion in which useful insights were gained. In conclusion, the four different methods for retrieving feedback was found to be very effective, as it gave a variety of insights and helpful feedback. Mainly the combination of completely open feedback and nudged feedback through the use of concrete questions was interesting as it gave very different outcomes, but all useful.

2.5. Research Design

In this part of the chapter the approach and chronological order will be stated, in the form of a road map and a detailed timeline. First the road map will be presented, after which the timeline for the research will be given.

2.5.1. Road Map

The research consisted of five phases. These phases are described in the road map in figure 2.4. Each phase has a larger common goal to achieve, which took various tasks to achieve. Many of these tasks had to be done in chronological order, and were thus not possible to start without finishing a previous task. However there were some tasks which were started before completion of the previous phase, as can also be seen in the timeline, presented in figure 2.5.

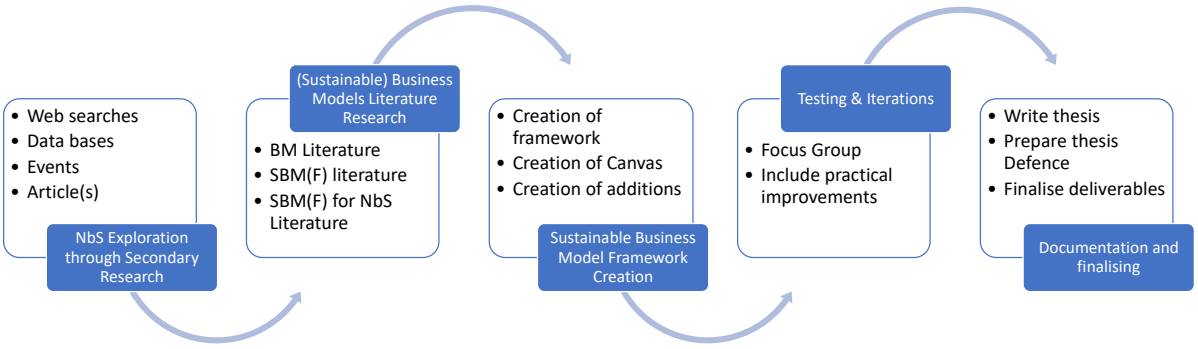


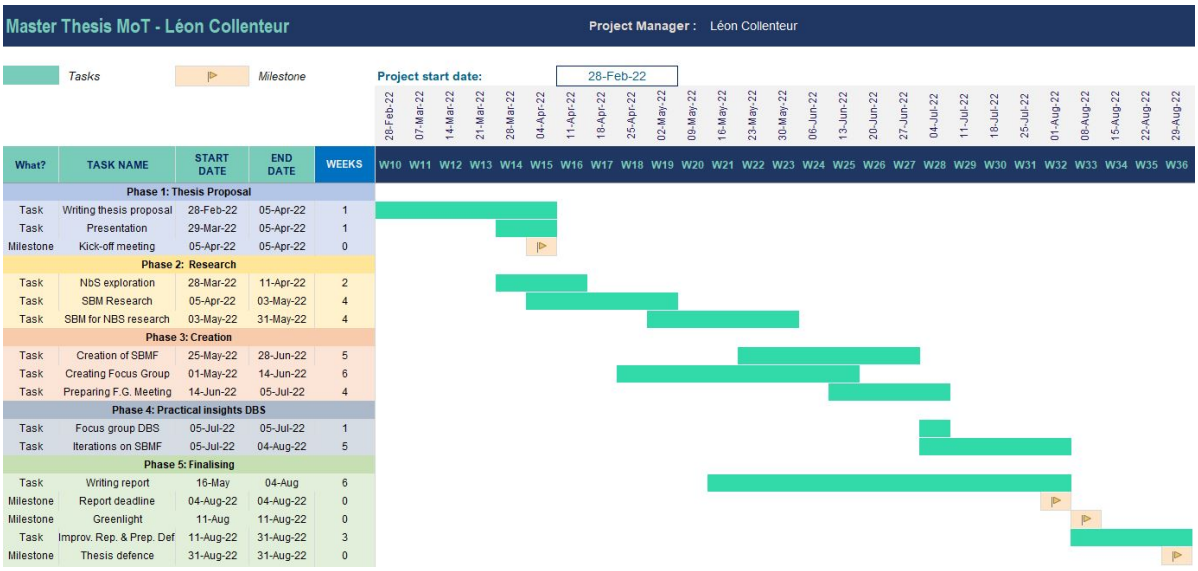
Figure 2.4: Roadmap of the performed research

The first phase consisted of an exploration phase for the Nbs. This provided a general understanding of which Nbs exist, and what benefits they embed. This is done through secondary research, in various ways. In the second phase a deeper research into the existing sustainable business models is performed. In this phase detailed knowledge is gained which will is used in the third phase to create a new Sbmf. The first Sbmf, in this phase, is created with the aim on Nbs in general, however the Dbs was kept in mind while developing this framework. In the fourth phase the framework will be evaluated and further developed with the use of an expert group. This phase let to various iterations on the framework. As the expert group consisted of experts from the Dbs section, this led to the creation of a framework specific for Nbs in the Dbs. In the fifth and final phase everything is documented and finalised. On top of that the final meetings, like the green-light meeting and the thesis defence, are prepared.

2.5.2. Timeline

The timeline connects the road map, and thus the phases, to specific moments in time. This timeline is used to plan and check whether the research was on track. The five phases are presented, including the most im-

portant tasks per phase. The timeline can be seen in figure 2.5. In this timeline various tasks and milestones can be seen, which are grouped phase. There were 4 official milestones within this research, which were the 'kick-off meeting, the 'report deadline', the 'greenlight meeting' and lastly the 'thesis defence'.



What?	TASK NAME	START DATE	END DATE	WEEKS
Phase 1: Thesis Proposal				
Task	Writing thesis proposal	28-Feb-22	05-Apr-22	1
Task	Presentation	29-Mar-22	05-Apr-22	1
Milestone	Kick-off meeting	05-Apr-22	05-Apr-22	0
Phase 2: Research				
Task	NbS exploration	28-Mar-22	11-Apr-22	2
Task	SBM Research	05-Apr-22	03-May-22	4
Task	SBM for NBS research	03-May-22	31-May-22	4
Phase 3: Creation				
Task	Creation of SBMF	25-May-22	28-Jun-22	5
Task	Creating Focus Group	01-May-22	14-Jun-22	6
Task	Preparing F.G. Meeting	14-Jun-22	05-Jul-22	4
Phase 4: Practical insights DBS				
Task	Focus group DBS	05-Jul-22	05-Jul-22	1
Task	Iterations on SBMF	05-Jul-22	04-Aug-22	5
Phase 5: Finalising				
Task	Writing report	16-May	04-Aug	6
Milestone	Report deadline	04-Aug-22	04-Aug-22	0
Milestone	Greenlight	11-Aug	11-Aug-22	0
Task	Improv. Rep. & Prep. Def	11-Aug-22	31-Aug-22	3
Milestone	Thesis defence	31-Aug-22	31-Aug-22	0

Figure 2.5: Timeline of the performed research

3

Literature Review

In this chapter the performed literature research will be presented. This will be done in the following manner. Firstly, some background knowlegde and information for (S)BM will be provided, in order to help the reader understand everything that will be presented in this chapter. Secondly, literature found on the sustainable business models for Nbs will be presented. As it is also important to understand the other Sbms present, for other applications, these are also researched and will be presented in the second part of the literature review. In the last part, the novel Sbmf for Nbs will be presented, which is the result of the all the findings in the literature review.

3.1. Background Information Business Models

A business model is the rational of how an organisation creates, delivers and captures value (Osterwalder & Pigneur, 2010). A (S)Bm theory can be used to create a Bm for organisations. There are different ways to work with the business model theory, and thus create a Bm. For example, for the business model theory presented by Osterwalder et al. in 2010, a canvas is created to express this theory. A tool or framework supporting a business model theory can help creating a business model.
A Bm thus focuses on the rational of how an organisation creates, delivers and captures value, as mentioned before. The most commonly used and seen as the best tool for working with this Bm, by osterwalder et al. (2010), is the business model canvas (Bmc), which can be found in figure 3.1.

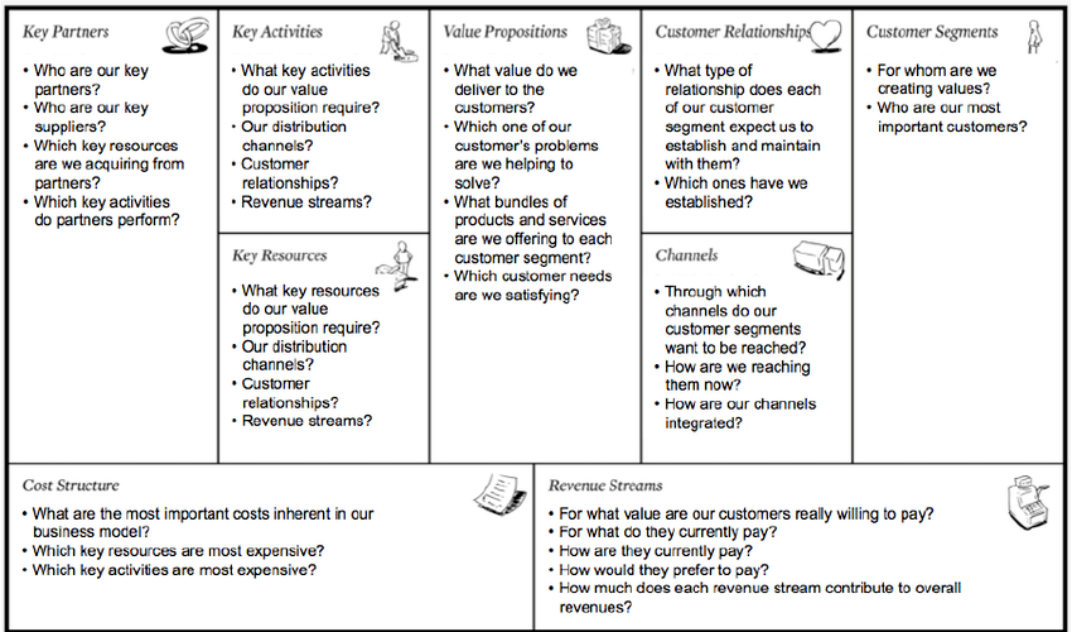


Figure 3.1: The Business Model Canvas by Osterwalder et al. (2010)(Osterwalder & Pigneur, 2010)

This canvas consists of 9 blocks for describing the Bm of the organisation. The value proposition is centered in this canvas, with the three elements: creation, delivery and capturing of value surrounding the value proposition. The key partners, activities and resources blocks are part of the creation of value in the organisation. These describe how the organisation is able to create value, what partners are needed, what resources and which activities. The customer relationships, customer segment and channels are part of the delivery of value. These describe how the organisation is able to deliver its value and to whom. It also describes how the organisation manages the relationship with their customer. The cost structure and the revenue structure are part of the capture value element. This part describes the flow of money and how the organisation makes profit: what costs are made, and what revenues are created.

As will be seen in the following part of the report, a business model (framework) can take various forms, which makes investigating and comparing them more difficult. Some business models contain a canvas or tool to provide a practical solution which can be easily used. Others have a step to step guide for creating a (specific) Bm, but do not necessarily have a template or tool, while others provide a complete handbook which can be used as a guide for creating Bms including a framework, tools, and useful extra information (for instance on financing). The other way Bms can differ from each other is through how specific they are. There are very general Bms, like the Bm theory by Osterwalder et al.(2010), but also more specific Bms like the Nbs Bm (Egusquiza et al., 2021). If the purpose of the Bm is very specific the Bm theory (and framework) will contain elements and aspect which are more important for that use case. In this part chapter the theory of each Bm will be explained, if applicable a tool for working with this theory will be given, and the thing that sets this Sbm(f) apart, will be further elaborated upon.

3.2. (Sustainable) Business Models for Nbs

In this part the literature that is found on Sbm for Nbs is presented. The first Business Model is the Nbs Bm for which two tools are created, the Nbs Bm Canvas and the Extended Nbs Bm Canvas. The second, a framework for Nbs is the Natural assurance schemes.

There is not many literature available on the Sbm of Nbs in general, and especially not for the Dbs. Many of the literature is scattered, but the main problem is that a lot of the research done on the Bms of Nbs is not published. There are only a few useful articles that are published which cover the Sbms of Nbs. However, there luckily there is one very important article presented by Mayor et al. named "State of the Art and Latest Advances in Exploring Business Models for Nature-Based Solutions", which was published half 2021 (Mayor, Toxopeus, et al., 2021). This article does not only cover published literature, but also includes many reports and research findings by the European H2020 research groups on Nbs. Most, if not all, work on the (S)Bms of Nbs is performed by these research groups, which is not surprising as it is a term first presented by the European Commission back in 2015 (European Commission, 2015).

This article groups all the performed research on Bms for Nbs and categorized the results. The work on Sbm for Nbs can be categorized into three types. All of these are researches and work done in order to stimulate the creation of new Sbm (archetypes) with Nbs and can therefore be seen as supporting instruments. The first category of support instruments is Bm Catalogues and good practices Guide. As can be understood from the name this category includes current successful Bms making use of Nbs, and on top of that includes ways of working that appear to be working and succeeding. The second category involves tools for stakeholder engagement. This means, that the tools are created in such a way that they improve the way stakeholders are incorporated in the Bm. This is very important for Nbs as Nbs offer many co-benefits to various beneficiaries. By including all these beneficiaries, it is easier to acquire Nbs, and thus make Bms based on Nbs work. The third and last category is tools for Business Model creation. In this category tools are included that support and enable the creation of new Sbms. In this section, all the three categories, and found literature per category will be introduced.

3.2.1. Category 1: Bm Catalogues and Good Practices

The first category contains Bm catalogues and good practices. These are literature, and especially reports, that do, instead of offering a framework, offer current Bms that are proven the be feasible. It thus gives a summary of existing Bms that are working for Nbs. The first thing that will be presented in this category is work of the NAIAD research group: 'Collection of international good practices in financing and funding nature restoration'(NAIAD, 2019) . The second literature finding that will be presented is the Naturvation Bm catalogue (Toxopeus, 2019)

NAIAD's Collection

The first report that is identified and falls under the first category is the report published by the NAIAD, called the: 'International good practices in financing & funding nature restoration'(NAIAD, 2019). This report is created to facilitate an overview of successful examples of how to finance nature restoration projects. This can be used as ideation and inspiration for others who have the same, or similar, purpose. The report is divided into two parts, each with an own perspective. In the first section examples are highlighted that are have been proven to be successful for funding nature restoration projects. These projects are assessed with the use of the Natural assurance schemes framework(Mayor, Zorrilla-Miras, et al., 2021), which will be presented in the third category of this section. The bottom line of this framework is that the Bm, and especially the value creation, is based on reducing risks. With the use of the Nas canvas it was aimed to identify and describe three aspects of each example. The first aspect that should be identified and described with the canvas it the process and aspects that are involved for risk reduction offered by Nbs. The second aspect is to identify all the actors, and their role, within the ecosystem of the Nbs for risk reduction. The last aspect that is tried to identify with the use of this framework is how value is captured with the Nbs, and how this is translated into revenue streams.

The second part of the report provides examples which are successful in the funding and financing of Nbs for ecosystem restoration projects. This list provides proof for the successful examples, and on top of that also in what way these examples are funded and financed. This is an important aspect since the financing/funding of Nbs is always a complex issue, due to the many (co-)benefits which are hard to express in money, and which are also to many stakeholders, rather than just to one stakeholder. This overview can thus very much help others which are dealing with the same problem, through providing examples, which could be copied, or just used as inspiration.

Naturvation Bm Catalogue(Toxopeus, 2019)

The second literature finding is the Naturvation Bm catalogue. This work aimed to create a catalogue with existing, proven to be working, Bms, as reference and inspiration material to others. The researchers categorized the Bms, to keep it clear and structured. In this catalogue they presented eight Bm categories, which can be found in the list presented below. On top of these categories the researchers presented two example cases per Bm to give a deeper understanding. The report is ended with a table with the eight Bm categories, including their value proposition, their value delivery, their value capturing and on top of that the enabling conditions & risks per category. The list of the eight Bm categories can be found below:

- Risk reduction
- Green densification
- Urban offsetting
- Green health
- Local stewardship
- Vacant space
- Green heritage
- Green education

The risk reduction Bm is a Bm based on reducing financial risks, imposed through for example natural hazards. This Bm category is based on making environments and buildings resilience to these natural hazards and environmental events through the use of Nbs.

The green densification Bm is a Bm which bases its value on the increased value of real estate. Very often real estate and other properties rise in value if green (Nbs) elements are applied, as this is something humans in general like, and thus are willing to pay more.

The urban offsetting model is a model which captures money flows through organisations who like to offset their negative environmental impact by acquiring Nbs in other places, and this way are trying to minimize their overall negative impact.

The green health model captures value through providing health benefits with the use of Nbs. Nbs offer both physical as mental health benefits. This benefits could for example be offered to hospitals or regular citizens through open green spaces.

The local stewardship model does not directly captures value through a specific value proposition, but rather through empowering citizens and local people % businesses to contribute to the roll-out of Nbs. This contribution could be both in time as in money. This works since they are also one of the key beneficiaries,

and thus have large interest in Nbs.

The vacant space model bases its Bm on, as the name suggests, on the availability of cheap, otherwise useless, spaces which can then be turned into green space with Nbs. These spaces then offer various benefits and values to locals and others.

The green heritage model creates revenue through asking money to the area which can then be used for recreational purposes. This could be both already existing nature/Nbs, or new nature/Nbs.

The last model, the green education model, captures it value through offering the opportunity for education with use of the Nbs. This could for example be city gardens where schools can have their own small garden, for which they are paying money.

3.2.2. Category 2: Stakeholder Engagement Tools

The second category that is identified in the literature review is the tools for stakeholder engagement. These are tools that promote the involvement of stakeholders early on in the process, making it a co-design, as this is very beneficil for the implementation of Nbs. There are two different tools that will be presented in this section. The first Bm tool is the Naturvation stakeholder engagement puzzle. The second tool is the ThinkNature handbook, which proposes two frameworks, the SITE4NBS and the RISE4NbS. First the Naturvation Puzzle will be elaborated upon, and afterwards the handbook, including the two frameworks, will be explained.

Naturvation Stakeholder Engagement Puzzle

The Naturvation Bm catalogue which is just presented is also used for the stakeholder engagement puzzle. As stakeholder is an important factor for Nbs, as Nbs offer many co-benefits to many stakeholders, it is important to incorporate them in the design process, making it a co-creation process. The catalogue is used as the basis for the puzzle, which can be seen in figure 3.2. This puzzle enables the stakeholders to play around, and through this game explore the value (propositions) that Nbs offer, and who benefits of these values. This will help the users, or participants, understand for who Nbs are interesting, and thus also, who is potentially willing to contribute to the funding of Nbs. The puzzle is played in three steps. In the first step a type, or specific, Nature-based Solutions should be picked. This could be an exemplary Nbs, or one from a case that the users are working on. Secondly, the puzzle board, as seen in figure 3.2, will be filled in. This board will be filled in with cards which state the value of a certain value. The same value can be offered to various stakeholders. The puzzle provides prefilled cards with values, but you are also able to come up with your own ones. The cards will be appointed to the stakeholders, and to a category under which the value falls. The last step is to mix and match Nbs Bms for your solution(s) or case. The Nbs Bm catalogue can be used as an inspiration for this step. In this step the goal is to identify the Bm that fits your project or case. At last, the value proposition, value delivery and capture should be determined for your case, on top of the potential enablers & risks.

Who values what?	Economic benefits flood risk reduction; material & energy efficiency; higher revenues; economic growth; employment; employee wellbeing	Biophysical benefits biodiversity; water quality; cooling; pollination; air filtering	Social benefits Health, social cohesion, relaxation, safety, noise reduction, concentration, justice	Cultural benefits identity, aesthetic value, sense of place, cultural heritage, symbolism, creativity
Public actors (municipalities, water boards, provinces, national government)				
Private actors (insurers, real estate developers, roofing firms, gardening firms, landscape architects)				
Not-for-profit organisations (NGO's, stakeholder networks)				
Citizens & local communities				

Figure 3.2: Puzzle for stakeholder engagement created by the Naturvation Project (Toxopeus, 2019)

The ThinkNature Handbook (Somarakis et al., 2019)

The ThinkNature handbook is focused on building a business case around the financing aspect, rather than the whole business model. This makes this handbook very useful for users who want more information on how to arrange the financing of Nbs. This handbook proposes a method to attract financing through engaging the stakeholders. The researchers recognise the complexity for building a Bm for Nbs, and thus they propose a new 2 step method which can be used for project initiation. The approach thus consists of two steps, the SITE4NBS, which can be seen in figure 3.3, and the RISE4NBS which can be found in figure 3.4

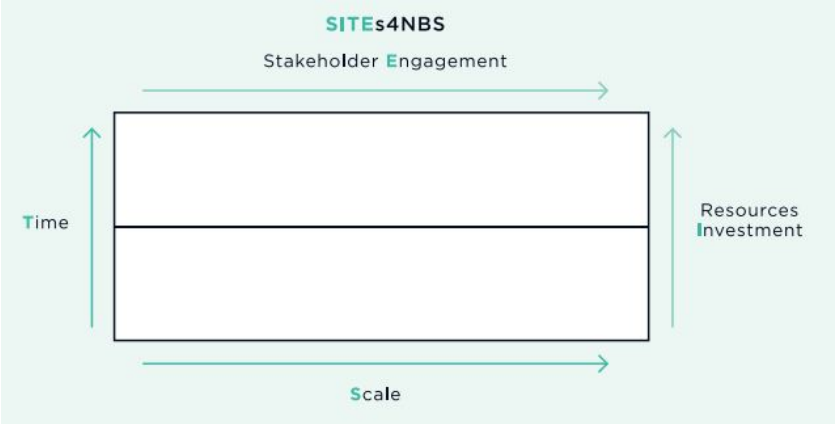


Figure 3.3: The SITE4NbS framework created by ThinkNature (Somarakis et al., 2019)

The SITE4NBS is an high level overview that engages the participating stakeholders in considering the resource investment required for Nbs. This is done over time and scale. The graph could be considered as follows: If the scale of the project increases there is need for more stakeholder engagement. On the other hand if it takes more time to implement the Nbs it requires more resources to be invested. These two of course have a relation, and also influence each other. This overview, which is not very specific will then be used as an input for the RISE4NBS framework.

Figure 3.4: The RISE4NBS framework proposed by ThinkNature (Somarakis et al., 2019)

The second framework is the RISE4NBS which is more of a strategic framework which can be used for the engagement and the design of Nbs projects. This framework includes the identified potential stakeholders, the resources and the financial options. The first part of this framework proposes the workflow in which the Nbs implementation processes is first designed, after which the Nbs are really implemented. The third stage is to identify if there is the opportunity to transfer and upscale the project. In the fourth and last stage the co-benefits across all the stages are monitored and evaluated.

The second part of the framework is the part where the RISE4NBS thanks its name to. This is a framework of the elements of a Nbs project. It consists of R(isk analysis), I(investment options), S(takeholder collaboration) and E(nvironmental-socio-economic). In the risk analysis step the risks are researched, and on top of that also the regulations, policy regulations and the requirements for governance. In the investment options step, the investment options are investigated. This will investigate, among others, the option for voluntary investments, local ownership schemes, government schemes, bonds and crowdsourcing. In the stakeholder collaboration step both the stakeholders contribution as the beneficiaries are identified. These could be for example communities, governments, NGO's, and (global) corporates. The ecosystem of stakeholders can of course diver per project. In the last step, the evaluation step the impact on the three different perspectives is estimated. This is evaluated on the environmental, societal and economic level.
The RISE4NBS and SITE4NBS framework thus are created to help initiators to engage stakeholders, and through the engagement of stakeholders attract the needed financing.

3.2.3. Category 3: Tools for Bm Creation

In this part the tools for the creation of Bms are presented. These include tools that support and enable Bm creation. The first tool that is presented is the Nbs Bm Canvas. The second tool that is presented is the Nas schemes framework.

The Nature-based Solutions Business Model Canvas

The Nbs Bm is a Bm specifically created for assessing Bms which are (mainly) based on Nbs, since the existing (sustainable) Bms did not fit this need. Somarakis et al. in 2019 described the need as follows: "Valuing nature and the contributions it makes to climate change adaption, resilience, or mitigation requires the re-designing of classical business models. (Somarakis et al., 2019).

For the Nbs Bm various tools are created. Firstly the Nbs Bm Canvas is created, which can be seen in figure 3.5, based on the general Bmc. This canvas is created to be able assess the Nbs Bm, by adding elements which are more applicable for these types of Bms. The Nbs Bm canvas is very similar to the general Bmc, however it has a few changes. As can be seen there are three changed/new elements: key beneficiaries, governance and cost reduction. On top of that, the value proposition is expanded to not only consider economic value propositions, but also environmental and social. The term key beneficiaries is better suitable, since Nbs often benefit not only the direct customer, but many more. For example, by adding Nbs to your house, the company nearby also benefits. On top of that, governance is added to the canvas. This is because the role of governance is really important in Nbs, and therefore how the Nbs will be managed

should be identified early on. Also it is important to consider how all stakeholders will be engaged, and how they will take part in the governance of Nbs. At last the cost reduction is also an important element, as this highlights the potential of Nbs to reduce costs within an organisation, or in the broader sense for the society. Nbs can reduce costs by for example preventing the need for technical solutions, by reducing waste, by insulation leading to less energy use, or by preventing other society costs on the long term (e.g. medical costs or CO2 reduction costs).

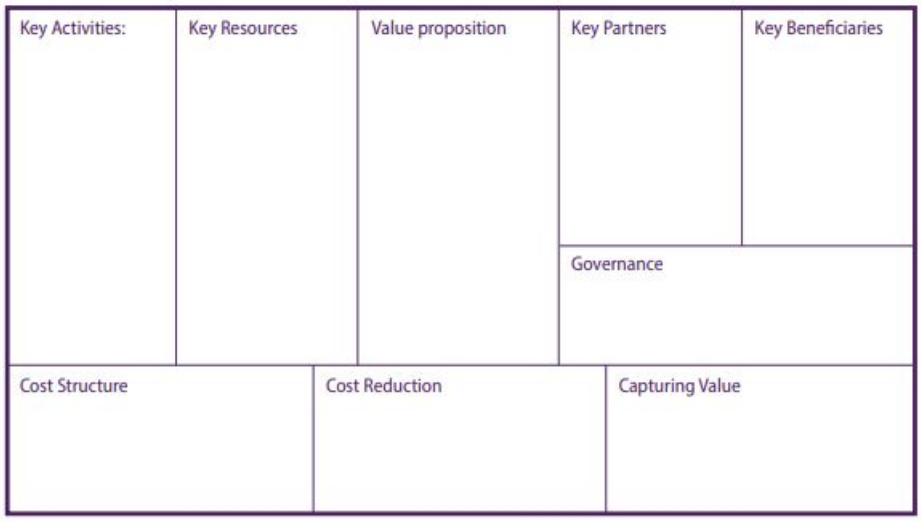


Figure 3.5: The Nature-based Solutions Business Model Canvas (McQuaid, 2019)

The second tool that is created for working with the Nbs Bm is the extended Nbs Bm Canvas, which can be seen in figure 3.6. This extended canvas is almost identical to the normal Nbs Bm canvas, however, it has one slight variation which is the addition of the financing costs needed upfront. This is due to the fact that the total costs over the lifetime of Nbs are mainly upfront; there is a big need for investment costs, while the operational costs are marginal (McQuaid, 2019)(Toxopeus & Polzin, 2017). The two additional elements let the user of the canvas first think of the capital needed upfront, and secondly who is going/willing to pay for it. Most of the time the one paying should also be the main beneficiary of the Nbs.

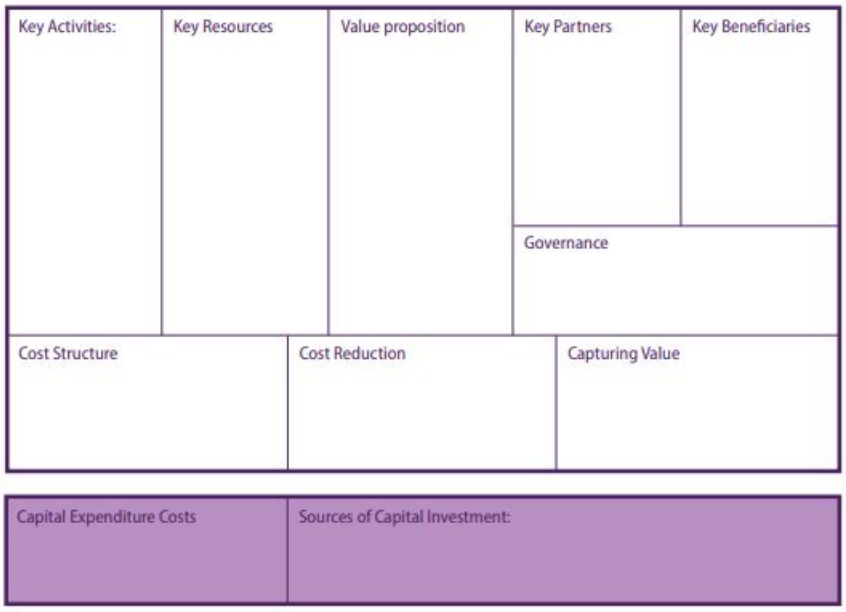


Figure 3.6: The Extended Nature-based Solutions Business Model Canvas (McQuaid, 2019)

At last, figure 3.7 summarises which elements are included in the general Bmc, the sustainable Bmc and the Nbs Bmc.

	BMC (Osterwalder and Pigneur, 2010)	Adapted Sustainable BMC (Bocken et al., 2018)	NBS BMC (McQuaid and Nua, 2019)
Key activities	X	X	X
Key partners	X		X
Key stakeholders		X	
Key resources	X	X (incl. capabilities)	X
Value proposition	X		X (incl. environmental, social and economic value)
Profit		X	
People		X	
Planet		X	
Customer Segments	X	X	
Key beneficiaries			X
Customer Relationships	X	X	
Channels	X	X	
Governance			X
Cost structure	X	X	X
Revenue streams	X	X	X
Cost reduction			X
Capital expenditure costs			X
Sources of capital investment			X

Figure 3.7: Comparison of elements per Bm(Kampelmann, 2021)

The Natural assurance schemes Framework

The Nas framework is not a Bm but it is very much related to a Bm as it contains the same elements as a Bm, therefore it is researched and included in this research. The Nas framework is based on the value of disaster risk reduction (DDR) which is sometimes a very important aspect in organisations or projects. Assessing the risk reduction in projects or for example land management can lead to new Bms for organisations (NAIAD, 2019) (Mayor, Zorrilla-Miras, et al., 2021). This framework consists of two parts, a Nas Canvas and an additional Nas Canvas flow process. The Canvas can be seen in figure 3.8 and the flow process in figure 3.9

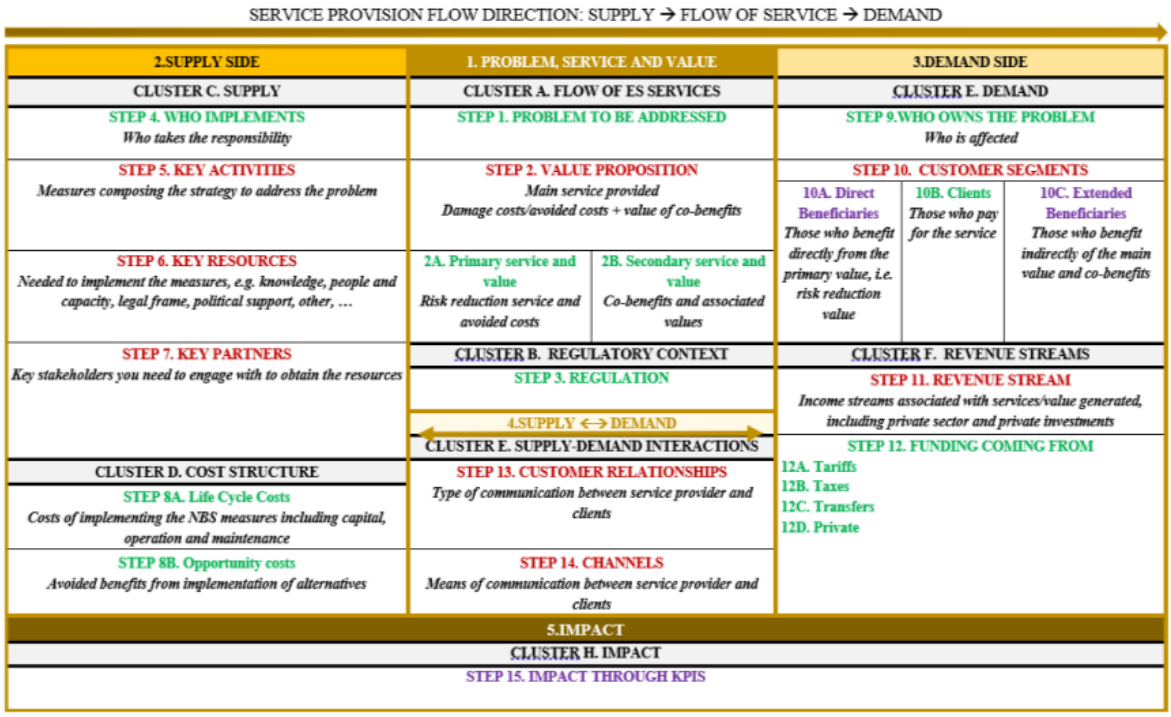


Figure 3.8: The Natural assurance schemes Canvas

The Nas canvas is an adapted version of the general Bmc, and is made more specifically for the analysing of Nbs and in special those aiming at DDR (Mayor, Zorrilla-Miras, et al., 2021). The additions to the general Bmc are that the Nas canvas is able to assess who implements the solutions, what are the problems to be addressed, who owns these problems, what are the regulations, what is the total cost structure (total life cycle costs and opportunity cost by avoidance of benefits of alternatives), and lastly where the funding comes from. Even though this canvas is much more detailed and elaborate than the general Bmc, it still contains the three elements of value creation, delivery and capturing.

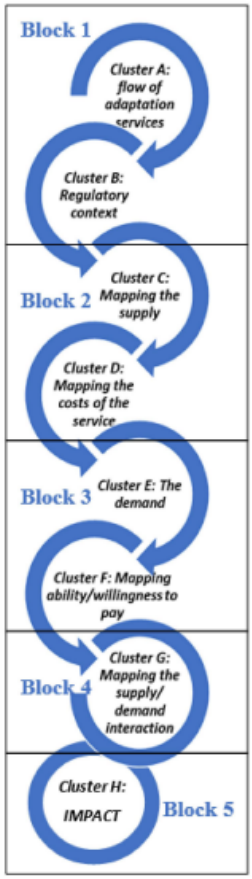


Figure 3.9: The Natural assurance schemes Canvas Flow Process

The Nas flow process helps with working with this canvas, since the canvas is harder to understand and way more elaborate. The 5 blocks in the flow process are related with the clusters (A to H) in the Nas Canvas

3.3. (Sustainable) Business Models

In this part both general Bms as more specific Sbms will be presented. These (S)Bms are used for a variety of organisations. These (S)Bms were not created for Nbs, but they are still very useful and provide valuable lessons. For all (S)Bms presented in this part the theory will be introduced, but also a tool for working with this specific theory will be provided. First the regular Bm will be discussed, after which the triple layered Bm will be presented. Thirdly the SBm will be presented and the section will end with the circular Bm.

3.3.1. The triple layered Bm

The triple layered Bm is a Bm which provides two extra layers to the regular Bm. The triple layered Bm is created in order to provide a Bm that can be used for organizations looking for more sustainable innovation (Joyce & Paquin, 2016). The triple layered Bm can be used to analyse Bms on not only the economical aspect, but also on the environmental and social. The environmental and social level are the two extra layers on top of the economical layer, making it triple layered. The environmental layer is based on the Life cycle Assessment (LCA) perspective, while the social level is based on the stakeholder perspective (Joyce & Paquin, 2016).

A tool for working with the triple layered Bm is the triple layered Bm canvas, which can be seen in figure 3.10. The triple layered Bm helps with the exploration of (more) sustainable Bms and with more sustainable innovation (Joyce & Paquin, 2016). As can be seen, the economical layer is exactly the same as in the Bm canvas, created by Osterwalder et al. in 2010, but with two additional layers. The addition of these two layers are mainly focused on helping creating a Bm which can be sustained over a long period of time.

Much in the same way the original business model canvas is used to understand how revenues outweigh

costs, the main objective of the environmental layer of the Tlbmc is to appraise how the organization generates more environmental benefits than environmental impacts. Doing so allows users to better understand where the organization's biggest environmental impacts lie within the business model; and provide insights for where the organization may focus its attention when creating environmentally-oriented innovations. As mentioned above, environmental impacts can be tracked with multiple indicators. Leveraging the life cycle approach

The main objective of the environmental layer is to understand the impact that the organisation has, both negative as positive, on the environment. The layer is based on the LCA approach, in this approach the impact of the product (or service from an organisation) will be assessed in all phases(Finnveden et al., 2009). By this layer an organisation is better able to understand the complete impact of their organisation, rather than only in the use phase, which is often the only one considered. By better understanding this, an organisation is also better able to steer their organisation to a more environmental friendly organisation.

The aim of the social layer, through a stakeholder approach, is to assess all connections and influences between all the stakeholders and the specific organisation and to understand the social impacts that occur through their connection with the stakeholders. This leads to better knowledge on the social impact of the organisation and how to improve the value that the organisation creates for society.

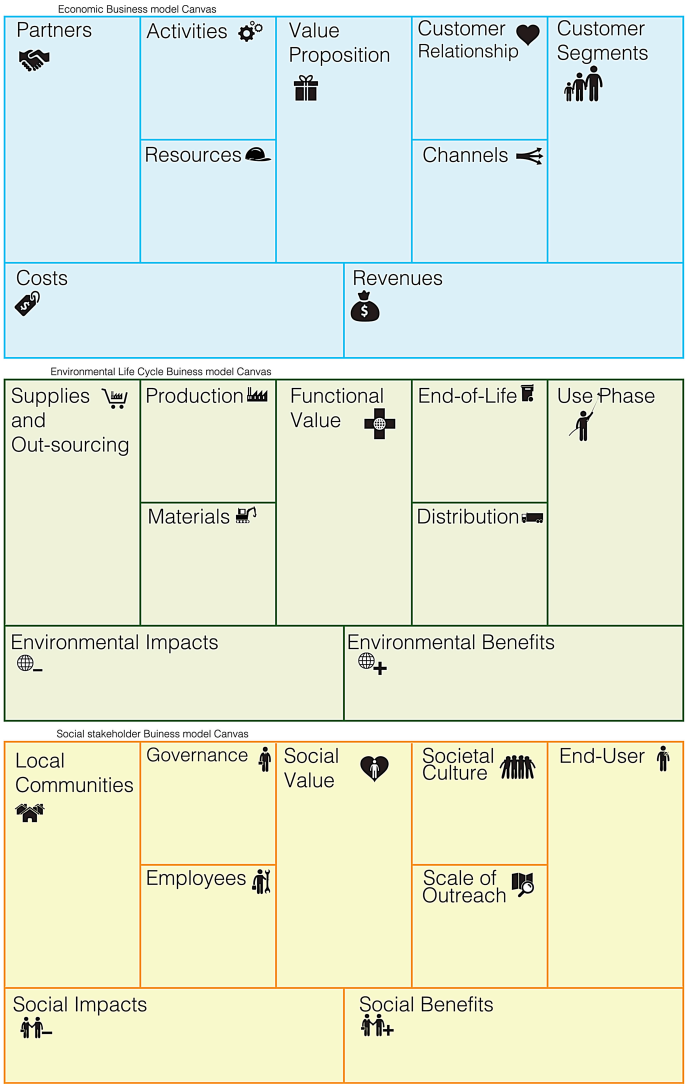


Figure 3.10: The Triple Layered Business Model Canvas(Joyce & Paquin, 2016)

3.3.2. The sustainable Bm

As previously mentioned a sustainable business model consists of the same three elements while also contributing to the environmental or societal sustainability. (Henry et al., 2020)(N. M. P. Bocken et al., 2014) (Lüdeke-Freund et al., 2018) (Boons & Lüdeke-Freund, 2013). A sustainable Bm helps organisations with assessing and understanding (i) their sustainable value proposition to all stakeholders (including clients), (ii) how they create and deliver their value to the stakeholders (iii) and how they capture the economic value while also maintaining natural and social capital on the long run (Schaltegger et al., 2016) (Lüdeke-Freund et al., 2018). Concluding, sustainable Bms enable organisations to capture economic profit while creating social and/or environmental value (Boons & Lüdeke-Freund, 2013).

The Sbm Canvas, see figure 3.11, is a tool created for the implementation or assessment of a Sbm. As can be seen the Sbm Canvas consists of the same four elements as the general Bmc, and only differs in the value proposition. The value proposition of the Sbm is divided into three parts: Profit, people and planet. These are similar to the three layers of the triple layered Bmc. However, the Sbm canvas only considers the positive impact on the planet and people, while neglecting the downsides.

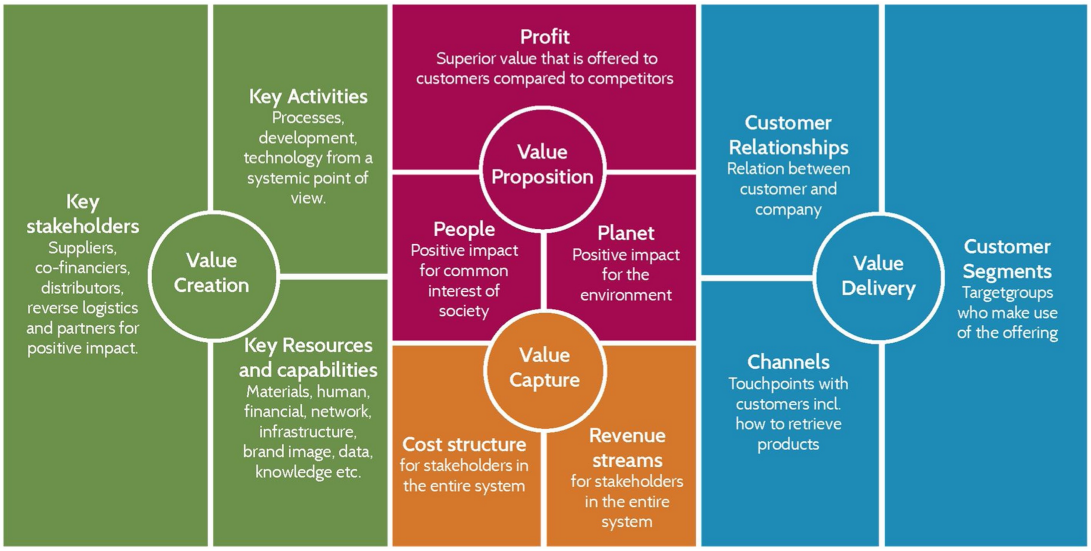


Figure 3.11: The Sustainable Business Model Canvas (N. Bocken et al., 2018)

3.3.3. The Circular Bm

The concept of circular Bms is rather new and there is still debate about the exact definition of it. However, Geissdoerfer et al. performed an extensive literature review in 2020 and came to the following definition: "circular business models can be defined as business models that are cycling, extending, intensifying, and/or dematerialising material and energy loops to reduce the resource inputs into and the waste and emission leakage out of an organisational system. This comprises recycling measures (cycling), use phase extensions (extending), a more intense use phase (intensifying), and the substitution of products by service and software solutions (dematerialising)" (Geissdoerfer et al., 2020). In other words that mean that circular Bms try to retain all the goods and products used in their organisation, for using these again, ideally without adding extra physical resources. This would lead to a more circular and sustainable organisation. As there is a limited amount of physical resources in the world circular Bms are very much needed.

There is not yet a mainstream tool or framework for working with the circular Bm (Geissdoerfer et al., 2020)(N. Bocken et al., 2019), however there are two main tools created. The first one, a circular Bm tool is developed by Nußholz and can be seen in figure 3.12. With this tool all the elements of the Bmc can be assessed with a circular perspective. This will be assessed on 4 moments, which are very similar to the phases of the LCA. The first, and third, moment is the collection and reintegration of resources. This is done at 2 moments, before the first sale and afterwards (with returned products e.g.). The second moment is the first sale moment, when a product or service is sold. The fourth moment is in the additional sales that organisations have, and the last moment is in the material recovery phase.

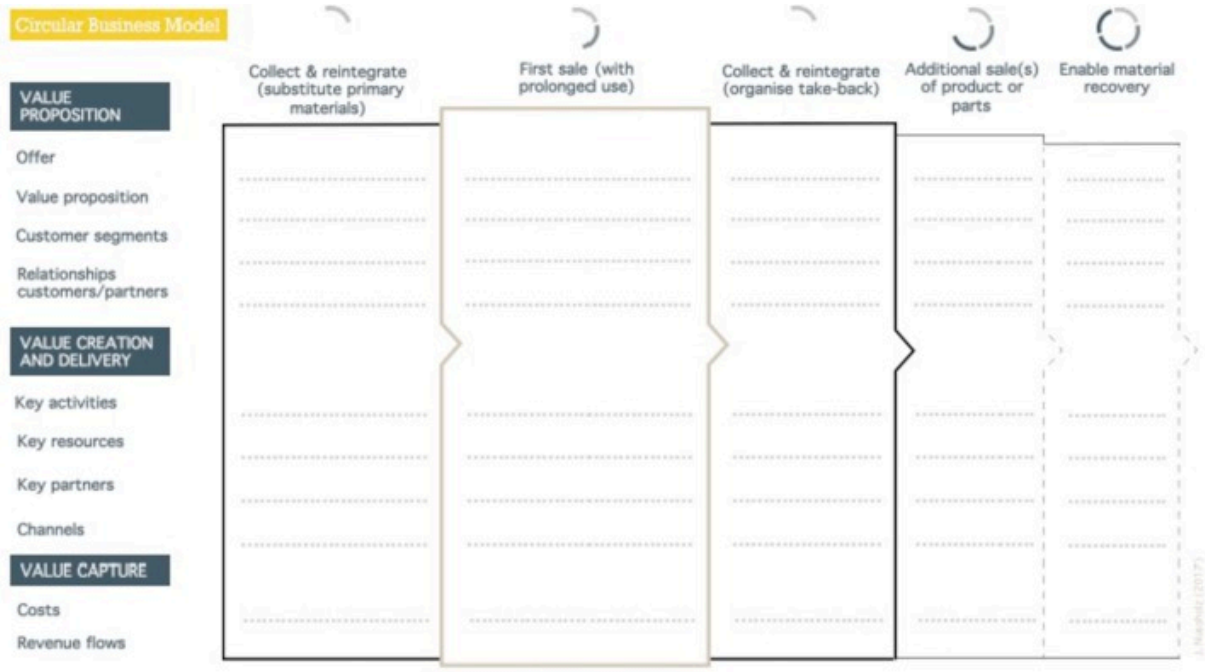


Figure 3.12: Circular Bm tool by Nußholz(Nußholz, 2018)

The second tool created is a circular Bm framework by Lewandowski, which can be seen in figure 3.13. This framework is very similar to the Bmc, but has two extra elements: the take-back system, and the adoption factors while the other 9 elements are the same. The take-back system is to assess the take-back system as this is an important step in closing the loop and making the organisation more circular. The adoption factor is there to understand the capabilities of the organisation to be(come) a circular organisation. On top of that the other elements, even though they are called the same, have a different implication and are focused on circularity.

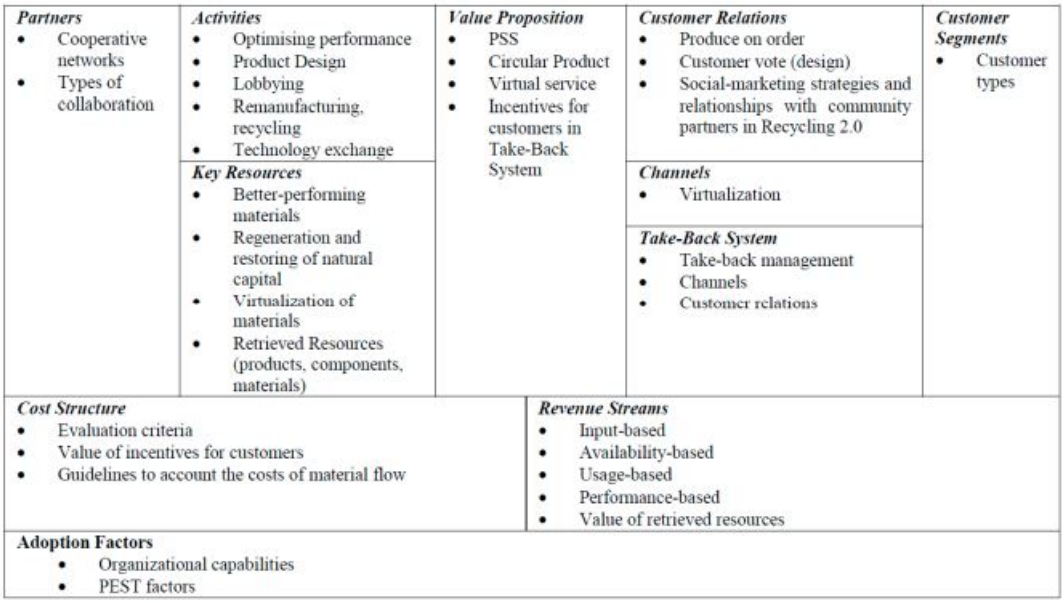


Figure 3.13: Circular Bm canvas by Lewandowski(Lewandowski, 2016)

3.4. Novel Sustainable Business Model Framework for Nature-based Solutions

All the findings in the literature review are processed, through a creation phase as described in chapter 2.3, into a novel Sustainable Business Model for Nature-based Solutions. Even though it is already designed with the building sector in mind, it is not yet tested by experts from the field. Therefore, this Sbm is solely a result of the literature review and a creation phase. A Sustainable Business Model for Nature-based Solutions is the rational of how an organisation can create, deliver, and capture value for both humans as an individual, as for society as a whole, as for nature, through the means of Nature-based Solutions. The created, and in this chapter presented, Sbm offers a framework for working with this theory. The framework consists of a guide, A canvas as tool, and informative and assisting sections. This section will start with an explanation of the structure of the Sbm, followed with a guide for explaining how the work with this Sbm. After this the tool, a novel Nbs Bm Canvas will be presented and how to work with this. At the end the supporting sections for this tool will be provided.

3.4.1. Guide

A Sbm is of high importance to both organisations themselves, as people outside the organisation. A Sbm can be used as a way to give an overview of an organisation and to understand all aspects of the organisation. In this way it can be used by organisations to reflect upon themselves. It is an easy method to see all aspects and see where improvement is possible. On top of that it can help understanding links within the organisation, which are otherwise hard to grasp. But also for people outside the organisation it is of importance, for instance for investors. A good Sbm is one of the most important things for attracting funding, as it a good method to communicate your business making it easier to understand. On top of that, you are able to show that you are able to capture value, which is an important factor for investors.

This Sbm for Nbs is created for organisations and projects, within organisations, which are currently using, or aiming to use, Nbs as a product or service. As mentioned, it is important to have a good Sbm for your organisation. However, for organisations working with Nbs the current Sbms are not appropriate and thus this will lead to problems for organisations. Therefore this new Sbm for Nbs is created which will help organisations working with Nbs, and ultimately lead to more Nbs being implemented, creating a greener and more sustainable world.

Before using the Sbm the tool and additional sections should be scanned, to understand how the Sbm is built up and where supporting information can be found. The tool includes a workflow of how to go through the canvas. For the following blocks the supporting sections can be consulted: The value propositions (economic, societal, and environmental), the key beneficiaries, the social impacts, the social benefits, the environmental impacts and at last the environmental benefits. When novel blocks aren't understood, the detailed information about each block can be used to understand what, and why, is needed. When the canvas is completed, either with the use of sticky notes or a regular marker, connections within the canvas can be highlighted with colour marking. By linking the various notes a deeper understanding will be gained. For example this helps seeing what activities lead to what costs, revenues, or impacts. This is not a necessary step; however it is highly advised. At last, the canvas can at this point be used to identify on what aspects the organisation is lacking and what is missing. These are aspects on which the organisation can organise brainstorm sessions.

3.4.2. The Sustainable Business Model Canvas for Nbs

To be able to work with the Sbm for the Nbs, a tool is created in the form of a canvas which can be filled in. A canvas is a very common, and one of the most used ways to present or create a (S)Bm. Because of this, the tool will feel familiar and be easier to understand and use. The novel canvas can be seen in figure 3.14. A brief way of going through the canvas is provided before at last the new blocks to the Bmc will be explained, while also handing reasoning for the choice of that specific aspect/block.

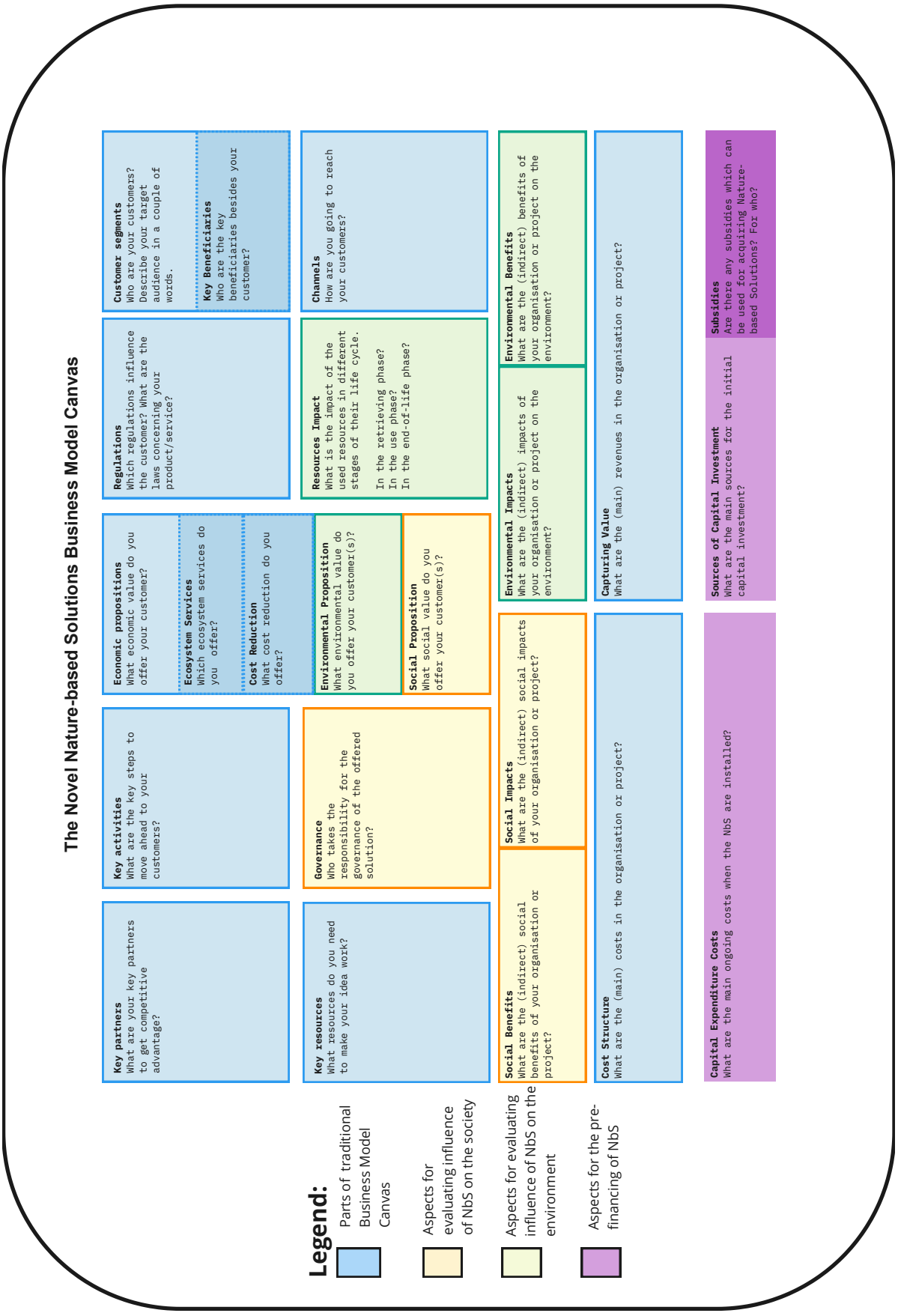


Figure 3.14: Novel Nature-based Solutions Sustainable Business Model Canvas, the Miro board can be accessed through:https://miro.com/app/board/uXjVOqk_Tjc=/?share_link_id=446057734265

To improve the usability of the canvas a workflow is created, which will help going through the canvas. The canvas consists of 5 parts, namely: Value creation, value delivery, value impact, value capturing and financing-upfront. Filling in the canvas should go in the same order as the parts mentioned above. The order in which one should go through the canvas can be seen in the list below:

1. Value Creation
    (a) Customer segment
    (b) Value propositions (Economic, environmental & social)
    (c) Channels
    (d) Regulations
2. Value delivery
    (a) Key partners
    (b) Governance
    (c) Key activities
    (d) Key resources
3. Value Impact
    (a) Resources Impact
    (b) Environmental Impact
    (c) Social Impacts
    (d) Social Benefits
    (e) Environmental Benefits
4. Value Capturing
    (a) Capturing Value
    (b) Cost Structure
5. (Up-front) Financing
    (a) Sources of Capital Investment
    (b) Capital Expenditure Costs

Now the order of how to go through the canvas is known, it is important to understand each block. In the next part all the new blocks will be introduced.

Ecosystem Services

Ecosystem services are services from nature and complete ecosystems that have a (in)direct contribution to our society. Thus the benefits that nature provides to us, humans, and the way we live. Nature-based solutions often also provide ecosystem services and therefore it is important to understand these and what its (economic) proposition are. This is also acknowledged by the European union who states in their proposal for further research on Nbs that ecosystem services (and its value) should be incorporated in future business models (European Commission, 2015). Ecosystem services can be split up into 3 categories which are: Production services, regulating services and cultural services. Production services are services that provide a product through using nature, examples are: wood production, clean water production or food production. Regulating services are the ones that offer a regulating function, this are for example services as pest control, pollination or climate/flood regulation. The last are Cultural services which provide cultural means to society. Examples of this service are recreation, aesthetic value or tourism provided by Nature-based Solutions

Cost Reduction

The economic proposition of Nature-Based solutions can often be found in cost reduction by various means. Instead of creating extra economic value Nature-based Solutions can reduce the money needed for for example: energy consumption (through insulation), CO2 sequestration or mitigation of flood risks. Nature-based Solutions can be used instead of other technological solutions like air conditioning or water drains.

Social Proposition

As Nature-based Solutions do not only offer an economic value and environmental value, it is also important to understand the Societal Proposition. Examples of societal values are the aesthetics, health benefits,or cultural coherence offered through Nature-based solutions.

Environmental Proposition

As Nature-based Solutions do not only offer an economic value and social value, it is also important to understand the Environmental Proposition. Examples of environmental values can be a biodiversity increase or climate mitigation, offered through Nature-based solutions.

Regulations

Regulations are important to understand since there are many regulations influencing the building sector. For example 'het bouwbesluit' offers strict regulations. Which ones are applicable for in your project / for your customers? Are they obliged to absorb CO2? Are they obliged to have an amount of green in or on their building?

Social Benefits/Impacts

For every organisation it is important to understand the impact the company makes besides economic profit. Nature-based solutions can have both benefits for the society as a whole as a negative impact on the society. What are these benefits and impacts? What happens if everyone implements these solutions?

Environmental Benefits/Impacts

For every organisation it is important to understand the impact the company makes besides economic profit. Nature-based solutions can have both benefits for the environment as a whole as a negative impact on the environment. What are these benefits and impacts? What happens if everyone implements these solutions?

Key Beneficiaries

It is important to know who the Key Beneficiaries are by implementing Nature-based Solutions. Is it the one (directly) paying for the solution? By understanding who is benefiting the most it is easier to make it a working business case. Are the ones paying the same as the main beneficiaries? If this isn't the case, you could think of ways solving these mismatches.

Governance

As nature-based solutions partly consist of nature, it needs maintenance during its life-time. As many of the end-users do not have the expertise, time or interest to do this (regularly), it is good to think of the Governance of the Nature-based Solutions upfront. Who will be responsible, what kind of work, how often are questions that could be considered while filling in this box.

Resources Impact

As for every solution, service or product offered, Nature-based solutions also require resources. By assessing the resources Impact in all the phases of a life-cycle a better overall understanding of the impact of the organisation or project will be gained. The different phases are: retrieving resources, the in-use phase and the end-of-life phase. What resources need to be retrieved and what is the impact of this? What is the impact of the resources when they are in use? Are there any toxic resources, or are they degrading over time? At last, what will happen with the resources at the end-of-life, are they useless or can they be re-/upcycled?

Subsidies

As many Nature-based Solutions offer a diverse range of benefits/values, to not only the one buying, there are often subsidies available by the (local) government. This could be, for example, subsidies for acquiring Nature-based Solutions or for the development of Nature-based Solutions. Subsidies can help customers acquiring Nature-based Solutions, and it is therefore important to understand: Which subsidies are available? And for whom?

Capital Expenditure Costs

Even though the largest part of the costs are required for the capital investments, it is also important to already think of the Capital Expenditure costs, which are the on-going costs to keep the nature-based solutions maintained. How will these costs be managed, who is paying for them and in what way? By incorporating this early on it reduces the change of unexpected costs later on.

Sources of Capital Investment

The largest part of the costs for Nature-based Solutions are the Capital Investment costs, thus pre-financing. Compared to other (grey) solutions they need an high investment, but have (way) lower operating costs. The upfront financing is there for a very important aspect which should be taken into consideration(Mayor, Toxopeus, et al., 2021). Therefore it is important to think about who is making the capital investment. Is this only the buyer, or also the homeowners' association, the neighbourhood, subsidies, or external investors (for example banks or insurances?)?

3.4.3. Supporting Sections

Two extra sections are created to help the person or organisation working with the canvas. The first is an section with a list of examples of Nbs, while the second sections contains an extensive list of value propositions offered by Nbs. Both sections are included in Appendix F.

The list of examples of Nbs, which are suitable for the (Dutch) building sector, contains 14 identified Nbs. The list is created for users of the Sbm to know what Nbs could be used in their organisation or project. On top of that, the list can be used as an ideation method through seeing the already existing Nbs (for the Dbs), and thus the potential and possibilities. The list gives background information for each included Nbs which is important to know for that specific Nbs. On top of that, the list includes the most important and characteristic value propositions / benefits of that Nbs. On the other side, it also includes the disadvantages, or things to take into account while implementing this Nbs. This first section can be thus used for ideation for an organisation, but on top of that could be used as a help filling in the blocks of value propositions (economic, societal and environmental), the social benefits, the social impacts, the environmental benefits and the environmental impacts. This list has specifically much value in projects where there is interest to implement Nbs, but the specific solutions are not yet known.

The second supporting section is a list of value propositions that Nbs can offer. This extensive list divided the propositions into eight categories: Cooling Functions, Surface Water Regulation, Water Purification, Air Purification, Biodiversity, Socio-Cultural Services, Provisioning Services and Climate Regulation. Each category consists of 1 or more value propositions. In total 19 value propositions which can be offered through Nbs are identified. These value propositions are placed at the x-axis of the table, while on the y-axis beneficiaries of these propositions are positioned. These are split up into three categories: Government, Community and Commercial. Each category consists of at least 6 identified potential beneficiaries. In total there are 23 beneficiaries who could benefit from one of the 19 value propositions. The table itself is filled in with use of colour marking, with 4 possibilities: Not applicable, low, medium and high. This means that if a box is filled in with high (colouring) it means that the beneficiaries has high interest in that value proposition, and are thus highly impacted through that value proposition. For instance, you could see that a regular citizen has almost in all value propositions a high interest. This supporting section can be used as help for filling in the following blocks: The value propositions (economic, societal and environmental), the key beneficiaries, the social impacts, the social benefits, the environmental impacts and at last the environmental benefits.

3.4.4. Preliminary Results

Even though the Sbm is finished nor perfect at this point, it is an improvement to the other existing Sbms. First of all the Sbm is when compared to the current Nbs Bm(c) more extensive and covers a lot more aspects, which are shown to be important for Nbs (in the Dbs). On the other hand, this Sbm for Nbs is much more compact than the Tlbmc. The Tlbmc consists of 3 layers, making it a very extensive, and time taking Sbm. On top of that, the Tlbmc contains many parts which are not of importance to Nbs (in the Dbs). On top of that, this novel Sbm for Nbs contains, not just only a tool, but also additional sections which are supporting the user. These sections help the user with understanding what possible Nbs there are, and what the opportunities are that they offer. On top of that they help identifying the value proposition that the organisation can offer (in their project) with the use of the second additional section. This also helps organisations identify if there is a mismatch in the beneficiaries, and the ones paying for the solution. The tool, a canvas,

for working with this Sbm for Nbs is more suited than the existing ones. When compared to the already existing Nbs Bmc this canvas includes extra aspects. The first example which is added is the 'Subsidies' block as subsidies are an important factor for implementing Nbs, because one of the main beneficiaries is the general citizen, which are represented by the governments. Secondly, with the novel Sbm canvas an organisation is able to assess the impact the organisations has, both on a social level as on an environmental level. This is important since the most of the organisations working with Nbs care about their impact on the world. Furthermore, which is also related to the last argument, this canvas is better suited as it enables the organisations to assess the impact resources make. On top of that, this canvas offers the ability to see which regulations have an influence on the organisation or the solution they implement. Especially in the building sector this is important since there are strict regulations, in the Netherlands, which a building has to meet. This could force the customer to implement Nbs as well. On top of that, this novel canvas makes a distinction between the customer segment and the key beneficiaries, which is important since it is often seen that there is a mismatch in this part. By identifying this mismatch you are able to deal with it. At last, it is advised, in the guide, to use various colours to show links in the canvas. This can of course also be done with the already existing Sbms. All these aspects contribute to fact that the novel Sbm for Nbs is easier to work with than the Tlbm(c) and more useful than the existing Nbs Bm(c). In that way it combines the best of both worlds, thus both Sbms, which leads to a better middle ground. In the next part the results of the novel Sbm for Nbs in the Dbs will be shown, which are the results and improvements after the focus group.

4

Results

In this chapter the results of the research will be presented. The preliminary results from the literature review were presented at the end of that chapter. This was the framework that was retrieved before the focus group meeting. In this chapter the results after the focus group meeting will be presented. First the framework will be presented, after which the qualitative results will be provided.

4.1. Sustainable Business Model Framework for Nature-Based Solutions in the Dutch Building Sector

In this section the results, after the focus group, of the Sbm for Nbs in the Dbs will be presented. This results is thus achieved through first performing a literature study, which is then used as the basis for the creation process, and improved with the use of the focus group. This combines the existing theory with the practical knowledge, leading to the best result. In this part only the improvements will be introduced, which means that if it is not mentioned or discussed in this chapter, it has not changed. There are only small changes made in the guide, which are already implemented in the guide stated in the last part, and in the additional sections. Also the structure is kept the same, and no additional sections are added. As it was retrieved with the focus group that extra sections were not necessary. Even though the nature inclusive architect said that "I think it's valuable information for people to have", (s)he also mentioned that "there are a lot of things that I think general information can help with", which implies that it is of course useful, but not necessary. On the other hand, the founder of the startup in bio-receptive concrete mentioned that with extra informational sections "you would also be nudging, I think you shouldn't". To that the environmental economist at JIN climate added that it is not even that useful, especially over time as "It's often highly context specific. The way real estate is financed. Go into healthcare, public real estate private. It's completely different." For the regulations (s)he said: "these regulations rules are updated, revised" making it useful for adding an extra section for these to the Sbm. Therefore, in this chapter only the canvas and the workflow will be discussed, which are the core of the Sbm.

4.1.1. Improvements to the Sustainable Business Model Framework

There are various changes made to the canvas, which will be explained in this part. The improvement range from small changes, like typos, to adding extra parts. The canvas can be seen in figure 4.1. After all improvements directly made to the canvas are explained, the improvements to the workflow will be handed.

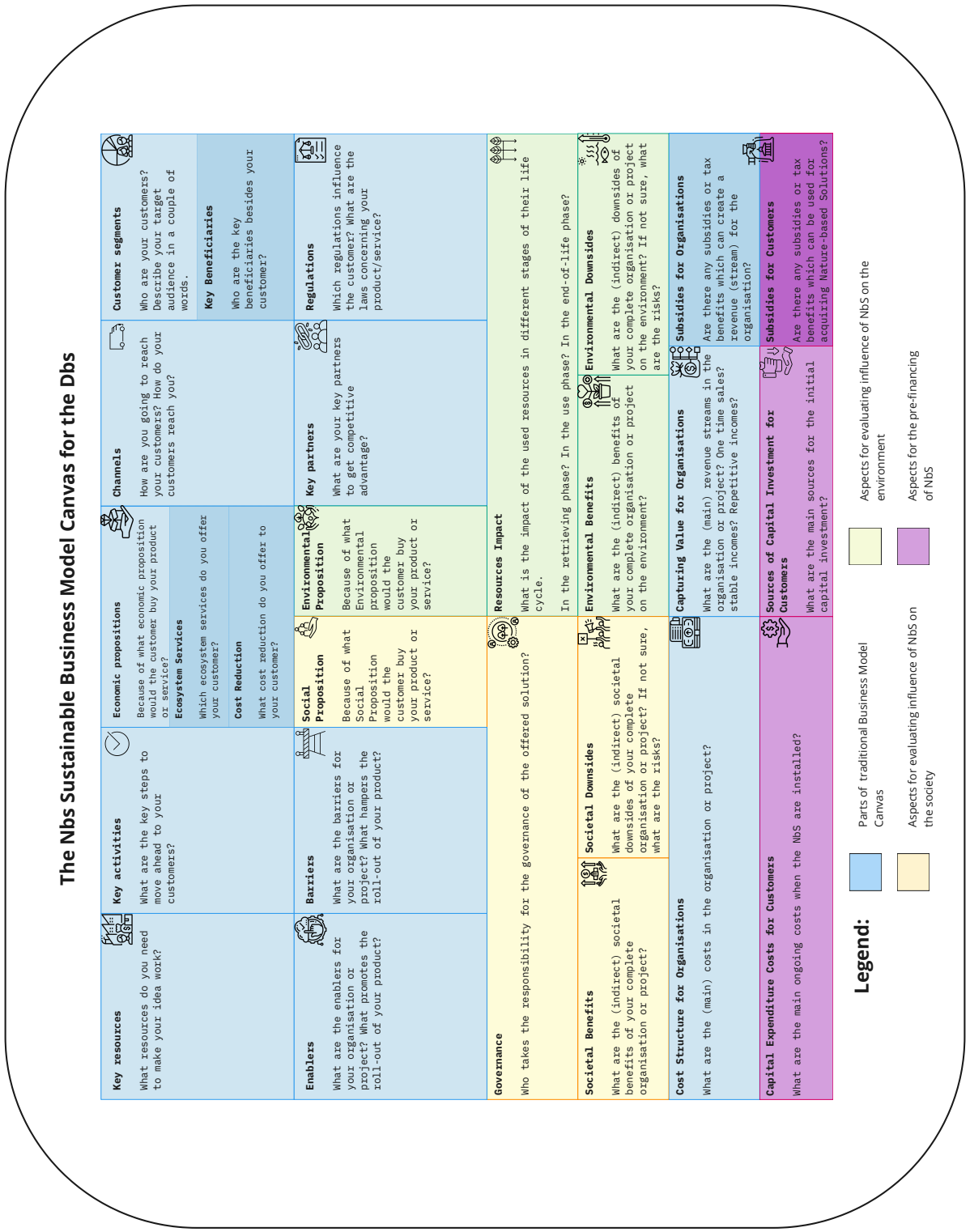


Figure 4.1: The Nbs Sustainable Business Model Canvas for the Dbs

Structure

As mentioned, the improvements vary a lot. What can be seen directly from figure 4.1 is that the layout has changed a lot, while keeping the same colours in the canvas. This is mainly done to create a more soothing and a clearer canvas, as the old canvas deemed to be an intense canvas without a clear structure, as an employee of startup consultancy & Green roofs mentioned that "Some topics were connected, but

have a different colour. That made me confused about the connections they have together. Maybe you could place them in a joined border." There was more confusion about this by for instance the founder of a consultancy comp. which stated on a note: "Seemingly a bit of overlap between parts?". Which could be caused through both the wording which was not good enough, but also through the structure which made it harder to understand. The structure has been changed in various ways. First of all the room between blocks is removed, as it only made the canvas larger, but not more clear. On top of that, the aspects which have the same colouring, such as parts of the traditional Bmc, or the society aspects have been grouped better, and given a more specific place in the canvas. At last, also the blocks which are closely related, such as the customer segment, regulations, key partners, and the channels are placed together. These all share the connection that they include aspects or actors which are from outside the organisation. On the other hand, the key resources, key activities, enablers and barriers (which will be explained in the next part) are placed together as well, as these are mainly aspects within the organisation. All these improvements led to a more clear and soothing canvas, which is more logical.

Addition of barriers block

As can be seen on the canvas, and just mentioned, is that there are two blocks added to the canvas. These are 'Enablers' and 'Barriers'. They are added because it became clear during the focus group meeting that they are lacking on the canvas, while there is a need for it. This was for instance mentioned by the Environmental Economist at Jin Climate who commented "Not sure where to include any barriers and risks for the Nbs implementation and roll-out". As there are indeed many barriers for the implementation of Nbs (Sarabi et al., 2019), it is important to identify these barriers, as this will also help overcoming these barriers as an organisation. On top of that, it shows to others that you are thinking ahead, and know and understand the challenges your organisation is facing. The need for this aspect in the canvas is underlined by one who commented: "Missing in Bmc: risks and barriers. what is impeding your business?". As can be seen (s)he also mentioned the risks, which will be handled with in the 'Improvement in wording' part.

Addition of enablers block

If the barriers for an organisation should be identified it is also important to understand what the enablers are within your organisation. What is making it possible that you are doing your business on Nbs? Even though this was not mentioned by one of the experts in the focus group, it felt necessary and very logical to implement a block for the enablers within the organisation. By understanding the enablers an organisation is better able to steer in the right direction. There are nine very important and common enablers identified for Nbs of which the most important are: 1. Partnership among stakeholders, 2. Knowledge sharing mechanisms and technologies and 3. effective monitoring and valuation systems for implementation process and benefit.(Sarabi et al., 2019)

Splitting up the subsidies block

Even though subsidies were already implemented in the canvas, the way there are presented in the canvas has been changed. The main reason for this is that subsidies can be divided into two categories, rather than just one. This was for example mentioned by one of the participants who commented: "There is a big difference for a company if they get subsidized or if the costumer can receive subsidy, maybe you want to see the client subsidies back in a different block". This shows that there are two types of subsidies which have an impact on these organisations. The first one is a subsidy which can be used by the organisation, this could for example be subsidies for R&D or regular grants by the EU. On the other hand you have subsidies for the customer, which could be subsidies in the form of purchase subsidy or tax benefits. As can clearly be seen there is a big difference between these two types of subsidies, and it is good to be able to identify both clearly with the use of this canvas, which is also underlined by an employee of startup consultancy & Green roofs: "Also I think you should make a difference between subsidies and the receiver, where you put them in the canvas." Because of these reasons the subsidies are split up into 'subsidies for organisations', and 'subsidies for customers'.

Addition of symbols

In order to make the canvas more alluring symbols are added to the canvas. These symbols represent the box, and thereby help to understand the box/element faster. The use of symbols in frameworks and canvasses is

a commonly used strategy. Even though it does not add much value to the elements of the canvas, it helps with creating a canvas which is nice to use. This also came to the light during personal conversations about the canvas, where it was (often) mentioned that the use of symbols adds much clarity, professionalism and aesthetics.

Improvement in wording

The most improvements are made in the improvement of wording, both in the guide, as in the names of blocks, as in the blocks itself. These were especially needed since the wording made things unclear, and also let to the idea that things were overlapping, while they shouldn't be. Having the correct wording can have an enormous impact on the clearness of the canvas, and how people interpret things. This was also found in the feedback session from the focus group. On the question 'what they liked the least of this business model', half of the times it came up that the canvas had some parts unclear wording, which let to people think parts overlapped. This was mentioned by the founder Consultancy comp. who commented: "Seemingly a bit of overlap between parts? Maybe be more specific in wording? " while the transitions consultant also had this problem and commented "Some parts within the Bmc are a Little bit unclear which makes filling them out difficult and feels less relevant." In these two comments it can be directly seen what the influence of bad and not specific wording is. In this case it led to the idea that parts were overlapping and that due to the wording some parts also felt more difficult, but even worse, less relevant. At last also the Founder Startup Bioreceptive Concrete had this problem with the canvas by stating: "The meaning of the questions is not easy to distinguish." All these things show the necessity of improvements in the wording. Therefore the improvements made to this, thanks to the focus group, will be given here.

First of all, the social impact and environmental impacts were not clear, as this could be interpret both negative as positive, while it was meant to only address negative affects on the society and the environment. This was underlined by one of the participants who commented:"Difference between impact en benefit not really clear (which is positive?)". This was also a problem which an employee of startup consultancy & Green roofs faced, who said: "I think there is an overlap between benefits and impact." These two thus had a problem with the impact boxes, as they were not clear for them what they should fill in. At last the transitions consultant mentioned, when asked what (s)he would change or remove in the canvas, "Maybe it is possible to incorporate Benefits and impacts on social and environmental impact into 1. Or name them differently so that the difference is more clear". All these comments show that there was an huge misunderstanding due to the bad language. Therefore the words impacts are changed to downsides, as it is still important to evaluate the benefits and downsides, and not just only the benefits. Therefore the social/environmental impacts are now changed to social/environmental downsides. Also the explaining text in the box has been changed accordingly. On top of that, to the social & environmental downsides box a new text part has been added which is focussing on the risks to society or the environment, which reads: "If not sure, what are the risks". This means that if the downsides of the complete organisations are not known for sure, what are the risks that the organisation could cause? This will help people filling out this box, even if they are not for sure what the downsides are. This will then also help them with identifying (later on) if the risks are indeed (turning into) downsides to the society or environment.

There was also uncertainty about the difference of the propositions and the social & environmental benefits. This is a logical misunderstanding as they (of course) partly overlap. This problem was stated by the Founder Startup Bioreceptive Concrete who mentioned that there was need for "clearer explanation of the (difference between) the words benefits and proposition." The difference between these two is that the propositions are the reasons why your customer is interested in the product or service, whereas the societal & environmental benefits include these, but on top of that also includes benefits which have nothing to do with the customer. These could for example be measures an organisations take to increase their impact on the society and environment in a positive way, leading to more benefits. For example, if an organisation decides to plant trees, for carbon sequestration, it is not necessarily a proposition for the customer to buy your product or service, even though it could be.

Another misunderstanding was caused by explanation of the ecosystem services, which led to a confusion about the difference between the environmental proposition and the ecosystem services. This was commented by one of the participants through the feedback notes on Miro: "Ecosystem services vs environmental proposition - difference?" This means that the user did not understand the difference between these two blocks. As ecosystem services are services brought by nature, which could have a direct economic gain, rather than some which are very hard to express in monetary value (and thus are solely an environmental proposition) there is a difference between these. For example, tourism is an ecosystem services provided

by nature, which can be expressed in the end in a monetary value, while for creating extra biodiversity it is almost impossible (at this point of time). To make the distinction between these two clear the explanatory text has changed into:"Which ecosystem services do you offer *which have a direct economic gain?*".

Another unclearness that is improved is about the cost structure and value capturing and the pre-financing part, which apparently confused people. Especially it was not clear for whom, and thus from what perspective, they were filling in these boxes. This can be seen as one commented that the canvas should "Be clearer about the distinction between actual costs incurred and sources to cover costs + who pays for what". This shows, that in the old form it was not clear from the canvas itself what was meant with the boxes. This has been dealt with by clearly making a distinction between the costs and capturing value for the organisation and the customer. This led to that the boxes are changed into the 'Cost structure *for organisation*', 'capturing value *for organisation*', 'capital expenditure costs *for customer*' and the 'sources of capital investment *for customer*'. By really mentioning from what aspect the box should be filled in, helps with the clarity and distinction between them.

At last, changes in the text of the value capturing box were made, in order to promote the creativity in the revenue streams. As there are various ways to create revenue streams, as also commented by one of the participants: "Maybe here also brainstorm about types of revenue. Are they repetitive, stable incomes (services) or is it one time sells." By adding the questions of what kind of revenue stream it is, the user of the canvas is better to come up with new ideas for creating revenue streams.

Improvements to Workflow

Not only the canvas itself has changed, but also the workflow of how to go through the canvas has been modified (accordingly to the changes made in the canvas). First of all, it seemed that the old workflow wasn't complete, and was missing the small boxes within the larger boxes, as was commented by the founder of a consultancy comp. "Key beneficiaries not mentioned in step-by-step agenda". On top of the key beneficiaries, also the ecosystem services, the cost reduction and the subsidies were not mentioned explicitly in the workflow. These are added to the workflow, while also including the barriers and enablers. On top of that, the order of some parts have changed, in order to make it more logical. The work flow can be found below.

1. Value Creation
    (a) Value propositions (Economic, environmental & social)
        i. Ecosystem Services
        ii. Cost Reduction
    (b) Customer segment
        i. Key Beneficiaries
    (c) Channels
    (d) Key partners
    (e) Regulations
2. Value delivery
    (a) Key resources
    (b) Key activities
    (c) Enablers
    (d) Barriers
    (e) Governance
3. Value Impact
    (a) Resources Impact
    (b) Societal Benefits
    (c) Environmental Benefits
    (d) Environmental Downsides
    (e) Societal Downsides
4. Value Capturing
    (a) Cost Structure

   (b) Capturing Value for Organisations
      i. Subsidies for Organisations
5. (Up-front) Financing
   (a) Capital Expenditure Costs for Customers
   (b) Sources of Capital Investment for Customers
      i. Subsidies for Customers

4.2. Qualitative Results

The creation of the novel Sbmf led to various results and improvements, compared to existing Sbmfs, which will be presented here. Some of these results are substantiated with qualitative feedback gathered during the focus group meeting. This part will show what sets this novel Sbmf aside from the Tlbmc and the Nbs Bm canvas, which are the two main alternatives. But the uniqueness of this canvas, and its main advantages (& disadvantages) will be highlighted.

Compact

To start with, this new framework, and in special the canvas, are compact compared to the alternatives. One of the best and most used canvasses for organisations, who like to give an overview of their organisation on all perspectives, is the Tlbmc. This canvas enables the user to understand the organisation on the economic, social and environmental perspective. However, this canvas is very extensive, and takes a lot of time to use and fill in completely. Besides that, the canvas might frighten users due to its complexity and comprehensiveness. On top of that, this canvas contains a lot of aspects which are not useful for Nbs in the Dbs. One of the other canvasses which could potentially be used for Nbs in the Dbs is the Nas framework, which is more aiming on the aspect of reducing risks of natural hazards through Nbs. Even though this canvas is compacter than the Tlbmc, it is still more extensive than the novel canvas. On top of that it is especially it is very cluttered and not clear. By the first glance at the canvas you would be demotivated. The last usable canvas for Nbs in the Dbs is the Nbs Bmc, which is indeed compacter than the novel Sbmf for Nbs in the Dbs. However, in this canvas a lot of aspects are not covered which will be also shown in the rest of the chapter.

Comprehensive

Even though it is, compared to other canvasses, a compact framework and canvas, it is a comprehensive approach, which touches upon many different important aspects. This was also underlined by The Environmental Economist at Jin Climate who said that the framework is a "comprehensive approach". In some cases this could be a downside, especially if you are looking for an easy and fast canvas. However, this canvas has not been created for this purpose, but rather to cover all important aspects. By having such a comprehensive approach, it is made sure that nothing is missed which is important for organisations working with Nbs in the Dbs. Another participant, the nature inclusive architect, mentioned that the canvas also "goes beyond direct parties". This is an important factor since Nbs often have a large(if not most) impact (both positive and negative) on indirect parties. For example, when having a green facade, this offers many benefits to the whole street. Compared to the Nbs Bmc, which is a more compact approach, it includes many aspects which are of importance to Nbs in the Dbs. These include subsidies, regulations, barriers & enablers, but also ways to assess the impact of the organisation. The impact of the organisation is represented by the 'resources impact', the 'societal benefits/downsides' and the 'environmental benefits/downsides' blocks. The impact assessment will be further explained in the next part. All the aspects that are included in the novel Nbs Bmc for the Dbs can be seen in table 4.1. It should be noted that the Tlbmc includes many aspects which are not included in the table, as they are not of influence on organisations working with Nbs in the Dbs, but also for the convenience of keeping the table compact. On of these extra additions to the canvas itself, the framework also consists of a workflow and additional sections, making the framework more useful and complete. This was also recognised by the founder Consultancy comp. who mentioned, when asked what he liked the most of this framework, "The step-by-step guide how to navigate the canvas". All these, small, additions to the canvas, lead to a complete and very useful framework.

Table 4.1: Comparison of the included elements per Bm framework

	Bmc	Nbs Bmc	Tlbmc	Nbs Bmc for Dbs
Key Activities	X	X	X	X
Key Partners	X	X	X	X
Key Stakeholders				
Key Resources	X	X	X	X
Value Proposition	X	X (Env, Eco &Soc)	X (Env, Eco &Soc)	X (Env, Eco &Soc)
Customer Segments	X		X	X
Key Beneficiaries		X		X
Customer Relationssships	X		X	
Channels	X		X	X
Governance		X	X	X
Regulations				X
Cost Structure	X	X	X	X
Revenue Streams	X	X	X	X
Cost Reduction		X		X
Capital Expenditure Costs		X		X
Sources of Capital Investment		X		X
Enablers & Barriers				X
Subsidies (Orga. & Cust.)				X
Benefits & Downsides (Soc. & Env.)			X	X
Resources Impact			X	X
Ecosystem Services				X

Impact Assessment

One of the key advantages of the new Sbmf is that it enables the user to assess the impact an organisation has. This is becoming a more and more important factor for organisations, as everyone sees and understands the need of having a positive impact on the world. This is one of the main advantages over the already existing Nbs Bmc. This was recognised and mentioned by various participants in the focus group, of which the transitions consultant mentioned: "It gives you more insight in potentials of your business beyond revenue. And makes you aware of the impact of your business in the Triple P. ", when asked what he liked the most of this new framework. The triple propositions are of great value to these kind of organisations, as customers/people are increasingly valuing the societal and environmental proposition over the economical. When an employee of startup consultancy & Green roofs was asked the same question (s)he replied: "I like that it leaves space to point to the benefits that are specific to Nbs. You get an overview of all the beneficiaries and benefits". This shows that (s)he agrees with the need for not only the economic proposition, but also the societal and environmental. On top of that (s)he mentions that the additional section, the overview of benefits and beneficiaries, is something favorable. This is probably cause this will help the user identifying the benefits and propositions of their organisation. At last, the Founder Startup Bioreceptive Concrete commented on the same question that he liked the most of the framework:"The added environmental part: what are the needs and what do you deliver." All these comments show that the ability to assess the impact with the use of this framework, is one of the main advantages and is highly valued.

Overcoming Nbs problems

One of the other main values of this framework is that it is of course created for Nbs, but especially on the problems that the implementation of Nbs are facing. The main barrier to Nbs development, according to Sarabi et al. (2019) is the 'uncertainty regarding implementation process and effectiveness of solutions'(Sarabi et al., 2019). This is one of the few barriers that the framework won't help you with solving. Other barriers mentioned are 'inadequate financial resources', 'path dependency' and 'inadequate regulations'. The lack of financial resources is certainly thus a barrier to Nbs, therefore a good business plan is needed to find funding, and on the other hand creative revenues streams are necessary to survive. This framework helps with this matter, by letting you think of various revenues streams, but also by letting you think of potential subsidies which can be used. On top of that it helps you determining which value propositions the organisation offers, and for whom. By knowing these, and seeing potential mismatches, an organisation is better able to attract funding from the right sources. The next barrier is path dependency, which

means that currently humans are not yet accustomed to Nbs, but rather to grey solutions and therefore often prefer these over Nbs. This is a problem that takes time to overcome, however, this framework aims to overcome this by showing people what Nbs are, which Nbs are available, and what values these offer. This is done through the additional sections. At last, inadequate regulations are a key barrier to Nbs, therefore it is important to understand the current regulations which you are facing as an organisation. These regulations can both have a positive influence as a negative influence on your organisation. For example if there are regulations which obligate building owners to get green facades, this could help you as an organisation installing green facades. On the other hand, if there is a regulation prohibiting green facades, it won't work well. Therefore it is important to understand to regulations influencing your organisation, also to see your dependency on regulations.

Specifically for Dbs

Another feature that makes this Sbmf so unique is that it is specifically created for, and with, the Dbs. First is was developed based on existing literature about Sbm and Nbs, however the Dbs, and their needs and wishes, were kept in mind while creating the framework. It is then improved by various experts all working with Nbs or from the Dbs. There is not one specific block which is only useful for the Dbs, however, all blocks are important for the Dbs. Some are especially important, such as the regulations, as the building sector is highly regulated in the Netherlands. On top of that, the key beneficiaries, is an important aspect to consider, as in the building sector, very often the one who is paying for the building, does not has the directs benefits of the solutions. For example, if there are tenants, but also when an apartment is part of a homeowners association.

Stimulating creativity

One of the last things that sets this framework aside is that it is stimulating the creativity of the user, which can be very useful for implementing Nbs, as it is not always so straight forward. For example, getting funding is perhaps harder, and also it can be harder to attract customers, as the main advantages of Nbs are hard to express in monetary value. This creativity will also help coming up with a proper and working business model. This stimulation for creativity and ideation can be found in various parts of the framework. First of all it can be found in the section of existing Nbs, which gives an idea of what Nbs are available. On top of that it offers the value propositions which these Nbs have, which is not always straight forward. This can help with the ideation phase for organisations. On top of that the extra section for the value propositions and beneficiaries helps the user to come up with ways to create revenues streams from the extra beneficiaries. As it is sometimes hard to understand all propositions that Nbs offer, and to whom this will help with that step. As mentioned before it is harder to attract funding or customers willing to pay, and therefore the financing is a larger part of this framework. The box of 'capture value' nudges for extra creativity with the use of questions. But on top of that, the boxes for subsidy will also allow to be attract financing through that way.

Improved biggest flaws

There were of course also flaws in this novel framework, which will always be there. However, with the use of the feedback from the expert group, a lot of flaws were taken away. As shown in last section there were a lot of improvements made to the framework after the focus group which were explained in chapter 4.1.1. The biggest flaws were in unclearness, caused primarily by bad wording. When the participants were asked what they liked the least of the Sbmf, 4 out of 5 participants answered that certain things were unclear. Such as the purpose of the canvas, which was then improved in the guide. It was also commented that there was potential overlap, as the differences were not clear in the canvas. This problem was solved by rethinking and rewriting the texts of the box. On top of that it was mentioned that some parts were unclear in general, and that the texts didn't explain what they should've explained, leading to doubts about the relevance of these boxes. Furthermore, the structure of the canvas was not as good as it could be, especially since aspects that were connected, and had the same colour, were not close together on the canvas, making participants confused. This was fixed through restructuring the canvas and placing common aspects close to each other. At last, there was one comment about the lack of the ability to address barriers and risks. This was solved by introducing a new block: 'barriers', and by adjusting the text of the environmental & societal downsides where there is now room for risks. All these improvements makes the framework well adapted to the wishes and needs of the Dbs, and makes the framework in general much better.

4.2.1. Main findings focus group

In this part of the chapter the main findings of the focus group meeting will be presented. These findings are all already presented and thus this can be seen as a summary of the findings of the meeting. The main findings can be found in table 4.2 just below.

Table 4.2: The main findings of the focus group meeting for the framework

	What?	Why?	Improvement
Finding #1	Addition Barriers	Missing	Addition of new element for assessing the barriers to the organisation
Finding #2	Addition Enablers	Missing	Addition of new element for assessing the enablers for the organisation
Finding #3	Structure	Unclarity	The canvas is restructured to overcome unclarity and show connections
Finding #4	Split Subsidies	Missing	The subsidies box is split up into two parts as there are subsidies available for two parties
Finding #5	Wording	Unclarity	Many improvements in wording and making boxes more distinct
Finding #6	Workflow	Unclarity / Missing	Update on workflow as it was incomplete and new elements were added

It should be noted that these are not all the findings of the focus group, but rather the main findings which led to improvements in the framework. There are also findings on the implications of this framework which will be presented in chapter 5.

5

Discussion

As the gathered results are now presented and understood it is time to reflect upon the research, and learn lessons from it. This is done by first presenting the implications the research has. In the second section the research will be reflected upon, by examining the methodology used and seeing where any flaws in the process occurred. At last, recommendations, based on this research, will be given. This will include both recommendations for future research, as for practice.

5.1. Implications of Results

In this section the implications of the research will be presented. To understand the implications a distinction is made between implications on practice, and implications on theory. It will be investigated what influence the research currently has on both. At last the implications overtime will be researched and presented. This is done to understand whether the research, and its findings, is future proof and useful for a longer period of time.

5.1.1. Implications for Practice

This part of the chapter is split up, again, into two parts. The first part will explain how the new Sbmf should be used, while the second will present who should use the framework.

How should the framework be used?

In order to understand the implications for practice it should be first understood how the framework should be used, and at what moment. Of course it should be clear that the framework should be used by organisations who are (currently) working with Nbs (in the Dbs), as this Sbmf will lead to a better representation of the real organisation. However, it is not entirely clear yet in which situations an organisation should use the framework. Therefore this part of the research will elaborate upon that aspect, with the use of feedback retrieved with the focus group. The first thing that is overall agreed to, by the experts, is that the new framework should not be used for ideation, but rather for giving an overview of an organisation. This is for example firstly mentioned by an employee of startup consultancy & Green roofs who made the following remark: "I have to remark what I have with the normal business canvas model as well, is that sometimes it feels more like a putting down, like getting an overview of what you kind of already know." (S)he has the issue with this framework that it is not suitable for coming up with new (business) ideas, or at least not ideal. This is also underlined by the founder Consultancy comp. who mentioned in the focus group meeting that: "for ideation it's as has been said before, it's really not a good tool because it boxes your thinking and it doesn't allow for creativity. What it is good for is fleshing out already existing ideas that come out of an ideation phase where you've gone really wild with different methods, and then you channel those ideas into this kind of framework". Therefore it should be clear that the framework should be used for giving just an overview of an organisation, to which "it often does help", as commented by the Founder Startup Bioreceptive Concrete. Besides that, it was found that this novel framework is quite a comprehensive and extensive framework requiring more work than the Nbs BM Canvas. Therefore, the founder Consultancy comp. said that it could be potentially used "for a project with a lot more time and serious interest of implementation." This means, that in an organisation or project is should be determined how much time there is available for

using a Sbmf, as this one requires more time, but also potentially lead to better outcomes. Using this framework "would then be the starting point of writing a business plan." according to the founder Consultancy comp..

A potential workflow incorporation this framework could look like the following: First, this framework would be used to give an overview of an organisation (which is working with Nbs in the Dbs), secondly the overview, and thus the organisation is analysed through which then improvement points could be found. When the aspects, which should be improved, are known, brainstorm sessions could be held for coming up with creative ideas. These brainstorm sessions could be held in many different forms. When, from the brainstorm sessions, new ideas flow out as an output, the framework could be filled in again. This new framework then represent the organisation which it could become. In this way, the framework contributed to the ideation process, by handing first concrete aspects for which brainstorm sessions could be organised.

Who should be using the framework?

Now it is known how and when the framework should be used, it is important to understand for whom the novel framework is interesting. This is, partly, also determined with the use of the expert focus group. First of all it should be understood that the framework could be used by organisations working with Nbs, especially in the Dbs. However, 'organisations' is still a wide concept, and therefore a better understanding is preferred. These organisations could be either start-ups or well established firms.

First of all, this novel framework is could be useful for start-ups or young organisations as an employee of startup consultancy & Green roofs mentioned, when asked whether this framework could be used within their organisation: "I would like to work with this model, because I feel it does not only give an overview of focus points, but also some raison d'être of your company". With this it is meant that with the use of this framework it does not only tell the story of how your organisation creates, captures and delivers value, but it is also able to represent the reasoning why the organisation is doing the work it is doing. Therefore, this framework is especially useful for organisations which are aiming for a positive impact, as this framework is better able to assess the impact the organisation has. However, it is not so useful for research organisations as the Environmental Economist at Jin Climate mentioned: ""Maybe interesting for start-ups and companies, but less for us as research organisation". The reasoning behind this is that research institutions and organisations prefer to perform research on a system level rather than on an organisational level, as this is more useful for predictions and understanding. Therefore it can be concluded that the framework is not very suitable for the work done in research institutions.

As the Environmental Economist at Jin Climate mentioned that it is potentially useful for start-ups it is interesting to look at the applicability for their type of organisations. the Founder Startup Bioreceptive Concrete mentioned during the focus group meeting that "I just don't like these generic models, for other uses than clarifying your own thoughts and assumptions. The reason is that I, try to talk much more with people from from the the scene from the building sector and from the municipality". This shows that his personal opinion is not to use these kind of frameworks in their start-up, as it only helps clarifying his/her thoughts. New insights should be brought through the conversations with experts and policy makers from the field, i.e. the building sector and the municipality. However, when the Founder Startup Bioreceptive Concrete was asked whether (s)he would work with this canvas within their organisation the Founder Startup Bioreceptive Concrete commented: "I try to avoid models in general" (as just was mentioned), "I like this one to push myself into summarizing some of the USP's/UBR's" (Unique selling points / unique buying reasons). However, an employee of startup consultancy & Green roofs, also from the start-up environment mentioned that she would like to work with the model/framework. These two comments are a bit contracting, however the Founder Startup Bioreceptive Concrete made a good point, which is that the framework should be just used for giving an overview and clarifying your thoughts, but that it shouldn't be used for coming up with new ideas and insights. Therefore it can be concluded that this framework can be very useful for start-ups and young organisations, but that it should be used correctly as the insights should still come from experiences.

On top of the start-ups other interesting users of this framework are architectural firms, as they are highly involved in the roll-out of Nbs in the (Dutch) building sector. Therefore, there were also participants included in the focus group from this perspective, in order to make sure that it would be also designed to fit their needs. However, during the meeting it became clear that architectural firms prefer not use these canvasses in their work/projects. When the nature inclusive architect was asked whether (s)he would work with this framework within their organisation, (s)he commented that (s)he was "not sure why a canvas in-

stead of an overview in another format." This shows that this framework does not offer any benefits over other formats which are currently used in their projects. However, it could be interesting for them as an organisation to use the framework to assess the complete organisation, and see where improvements (for impact) are possible. But in general it can be concluded that the framework is not suited for work within architectural firms, which was not expected, and is thus not very surprising.

At last, the framework could be used indirectly through companies, especially consultancies, or governments which are aiming to help other firms with reorganising their business (structure) to become more nature-inclusive. This framework would then be used to give advise. This could be done for example by first using the canvas for creating an overview, after which points of improvement could be determined. This will be further highlighted in chapter 5.3.2. However, there are thus possibilities to use this framework indirectly in consultancies, municipalities or other organisations giving advise.

To conclude, this framework is applicable and useful for organisations who are working with Nbs in general, for organisations for who the impact and the 'raison d'être' is very important, for start-ups and young organisations and lastly for organisations using it indirectly through advise, such as consultancies or municipalities. The framework is however not very useful for architectural firms.

5.1.2. Contributions to Research

On top of the implications for practice, there are various contributions to research. First of all, with the novel Sbmf, there is an additional framework (and theory) to use/work with. Furthermore, this framework, for Nbs in the Dbs is the first framework that is created specifically for a sector, the Dbs. This is importance since the term/concept Nbs is a very wide concept, which includes many different solutions in many sectors. For example, Nbs in coastal defence are completely different from Nbs for the building sector. As these solutions are very different from each other, it also means that organisations working with these Nbs are thus (very) different. This would mean that when these organisations are all using the same framework, this will lead to generalizations within the framework. This is not ideal for a model, which should represent the business as good as possible. Because of this the organisations using this framework will not come to ideal results, as the model is not good enough. Therefore it is of importance that more specific frameworks are created, especially since Nbs covers many sectors and is a very broad concept. On top of that, it not only is useful for specific organisations, it also shows that the concept of Nbs is rising in popularity and is becoming more mature. This will lead to more awareness of this term in the society, which will also mean that more people will consider Nbs in their organisation / project. This will then of course also lead to more popularity in research.

On top of that this research could be of importance for another cause. This research is an example of how a Sbm for Nbs could be created for a specific sector, in this case the Dbs. However, since Nbs is a wide concept, there are many other sectors for which an appropriate framework could, or should, be created. For example, city planning requires completely different things from the organisation than the building sector. This methodology could therefore be also used for creating a Sbmf for other sectors, like the Nbs for coastal defence, city planning or land management.

Furthermore, this research could serve as a guide or inspiration for researchers who are researching the creation of a new Sbmf for another specific applications or sector. The methodology, and literature review, used in this research could be used or copied for research in other Sbmf. This is because the way of working is very similar, but on top of that, the content is also very similar. Especially when the application has something to do with nature-inclusive solutions, such as Nbs itself, it would be very useful.

At last, this research adds qualitative data to the research on Nbs, especially through the use of the focus group. This qualitative data gathered through the focus group gave valuable insights, which are used to improve the framework. For instance this research found that extra elements were necessary in the canvas. Especially novel elements which made it possible to do a proper impact assessment, and to identify all the benefits of Nbs and to whom they apply, were important insights of this research. On top of that, the elements to find creative ways to gather the right financing, such as the 'subsidies' boxes, are useful. On top of that the qualitative data gathered also gave insights in how to use the framework and for who it is interesting. This is of importance to researchers as this helps steering their research in the right direction, and thereby making it more valuable in practice.

To conclude, with this research there is a new Sbmf for Nbs available, which adds value to the literature on Sbm(f). On top of that this framework is a niche Sbmf, which is created for a specific sector withing the Nbs world, which is thus more useful to organisations working in the Dbs. The creation of more specific Sbmfs also shows that the interest in Nbs in general is rising, which is a positive thing when considering

their (co-)benefits. Fourthly, this research could be used as a reference for creating either a Sbmf for organisation working with Nbs in another sector, or for other Sbmfs with other purposes, especially other nature-inclusive purposes. At last this research contributed to research through gathering qualitative data which led to various useful insights.

5.2. Reflection on Research

For a research it is important to understand what things could be improved, or done in a different way. The way the research is performed influences the results. Therefore in this section the reflection on the research will be given. There will be reflected upon the metholodogy, the literature review and the focus group.

Methodology

The first thing that will be reflected upon is the methodology. Thus what could be improved in the complete process. This research, as seen in the research design, is performed in a linear way. This means that, in general, the second step is not started before finishing the first one. On top of that, the whole process is just performed once throughout the whole research period. Linear process methods have a variety of advantages, however, it also has some downsides. For example, it often means that results are just gathered at the end of the process, rather than throughout the whole process. On top of that, including this research, it often leads to that feedback on the work is retrieved at the end. However, for this project it would have been very interesting, if not better, to use the scrum methodology, in which the process is done over three, or even more times. This would've led to results very early on in the process, and on top of that to feedback at early stages. Through this way the adjustments and improvements that had to be made would also have been less work. Using the scrum methodology could have led to more feedback sessions, and in the end thus a framework which had been based on more practical insights.

Secondly, in hindsight it would have been perhaps better to use individual interviews/cases, instead of the focus group meeting, for gathering feedback. Even though the discussion, which was possible in the focus group meeting, was very valuable to the process it also had some downsides. First of all, the use of a focus group, instead of individual interviews didn't allow for small improvements during a longer period of time. Instead of that the focus group provided feedback and thus room for improvements once. This could have costs more time and effort than when feedback moments were used constantly throughout the process. Secondly, creating and organising the focus group meeting took a lot of time since it was first of all very hard to find interested experts, but secondly it was very hard to find a suitable moment in their tight schedules for the focus group meeting. Because of this a lot of time and effort is put into this, while this time and effort could have also been used for research, and individual interviews. Individual interviews would have been easier to arrange, while it still gives valuable feedback. When individual interviews were used, this could have led to (many) more small feedback sessions, leading to more and better feedback in the end.

Literature review

A second point of improvement could have been at the literature review. The main point of improvement could have been made when it could have included the BM for Nbs created by Naturesmartcities(NatureSmartCities, n.d.). This BM is based on accounting methods, which calculate the benefits of Nbs in numbers. This BM thus offers the user hard data on Nbs, which is very valuable to the end user. It is proven that this BM has a lot of great feedback and results. The BM consisted of an excel tool where local authorities can with to measure the impact of ecosystem services in the urban area (NatureSmartCities, n.d.). This insights would have very relevant and useful for this research. However, access to the real BM is not public, only to the guide and to the results. On attempts to get access to the excel tool (BM) was never responded, and therefore this BM has never been reviewed for this research. However, as this is a very useful BM, it would've been ideal to get access to this.

Focus group

The last point of improvement is the methodology of the focus group itself, thus not of the whole research design, but just of the focus group itself. The focus group could have been used in a better way, as was also mentioned by the Environmental Economist at Jin Climate. The comment was that (s)he would've started the focus group meeting with a rather small basis canvas/framework, which then would be improved and

extended with all experts together, instead of creating a complete framework which is then used in a case to retrieve feedback. This method would have created more discussion during the meeting, instead of during the case itself.

Secondly, a mistake was made with the recording of the meeting. Even though the meeting itself was recorded, the cases, which were held in breakout rooms were not recorded. This was not known before and it was assumed that the breakout rooms would have been recorded as well. Even though the breakout rooms were joined occasionally, not all information and discussion were attended since there were two breakout rooms. Because of this, some valuable discussion and insights were lost. Luckily the participants put their findings from the discussions into the Miro board.

At last the focus group did not include participants/experts from the municipality and government. Their perspectives do have much value to this framework, as they are one of the main stakeholders in the ecosystem of Nbs (in the Dbs).

5.3. Recommendations

As now the research is reviewed upon, it is possible to learn lessons from the performed research. These lessons will be in the form of recommendations, which will be presented in this section . The recommendations are split up into two parts. The first one is the recommendations for future research, while the second part will provide the recommendations for practice.

5.3.1. Recommendations for Future Research

There are various recommendations for future research, which will be presented in this part. First of all, further research should be performed in the methods for expressing the value of nature in monetary terms. This would provide the sector with many benefits, and definitely more ease as now customers, but also investors, are able to directly see the economic benefit of nature. Nbs offer many different co-benefits, such as air purification or water storage. These are hard to express in monetary value. On top of that this is an important factor since currently, unfortunately, most of the things in the world are profit / economically driven, especially for investors who are seeking return on their investments. Of course it is not (yet) possible to express all values and benefits that nature offers, in money. However, even small improvements could lead to large positive effects, as people then are finally able to clearly understand the value of money. This problem is also underlined by one of the experts, the Founder Startup Bioreceptive Concrete, who said the following "the biggest problem, which is still, I think also unsolved with this model, is what is the monetary value of of certain environmental benefits or propositions." Unfortunately, this framework thus does not solve this problem, and therefore research in this field is preferred.

Secondly, it would be beneficial when future research is performed, not only on one organisation, but rather on the whole ecosystem and how it behaves. It would be very interesting to understand and know which factors influence the success of Nbs. It should be understood that a technology is never a success without the complete ecosystem around it. the Environmental Economist at Jin Climate mentioned that "it's not about the individual technology or the individual actor, it's the whole ecosystem of actors that need to get along and everybody needs to get a piece of the pie in order to make it work." Therefore a research in the complete ecosystem of Nbs (in the Dbs) would be beneficial. This is also the opinion of the founder Consultancy comp. who says: "it is not in isolation that companies can solve particular sustainability issues or create that network value. It really has to have all those different interfaces with. Other companies, but also other types of organizations. " Therefore, to be able to solve sustainable issues a complete ecosystem should be in place.

Furthermore, for Nbs there is a need for more evidence based research. As Nbs is still a relatively new concept, there is not much proof on the (positive) effects of Nbs. This makes Nbs more risky solutions than conventional (grey) solutions. One of the identified enablers is therefore to have 'effective monitoring and valuation systems for implementation processes and benefits' (Sarabi et al., 2019). This is especially important for businesses, and their business model, as they are based on the value proposition they offer. It could lead to problems when it is not sure whether the value proposition, they are aiming for, is really existing.

Fourthly, it would be beneficial, from a research perspective, but also from a practical perspective, to get more expert feedback on the framework, and thus keep developing it further. Even though the framework is created and improved with the use of a focus group consisting of seven experts, there are probably still improvements possible if more feedback would be gathered. It would be good to use regular interviews, or another individual method, to gather this feedback, even though more focus groups would also work fine.

However, creating such a focus group, and gathering everyone around takes up a lot of time, while the focus group does not add that much more benefits. Especially the feedback and insights from the municipality, government and the normal citizen would be very useful, as these were not included in the focus group. Therefore, more iterations on the framework through feedback sessions, either by individuals or groups, would be advantageous.

fifthly, it would be interesting to understand how Nbs compare to alternatives, such as traditional grey solutions. Currently Nbs are often still seen as nice-to-have solutions rather than as an alternative to grey solutions. By researching the comparison and trade-off between these two solutions, valuable insights can be gained. This research can focus on general differences between grey and Nbs solutions. On the other hand a comparison of the Bms of Nbs and traditional grey solutions would be interesting. This would gain insights in which circumstances a certain Bm is preferred over the other. This could help choosing the right Bm in a certain situation, resulting in less waste of energy, time and (financial) resources. This would also lead to a better understanding of the value of Nbs to Bms, and in which situations. All these things will promote the use of Nbs in the long run.

At last, as businesses and organisations, and their business models, are changing overtime it is important to have a framework that is able to capture these dynamics(Khodaei & Ortt, 2019). Not only do the organisations change, but also the whole ecosystem, and technologies they use, will change overtime. As Bms are a representation of the aspects of an organisation, Bms will also change overtime. When these aspects within an organisation also change, and thus become less, or not at all, important they should not be included in the framework. On the other hand, if aspects will become more important, they should be in the framework. Therefore a framework should not be static over a longer period of time. In further research therefore the focus should lay on the dynamics of this Sbmf.

To conclude, there are six recommendations for future research. The first being to put more effort in the research on expressing the (co-)benefits of nature / Nbs in monetary values. The second recommendation is to research the ecosystem as a whole, rather than on an individual organisation level. Thirdly more evidence and proof is needed for the impact of Nbs, and thus more research on these is needed. The fourth part that could be looked into is to gather more feedback, by experts, on the framework as this will lead to a better framework. The prior to last recommendation is to compare grey solutions (and their Bms) to Nbs (and their Bms). At last, the dynamics of a Bm should be incorporated in the Sbmf, thus creating a dynamic Sbmf.

5.3.2. Recommendations for Practice

The first recommendation for organisations who want to work with, or at least use, this research is to stimulate open innovation. With this it is meant that the framework and the research should be available not only to their organisation, but to other organisations as well. This will not only stimulate the publicity of this framework/research, but on top of that will also lead to more people working on this theme, and thus to better insights. In the end this will lead to a better framework, which is important for the uptake of Nbs. On top of that, it is mentioned that partnership among stakeholder is the highest success factor of Nbs, as stakeholders are a very important aspect in this ecosystem (Sarabi et al., 2019). Therefore, using open innovation, making this research publicit and stimulating others to use this framework as well will in the end lead to the best results, both for you as an organisation, as for the society as for the entire planet.

Secondly, as it was determined as well before, it should be clear by now that the framework should not be used for ideation, but rather for providing an overview of an organisation. This means that organisations should not incorporate this framework in their brainstorm sessions, as this will hamper the creativity, and thus the final results. If an organisation would like to use this research and framework for their organisation, it could be used in the following workflow, which is created to enhance the outcomes of using the framework. First of all, the organisation uses the framework, and fills in the canvas, for the organisation at that moment of time. With this, the organisation has a good understanding of itself and the work it does. As the framework is more appropriate for organisations working with Nbs in the Dbs it will also be better in representing the aspects that an organisation has or should have. The second step is to identify, using the framework, where improvements are possible. This would lead to a list of potential improvement areas. On these points brainstorm sessions should be held to come to good new ideas. When this is finished, the framework should be used again and the canvas should be filled in. There is also another workflow for organisations who do not have a business plan yet. They should start with first ideation, then fill use the framework and fill in the canvas, and at last write the whole business plan. This workflow is also validated by the founder of a consultancy comp., who is an expert in this field. When this workflow was mentioned

as a question: ”So I would say first ideation, then the business model canvas for instance, and then the business plan?.” (s)he replied: ”Exactly.” If an consultancy or a municipality wishes to use this research and framework in their consultancy work it would be advised to first develop the framework further with their own partners. This would make the framework even better for their type of customers. After the framework is improved, it should be tested with the use of (at least) three test cases. At last, the framework should be incorporated in their own work flow for consultancy.

Thirdly, a framework can be very complex, comprehensive and even frighting. This could lead to that people decide to not use the framework at all. On top of that, the aspects and blocks could be unclear for users as they do not necessarily have experience with Business Models. Because of this would be interesting to create a structure, where the canvas is not presented at as a whole but in many small parts. In stead of just offering blank boxes which have to be filled in, questions could be asked. The answers to the questions can then be automatically filled in the canvas. This would take away the complexity of the framework and make it accessible for everyone. A similar idea was proposed by an employee of startup consultancy & Green roofs who said the following: ”So I would really like to see a type of business model canvas that if you don’t know how to answer the question gives you like an outside model that you can use to only brain storm on only that one question so you can. Fill in like the answer of that brainstorming.” Therefor the third recommendation for practice is to make such a structure, to make the framework (and canvas) less complex.

At last, it is recommended when this framework is used in practice to make use of an experienced facilitator. This facilitator should, besides of course being familiar with the framework, have experience with Nbs in the Dbs. It is found that the facilitator highly influences the outcomes (Mayor, Toxopeus, et al., 2021). Therefore an experience facilitator should be used in all organisations.

To conclude there are four recommendations for practice. The first recommendation is to use open innovation to promote the framework. Secondly the framework should be used correctly, thus not for ideation, but rather for giving an overview. A workflow is proposed in which the framework is included. The third recommendation is to create a structure in which the canvas is filled in automatically and the user is just asked simple questions. The last recommendation is to use experienced facilitators when using this framework, as they highly influence the outcomes of the research.

6

Conclusion

In this research it was the aim to contribute to the diffusion of nature-based solutions in the Dutch building sector. This is achieved through a main research question and sub research questions. To achieve the main research questions, first sub research questions had to be answered.

The first sub research question *"What are the existing nature-based solutions which can be used in the dutch building sector?"* is answered through secondary research which resulted in a supporting section in the novel framework. This supporting section consists of a list of fourteen Nature-based solutions examples which are suitable to be used in the Dutch building sector. The list can be found in figure F.1 in Appendix F. On top of that, a deeper explanation of what the solution is, and what benefits and downsides it embeds, is provided. This list supports the use of the canvas in the novel framework.

The second sub research question was not aimed on Nature-based solutions, but rather on the existing sustainable business model frameworks. The second sub research questions reads as follows: *"What are the current sustainable business model frameworks?"*. To come to an answer to this question a literature research is conducted in which various sustainable business model frameworks were found. The current sustainable business model frameworks are: the business model canvas, the NAIAD collection, the Naturvation BM catalogue, the Naturvation stakeholder engagement puzzle, the SITE4NBS & RISE4NBS framework, the nature-based solutions business model canvas, the Natural assurance schemes framework, the triple layered business model canvas, the sustainable business model canvas and the circular business model canvas. The triple layered business model canvas and the nature-based solutions business model canvas were identified as the current two most suitable frameworks for this purpose, and can thus be considered as the potential alternatives to a novel framework.

The third sub research question *"How can current sustainable business model frameworks be improved to enable the use of nature-based solutions?"* is answered through a creation process and an iteration phase based on the outcomes of the focus group meeting. In the creation process the triple layered business model canvas and the nature-based solutions business model canvas are used as the starting point for the novel. Through a process in which the frameworks were altered, reduced, re-structured and at last merged a novel sustainable business model canvas is created. This canvas is the core of the novel framework and is accompanied by of a guide, a workflow and at last two supporting sections which help creating a sustainable business model. The canvas is improved compared to the alternatives by the additions of important elements and removing unnecessary elements, which led to a comprehensive, but compact canvas. On top of that the canvas is improved as this novel canvas is created to overcome the roll-out of Nature-based solutions is facing, and enables the user to do a thorough impact assessment of the organisation. Also, this framework is created to stimulate creativity through the addition of various elements and the supporting sections. At last, this framework can be seen as an improvement since it is created for, and with, the Dutch building sector making it an unique framework.

The fourth, and last, sub research question: *"How should the novel sustainable business model framework for nature-based solutions in the Dutch building sector be used?"* is answered through the practical insights gained in the focus group meeting. This led to the insight that the novel framework should be used for creating an overview of an organisation, rather than for ideation and brainstorming sessions. However, it could be incorporated in a workflow in which first the framework is used to create an overview after which points of improvement are identified. When these points are improved the framework can be used again and the

canvas can be filled in again to create a new overview of the improved organisation. The novel framework should be used by organisations working with Nature-based solutions (in the Dutch building sector), organisations who are striving for impact and for whom their 'raison d'être' is very important, and at last by consultancies in their work.

Answering all these sub research questions contributed to answering the main research question *"How can a novel sustainable business model framework foster the use of nature-based solutions in the Dutch building sector?"*, which was the primary objective of this research. To achieve this a list of suitable Nature-based solutions for the Dutch building sector is created, a novel framework is created through adapting two already existing canvasses, and at last recommendations on how to use this framework are given. When the framework is used appropriate this can contribute more sustainable business models making use of Nature-based solutions. This framework can therefore, when used by the right people in the right way, enable the use of Nature-based solutions in the Dutch building sector.

References

Agthoven, A. v. (n.d.). Pppcanvas: A simple tool to tackle complex business models of public-private partnerships. https://www.inclusivebusiness.net/ib-voices/pppcanvas-simple-tool-tackle-complex-business-models-public-private-partnerships

Babí Almenar, J., Elliot, T., Rugani, B., Philippe, B., Navarrete Gutierrez, T., Sonnemann, G., & Geneletti, D. (2021). Nexus between nature-based solutions, ecosystem services and urban challenges. *Land Use Policy*, *100*, 104898. https://doi.org/https://doi.org/10.1016/j.landusepol.2020.104898

Beattie, V., & Smith, S. J. (2013). Value creation and business models: Refocusing the intellectual capital debate. *The British Accounting Review*, *45*(4), 243–254. https://doi.org/https://doi.org/10.1016/j.bar.2013.06.001

Bertino, G., Menconi, F., Zraunig, A., Terzidis, E., & Kisser, J. (2019). Innovative circular solutions and services for new buildings and refurbishments [Cited By :6]. *Wit transactions on the built environment* (pp. 83–91). www.scopus.com

Bischof, A. (2021). *Deliverable d6.6: Ecsi business model analysis & typology*.

Bocken, N., Strupeit, L., Whalen, K., & Nußholz, J. (2019). A review and evaluation of circular business model innovation tools [Cited By :71]. *Sustainability (Switzerland)*, *11*(8). www.scopus.com

Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes [Cited By :1387]. *Journal of Cleaner Production*, *65*, 42–56. www.scopus.com

Bocken, N., Schuit, C., & Kraaijenhagen, C. (2018). Experimenting with a circular business model: Lessons from eight cases. *Environmental Innovation and Societal Transitions*, *28*, 79–95. https://doi.org/https://doi.org/10.1016/j.eist.2018.02.001

Boons, F., & Lüdeke-Freund, F. (2013). Business models for sustainable innovation: State-of-the-art and steps towards a research agenda [Cited By :977]. *Journal of Cleaner Production*, *45*, 9–19. www.scopus.com

Castellar, J., Popartan, L., Pueyo-Ros, J., Atanasova, N., Langergraber, G., Säumel, I., Corominas, L., Comas, J., & Acuña, V. (2021). Nature-based solutions in the urban context: Terminology, classification and scoring for urban challenges and ecosystem services. *Science of The Total Environment*, *779*, 146237. https://doi.org/https://doi.org/10.1016/j.scitotenv.2021.146237

Coes, D. (2014). Critically assessing the strengths and limitations of the business model canvas. http://essay.utwente.nl/64749/

Dewulf, K. (2010). Play it forward: A game-based tool for sustainable product and business model innovation in the fuzzy front end. *6th EMSU conferences (ERSCP-2010)*.

Dorst, H., van der Jagt, A., Raven, R., & Runhaar, H. (2019). Urban greening through nature-based solutions – key characteristics of an emerging concept [Cited By :65]. *Sustainable Cities and Society*, *49*. www.scopus.com

Egusquiza, A., Arana-Bollar, M., Sopelana, A., & Almenar, J. B. (2021). Conceptual and operational integration of governance, financing, and business models for urban nature-based solutions. *Sustainability (Switzerland)*, *13*(21). www.scopus.com

Escobedo, F. J., Giannico, V., Jim, C. Y., Sanesi, G., & Lafortezza, R. (2019). Urban forests, ecosystem services, green infrastructure and nature-based solutions: Nexus or evolving metaphors? [Cited By :105]. *Urban Forestry and Urban Greening*, *37*, 3–12. www.scopus.com

Europe, C. (2018). Nature-based solutions: Transforming cities, enhancing well-being. https://cordis.europa.eu/article/id/421853-nature-based-solutions

European Commission, E. (2015). Nature-based solutions and re-naturing cities, final report of the horizon 2020 expert group on nature-based solutions and re-naturing cities.

Ferreira, V., Barreira, A. P., Loures, L., Antunes, D., & Panagopoulos, T. (2020). Stakeholders' engagement on nature-based solutions: A systematic literature review [Cited By :58]. *Sustainability (Switzerland)*, *12*(2). www.scopus.com

Finnveden, G., Hauschild, M. Z., Ekvall, T., Guinée, J., Heijungs, R., Hellweg, S., Koehler, A., Pennington, D., & Suh, S. (2009). Recent developments in life cycle assessment. *Journal of Environmental Management*, *91*(1), 1–21. https://doi.org/https://doi.org/10.1016/j.jenvman.2009.06.018

Geissdoerfer, M., Pieroni, M. P., Pigosso, D. C., & Soufani, K. (2020). Circular business models: A review. *Journal of Cleaner Production*, *277*, 123741. https://doi.org/https://doi.org/10.1016/j.jclepro.2020.123741

Giordano, R., Pluchinotta, I., Pagano, A., Scrieciu, A., & Nanu, F. (2020). Enhancing nature-based solutions acceptance through stakeholders' engagement in co-benefits identification and trade-offs analysis [Cited By :41]. *Science of the Total Environment*, *713*. www.scopus.com

Henry, M., Bauwens, T., Hekkert, M., & Kirchherr, J. (2020). A typology of circular start-ups: An analysis of 128 circular business models. *Journal of Cleaner Production*, *245*, 118528. https://doi.org/https://doi.org/10.1016/j.jclepro.2019.118528

IEA. (2019). 2019 global status report for buildings and construction. *United Nations Environment Programme*.

Joyce, A., & Paquin, R. L. (2016). The triple layered business model canvas: A tool to design more sustainable business models [Cited By :390]. *Journal of Cleaner Production*, *135*, 1474–1486. www.scopus.com

Kampelmann, S. (2021). Knock on wood: Business models for urban wood could overcome financing and governance challenges faced by nature-based solutions. *Urban Forestry & Urban Greening*, *62*, 127108. https://doi.org/https://doi.org/10.1016/j.ufug.2021.127108

Khodaei, H., & Ortt, R. (2019). Capturing dynamics in business model frameworks. *Journal of Open Innovation: Technology, Market, and Complexity*, *5*(1). https://doi.org/10.3390/joitmc5010008

Lewandowski, M. (2016). Designing the business models for circular economy-towards the conceptual framework [Cited By :512]. *Sustainability (Switzerland)*, *8*(1), 1–28. www.scopus.com

Lüdeke-Freund, F., Carroux, S., Joyce, A., Massa, L., & Breuer, H. (2018). The sustainable business model pattern taxonomy—45 patterns to support sustainability-oriented business model innovation. *Sustainable Production and Consumption*, *15*, 145–162. https://doi.org/https://doi.org/10.1016/j.spc.2018.06.004

Malys, L. (n.d.). Nbs visualization. https://nbs-explorer.nature4cities-platform.eu/?nbs=GR_semi

Mayor, B., Zorrilla-Miras, P., Le Coent, P., Biffin, T., Dartée, K., Peña, K., Graveline, N., Marchal, R., Nanu, F., Scrieu, A., Calatrava, J., Manzano, M., & Gunn, E. L. (2021). Natural assurance schemes canvas: A framework to develop business models for nature-based solutions aimed at disaster risk reduction [Cited By :3]. *Sustainability (Switzerland)*, *13*(3), 1–21. www.scopus.com

Mayor, B., Toxopeus, H., McQuaid, S., Croci, E., Lucchitta, B., Reddy, S. E., Egusquiza, A., Altamirano, M. A., Trumbic, T., Tuerk, A., et al. (2021). State of the art and latest advances in exploring business models for nature-based solutions. *Sustainability*, *13*(13), 7413.

McQuaid, S. (2019). Nature-based solutions business model canvas guideboook: A collaborative output from the connecting nature horizon 2020 project. *Zenodo: Dublin, Ireland*.

Mok, S., Mačiulytė, E., Bult, P. H., & Hawxwell, T. (2021). Valuing the invaluable(?)—a framework to facilitate stakeholder engagement in the planning of nature-based solutions. *Sustainability*, *13*(5). https://doi.org/10.3390/su13052657

Morris, R. L., Konlechner, T. M., Ghisalberti, M., & Swearer, S. (2018). From grey to green: Efficacy of eco-engineering solutions for nature-based coastal defence [Cited By :105]. *Global Change Biology*, *24*(5), 1827–1842. www.scopus.com

NAIAD. (2019). *Deliverable 7.4:international good practices in financing and funding nature restoration*.

NatureSmartCities. (n.d.). A business model for greener cities. https://naturesmartcities.eu/business_model

Nußholz, J. L. (2018). A circular business model mapping tool for creating value from prolonged product lifetime and closed material loops. *Journal of Cleaner Production*, *197*, 185–194. https://doi.org/https://doi.org/10.1016/j.jclepro.2018.06.112

Ortt, J. R., & Kamp, L. M. (2022). A technological innovation system framework to formulate niche introduction strategies for companies prior to large-scale diffusion. *Technological Forecasting and Social Change*, *180*, 121671. https://doi.org/https://doi.org/10.1016/j.techfore.2022.121671

Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: A handbook for visionaries, game changers, and challengers* (Vol. 1). John Wiley & Sons.

Pek, R., Riedl, M., & Jarskỳ, V. (2017). Innovative approaches in forest management–the application of a business model to designing a small-scale forestry strategy. *Journal of Forest Science*, *63*(9), 393–400.

Raymond, C. M., Frantzeskaki, N., Kabisch, N., Berry, P., Breil, M., Nita, M. R., Geneletti, D., & Calfapietra, C. (2017). A framework for assessing and implementing the co-benefits of nature-based solutions in urban areas. *Environmental Science & Policy*, *77*, 15–24. https://doi.org/https://doi.org/10.1016/j.envsci.2017.07.008

Respyre. (n.d.). Advanced bioreceptive technology. https://gorespyre.com/

Ryan, K. E., Gandha, T., Culbertson, M. J., & Carlson, C. (2014). Focus group evidence: Implications for design and analysis [Cited By :71]. *American Journal of Evaluation*, *35*(3), 328–345. www.scopus.com

Sarabi, S. E., Han, Q., Romme, A. G. L., de Vries, B., & Wendling, L. (2019). Key enablers of and barriers to the uptake and implementation of nature-based solutions in urban settings: A review [Cited By :69]. *Resources*, *8*(3). www.scopus.com

Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2016). Business models for sustainability: A co-evolutionary analysis of sustainable entrepreneurship, innovation, and transformation [Cited By :270]. *Organization and Environment*, *29*(3), 264–289. www.scopus.com

Short, C., Clarke, L., Carnelli, F., Uttley, C., & Smith, B. (2019). Capturing the multiple benefits associated with nature-based solutions: Lessons from a natural flood management project in the cotswolds, uk [Cited By :30]. *Land Degradation and Development*, *30*(3), 241–252. www.scopus.com

Somarakis, G., Stagakis, S., Chrysoulakis, N., Mesimäki, M., Lehvävirta, S., et al. (2019). Thinknature nature-based solutions handbook.

Stancanelli, J. (2010). Conducting an online focus group [Cited By :27]. *Qualitative Report*, *15*(3), 761–765. www.scopus.com

Toxopeus, H. (2019). Taking action for urban nature: Business model catalogue. *NATURVATION Guide*.

Toxopeus, H., & Polzin, F. (2017). Characterizing nature-based solutions from a business model and financing perspective.

van den Bosch, M., & Ode Sang, Å. (2017). Urban natural environments as nature-based solutions for improved public health – a systematic review of reviews. *Environmental Research*, *158*, 373–384. https://doi.org/https://doi.org/10.1016/j.envres.2017.05.040

Walkiewicz, J., Lay-Kumar, J., & Herzig, C. (2020). The integration of sustainability and externalities into the "corporate dna": A practice-oriented approach. *Corporate Governance: The International Journal of Business in Society*.

Zott, C., Amit, R., & Massa, L. (2011). The business model: Recent developments and future research [Cited By :2206]. *Journal of Management*, *37*(4), 1019–1042. www.scopus.com

A

Stakeholder Analysis

Brench	Who	Value	Interest (1-5)	Role	Decision Power (1-5)
Governmental					
	Municipalities	Representing society (popularity), (short-term) economic gain, public health and well-being	3	Facilitator, policy- and decision-maker	4
	'Het Rijk' (RVO - TKI/ VNO-NCW)	Representing society (popularity), (short-term) economic gain, public health and well-being	2/3	Facilitator, policy- and decision-maker	5
	The EU (H2020 Research Groups)	High level of research	2	Researcher	3/4
Institutions					
	Academics	High level of research and education	3	Providing network, Researcher	2
	Research Institutions	High level of research, economic stability,	3	Providing network, Researcher	2
Commercial					
	Vendors (Installers / Producers)	Profit, reputation,	5	Seller, link between R&D and customer/end-user	3
	Customer (Architects / Soc. Housing / Building-owners)	Profit, fulfilling needs of end-user	3	Buyer	5
End-user					
	Tenants (Residents / Companies / Governmental)	price-quality, (mental) health,	3	Renting, influencing building-owner (customer),	3
	Society	(Mental) health, nature, natural resources,	5	voter, initiator	2
	Nature	Biodiversity, Air quality, Climate, Quantity	5		1

Figure A.1: Stakeholder analysis of the ecosystem of nature-based solutions in the Dutch building sector

B

Transcriptions of the focus group meeting

Léon Collenteur: It should be recording right now so that you know.
Léon Collenteur:So thanks for that as well. So the purpose of this meeting is to go through the business model which I created and to get feedback on the business model, and especially since you are all working or researching in this field and which this model is created for and that gives me practical insights hopefully which I can use to. Like the business model, even better, and to contribute to my research. And so that's the main purpose of the meeting. On top of that, I think it's really interesting to see who we're speaking with, and for the other participants are, and so I will also like to leave some room for that. And so the agenda is Also put under the Miro board. For which I will copy the link. In the chat right now, so if you if you haven't opened the Miro Board, we will work with that as well, so you can open the link which is put in the chat right now. But first we have a short introduction which I'm doing currently. Then we will get to know each other a little bit more. Then I'll go into the introduction of the case and we'll be working on the case. After which we have a short break and in the end we will do the presentation of the results that came out of the case.
Léon Collenteur:And then I will try to get her some feedback from you guys and then at the end there's some room for it. Questions and also for networking if you'd like to speak someone who's interesting for you as well. And so, but the first shall we start with the introduction? I will start with the introduction of myself. So my name is Leon Collenteur.

Léon Collenteur:

I'm in Masters student from Technical University of Delft. For the Master program management of technology and I did a bachelors in mechanical engineering and my interest is now completely changed or completely, It's really focused on nature based solutions or the area in which nature and technology is combined. Since I really like nature and I also think that nature currently is really under evaluated. I'm doing my research on the business models of nature based solution for that reason and I do that in cooperation with squarewise and **XXX** is also working at squarewise. So that's a bit of me and maybe **XXX** you can introduce yourself first.

Environmental Economist at Jin Climate:

Yeah, my name is **XXX**. I work at Yin climate Sustainability which is a small research unit, obviously a spinoff from the University of Groningen. I work as an environmental economist, really for 17/18 years now. I've been working in a range of mainly EU funded projects in the. Well, it's more than the bioeconomy, uh, so to say. And I'm currently coordinating a research project on land based mitigation technologies together with the TU Delft. I think that's. That's enough for now.

Léon Collenteur: Thanks a lot.

Nature inclusive Architect: I am **XXX**. I'm one of the owners of Nest where architect for the animals were.

Nature inclusive Architect:

Designing, building, and advising around nature inclusive environments in the build environment. So mainly at project developments. And and it's what we do.

Léon Collenteur:

Thanks a lot.

Startup consultancy & Green roofs:

Hi, I'm **XXX**. I work at a startup in Amsterdam called volume 3. And we advise homeowners and owners Associations on how they can go stepwise through energy transitions. And we also are trying to develop products for that.

Léon Collenteur:

Thank you. Yes.

Transitions consultancy:

I'm **XXX**, like Leon said. I'm also working for if I'm working for squarewise. We do All different kinds of projects, especially focused on energy transition and also more and more on agricultural transitions. So I think that's it and the next is up.

Léon Collenteur:

Thanks, **XXX** is the next up.

Founder Consultancy comp. in social BM development:

XXX as well, from Germany, and that's why we're speaking English I guess.

Founder Consultancy comp. in social BM development: I have a background in social innovation and social entrepreneurship and founded a consultancy company that helps SMEs learn from social enterprises. So we help them with business model development for net positive impact and so far that has been very broad and more recently I personally have also engaged more in the topic of nature based solutions and what kind of barriers and enablers there are to scaling those nature based solutions.

Léon Collenteur:

Thanks a lot, thanks a lot **XXX**. I think you're the last one. **Sustainability expert in housing corporation**:

Yes so, my name is **XXX**. I work for a housing corporation in the Netherlands called Alliantie, one of the Bigger housing corporations. We have about 60,000 houses. Floodings they have an architecture background. Worked a lot in sustainability and that's also what I'm doing here. So we we have all these houses need to be insulated and there needs to be a good strategy on how to make them. Energy savings sustainable future proof. Everything. Uh, without raising the rent, of course, so that's that's that's a big challenge and we we are starting. I'm not. I'm not really involved with that, but we are also starting to include nature based solutions especially for. Climate mitigation purposes.

Léon Collenteur:

Thanks a lot. Well, I think it was all really clear. And also I hope you can see the connection which you all have, even though you're all working in that different expertise field, but like. I think linked through nature to each other. The last participant I texted him he's coming in a few minutes, but I'm. Think he will then maybe. Introduce himself to the rest of you. For now we will just get on.

Léon Collenteur:

So what we're doing is, uh, a study case, and we will do that study case or the case with the use of the business model I created. I hope you have all seen the business model already. Otherwise, you can just go through it. If we're working on it.

Léon Collenteur:

So how we will do that this we will work for through the miro board. That are sent to you. So if you're all gonna open it right now, that would be nice. Also put the link in the chat for you to go over there. And if you have opened it, we will continue.

Léon Collenteur:

The case is already put on there, so the instructions for the case are there and what we will do is we will split up into two groups since I think it's too much work or it's too hard to cooperate with six people in the teams meeting. So we will split up into two groups which are predefined. In front of this meeting.

Léon Collenteur:

And we will go through the canvas in these two groups and I hope that everything will be quite clear when you're working on the campus, and if not I will be in this room for questions and I will also be joining the two groups and changing between the two two groups to see if there are any questions and how you are guys are doing. Umm? So if we all. I will actually. Share my screen for awhile.

Léon Collenteur:

So if you all have joined the Miro Board, you will see indeed this. These were the pre meeting tasks. I hope you have done these, but I if not no problem at all. So the business model is in the first section. There is the guide. There's the example and also the blank template which we will fill in during this meeting. If there are any blocks, So these parts which are not clear for yourself, you can have a look at the detailed information for a new block since I've changed them. Changed this canvas from the. The standard business model Canvas.

Léon Collenteur:

And in the section 2.1 and section 2.2, extra information can be found which will help you filling in the template or with inspiration for coming up with various value propositions or various solutions. And we will be working during this meeting. Or in the case over here in the frame for during the meeting. And again, uh agenda can be found here, but that's not really important. Also, the guide and the example are put over here again, to make sure that you are, you can see them easily and see what this expected from you

Léon Collenteur:

And these are the two blank templates, uh, which will work in. I will just divide the group into and and the first one we'll use the first template and the second one was second template.

Léon Collenteur:

And also here are the steps: in what order you should go through the Canvas. If you haven't seen them and there are also, that's a right bit more per block. And then let's get straight into the case itself. And the case is put on over here.

Léon Collenteur:

A super small introduction to the case, so a small Amsterdam based company start-up likes to introduce a new product on the market. Currently the company gives advice to organizational sustainability of the building, the product they like to introduce is a new green slash blue roof. Their main advantage is that they have created an anchor which can make the rule more modular. And then some facts about the company are stated and then the instructions. So please fill in the canvas with your group. You can make use of the guide and provide the sections for filling in the campus. Umm? So that's in short the case itself.

Léon Collenteur: And I will stop sharing my screen

Sustainability expert in housing corporation: Wait sorry léon. What is it? What is the I? I don't understand the anchor and the and the modular thing.

Léon Collenteur: Umm well, I don't think it's that important for the for the case itself, but it's more to show what their proposition or the proposition is by entering this new product and how they compare to other companies, for example. **Léon Collenteur**: Are there any other questions about the case? The. Yeah, about the case itself. **Environmental Economist at Jin Climate**:

Maybe so we are supposed to take the position of this startup company so the business model of the startup company is the only thing that matters here.

Léon Collenteur:

Yeah, exactly, and you can be creative for yourself. How you are you would Act and also what you think is the best to do as this company. So there's room for your own inspiration and also your own insights in this field.

Founder Consultancy comp. in social BM development:

And maybe another question so far, the company has focused their work on providing consultancy services, advisory service and now they want to move into actually providing the solution itself as well. Like a physical solution.

Léon Collenteur:

The roof indeed exactly, and I think the for the case itself. You can only focus on the product and leave the office part behind, which you know that they have done that before. So yeah.

Léon Collenteur:

Are there any more questions?

Startup consultancy & Green roofs:

And then because their main advantage is that they created, which makes the roof way more modular. So what what do you mean like what? What is the advantage of having a modular roof?

Léon Collenteur:

OK, Welcome Auke we're just going on for a minute and then I will get the introduction also to you to you.

Founder Startup Bioreceptive Concrete:

Goedemiddag.

Léon Collenteur:

Good afternoon, the meeting will be in English though. so I think the main advantage that I would like to say that because it's modular it offers. Other values to the customer. And for that. So then there's also room to see what you think as a group. Is the value proposition, for example, by having that it's not modular. Roof. So, that can in the end makes.

Léon Collenteur:

In the end, it leads to other value propositions that, for example, if you have a a roof which can only be placed as a whole if you can place part just parts of the route that offers new value propositions. For example, what I could imagine is for housing corporations. If they do not have a lot of money to invest in ones by having a modeler the roof, they can do it in steps and already start the the transition.

Environmental Economist at Jin Climate:

Like Flat roofs?

Léon Collenteur:

For now, yeah, but I'm I don't think it matters too much for the Case itself.

Léon Collenteur:

Are there any other questions except from **XXX**

Léon Collenteur: So I will put you into two groups are divided, two groups and the first group is **XXX** and **XXX**. And the second group is **XXX** and **XXX**?

Léon Collenteur:

Group 2, if you can already start with the two of you, then I will explain **XXX** a bit about the introduction and everything.

Léon Collenteur:

And so I will be joining the two groups. To see if there are any questions on how you are getting along.

Léon Collenteur:

And I think for in the we can have a 30 minutes approximately for this and I have to watch we'll take a small break, but I will see during the 30 minutes how everything will go on and how everyone is doing.

Léon Collenteur:

Then I will just put you in the two groups. OK I assigned everyone and I think you will be automatically joining the two groups.

Léon Collenteur:

There you go. You can now join the breakout rooms. Is that correct? In 10 seconds it's. OK.

Léon Collenteur:

I got will join your room as well.

Working on the case in breakout rooms

Léon Collenteur:

So welcome back thanks a lot. For the filling in the the case and the canvas.

Léon Collenteur:

I maybe wasn't clear on some parts at the beginning and also maybe during the case which may be troubled you a bit with the case itself and what I expected. But I think you really did a good job on the work and I already got some really good feedback which I can take further. So thank you a lot for that.

Léon Collenteur:

So for now I'm wondering what you thought of the the campus and working with the campus since. Using that feedback is the most important for me. But first, maybe you have some feedback that you already want to mention.

Léon Collenteur:

From the case itself or. The canvas that hasn't. Or there wasn't. Room for yet so.

Léon Collenteur:

No. Umm? So, uh.

Léon Collenteur:

I actually plan to go over the Canvas in total to show each other what how you feel in the Canvas. So maybe we could do that. Real quick.

Léon Collenteur:

For the first group and then somebody someone of that group would like to take lead and that by presenting it real quick. I may be highlighting the main parts of the what you filled in. for instance.That you could present the canvas. And just go over the blocks shortly and maybe see what theother group has to think about it. They have to have some feedback on that.

Léon Collenteur: Yeah, see if that works.

Nature inclusive Architect: Let me zoom in again because I always fight with this thing.

Nature inclusive Architect: So. We had quite a bit of quite a bit of discussion about different target groups, et cetera and and and what's relevant for them when it comes to green roofs. And when they will

actually get to a decision making point and how challenging that can be in lots of different groups, so there's lots of. Discussions spend on that. Sorry I need to move this thing. It doesn't want to do it.

Nature inclusive Architect: Ohh where to start? I think there's a number of things that are sort of obvious for. The type of products things like you need R&D and you need product development and you need prototyping and and builders and place and companies that work on that. So that's the top sections and for that you need money and materials and knowledge and labs and things like that as resources.

Nature inclusive Architect: You can, you know, come to a proposition that talks about. Then their value or increased value of the real estate through the green roof. Umm, but then there's also regulation, and there's also systems that subsidize or promote it in some way, like briam or subsidies. Uh, but also like being normal ring or. The mandatory nature, inclusivity or policies and.

Nature inclusive Architect: Sorry for that. And then you can sell this to indeed architects or owners of roofs, uh, via the contractor, or direct, UM, and then.

Nature inclusive Architect: Through channels like online or building fairs or anything, so those are the sort of common things that you'll find. Also in a standard business canvas. And then from a. Beneficiaries point of view. There's the added section that talks about OK. There's also a local community that that benefits from it. There's animals and plants that benefit from the extra grain. There's a project developers in the neighborhood that benefit from the extra value that it creates for the neighborhood. The water retention does something for the municipality, and there's all sorts of sites benefits for different parties.

Nature inclusive Architect: Resource impacts yes. Product hazard as well. Standard as well doesn't I mean yes, there's materials etc and it might be recyclable. Might not be. You need to produce it. You need to send it over, etc.

Nature inclusive Architect: And then again, there are sections that talk about the in the middle, the environmental proposition and the social proposition that is beyond the direct value for the customer. Which is about the increase in biodiversity or cooler city or UM, the fauna stepping stones that improve the biodiversity. Or it's about the place to relax for people around or that you're happier because you're having a nice view or a healthy view. So. In that sense, I think the canvas adds a number of Nice, sort of.

Nature inclusive Architect: Additions versus a lean business canvas. It's a lot. There's a number of them where we had discussions I think is A and an add-on. Have put all of those specifically on the sideboard for you. Sort of that where we had like. Is this a positive or negative impact? How do you translate governance things like that? So I think those are improvements that you can look into.

Nature inclusive Architect: Lots more. Lots of benefits for different parties, yes, so I'm not sure whether that's sort of, you know, there's not a lot of discussion on this. I'm reading it out.

Léon Collenteur: Linda also mentioned something funny that you were apparently presenting the one from Group 2, sorry.

Nature inclusive Architect: The guys were typing so it was just reading it, so that's done.

Léon Collenteur: Maybe a question for everyone I was wondering as well, it's Would it be for instance? Useful in the business model if you could could get a list of the regulations or subsidies as well since. You're a bit struggling with these since you were not completely sure which regulations were there, perhaps? But which subsidies were there? Would that be A useful addition to the business model.

Nature inclusive Architect: Maybe I I'm not sure whether it's in a business model canvas, but I think it's valuable information for people to have. It's a waste of everyone needs to find it somewhere. If you can help, but that that goes for a lot of things. That's also what's the best solution. Most cost effective? What are your options? Which one goes and does the best from a biodiversity and a benefit standpoint? And which one is the cheapest and everything in between? So there's a lot of things that I think in general information can help with. I don't, I wouldn't know how. Within a canvas you wouldn't be over, sort of. Delivering on information for people to deal with within such a small type of format, but that's maybe.

Founder Startup Bioreceptive Concrete: You would also be nudging. I think you should. That's something the entrepreneur should be able to to find out, maybe with the as Ingrid says, some general directions for information, but. I want not too much.

Léon Collenteur: OK, yeah.

Environmental Economist at Jin Climate: It's it's often highly context specific. The way real estate is financed. Go into healthcare, public real estate private. It's completely different. So yeah, subsidy wise. Subsidies may apply to part of the real estate stock of the building stock in the country and the other stock not so.

Environmental Economist at Jin Climate: The problem then is. Finding the information nudging is good. But these regulations rule, they are updated, revised. Keeping up to speed and trying to get that into a

database that is. Stating the current state of affairs is. There there will be consultants doing this work. Know the latest Way in the subsidy Forests so to say.

Léon Collenteur: OK, thank you for your valuable feedback I would definitely take that further.

Léon Collenteur: So for the next part is that I put on a few closed questions. In the feedback frame, which is completely to the right. Maybe? If you haven't, so the first feedback frame, and then there's even a second one, which is even further to the right. So if you zoom out completely. And go over to that Feedback frame ?

Léon Collenteur: I think that could. Can you also find it there. Maybe I should share my screen.

Founder Startup Bioreceptive Concrete: Leon, did you also? Did you also remove blocks from the original BMC?

Léon Collenteur: Yes I did

Léon Collenteur: So I think everyone can see my screen right now, so this is the frame for during the meeting the the second one. And if you could please go to the third one which is completely to the right over here.

Léon Collenteur: Then there are a few. Well, sort of open questions 5 questions and if you could all fill this in for me, that would be really beneficial. And if you could put your name first. And if you just copied the first one. And make a sticky note for yourself. So first Chris question reads, what did you like the most of the new business model?

Léon Collenteur: And the second one, did you like the least? And if you could take. Think proximately 5. To 10 minutes. Filling this in. That will be really nice. And that helps me a lot. And then after the meeting I don't have to gather any feedback anymore and I. Is that clear for everyone or does somebody ask a question about it?

Léon Collenteur: And please add your name to the sticky note. So I know from whoit comes from, what expertise field that is useful for. Taking it into consideration.

Founder Startup Bioreceptive Concrete: Pretty silent group.

Nature inclusive Architect: Yeah. Léon I have to leave in a bit

Léon Collenteur: That is fine, this is also the one of the last parts.

Léon Collenteur: Is everyone finished or somebody still working on one? Those are quite hard to. Put on our think type and speak in the same time so. Uh, okay, I think everyone. Just finished for this part.

Léon Collenteur: Thank you very much for the feedback you already gave and these were quite nudging questions, but in general how did you do you think if you have anything to share about the business model, campus or the business model? There's anything you would like to mention. How did you find it?. It's more of an open question for everyone.

Startup consultancy & Green roofs: I have to remark what I have with the normal business canvas model as well, is that sometimes it feels more like a putting down, like getting an overview of what you kind of already know.

Startup consultancy & Green roofs: Just so you can, you can condense it a bit and you get an overview of the whole, like what your company is doing, but some of the questions are actually kind of hard if you're still figuring stuff out. So for example, the first thing we started with was the customer.

Startup consultancy & Green roofs: Target audience, the customer segments and that already took us quite a while to like come up with what the customer segment would be and I remember from working with the traditional business model canvas that we had the same problem that it. If you still need to brainstorm it is, maybe it doesn't give you any handles on how to brainstorm on the questions that they're asking. So I would really like to see a type of business model canvas that if you don't know how to answer the question gives you an like an outside model that you can use to only brain storm on only that one Question so you can. Fill in like the answer of that brainstorming. Through your business model canvas.

Startup consultancy & Green roofs: It's like the mother document, but actually fitting that it can be quite challenging.

Léon Collenteur: Yeah. I think also for you "name of Founder startup Bioreceptive Concrete" Do you also have the feeling with working at your company?

Founder Startup Bioreceptive Concrete: Uhm? Well, I try to avoid these kind of models. UM, quite often it does help to give an overview to yourself, but also to for example, your team like what are we doing here? Which question are we answering? But the biggest problem, which is still, I think also unsolved with this model, is what is the monetary value of of certain environmental benefits or propositions and. Because I feel like if you want to scale up, people should should be willing to pay for it and and eventually, especially

with the bigger corporations. Yeah, like we had the customer is the municipality or or like we had an environmental benefit cleaner area. Who's going to pay for that? Like we all want to have cleaner air but who's going to pay for it?

Founder Startup Bioreceptive Concrete: And that's still still something that I find hard.

Startup consultancy & Green roofs: So is that the reason that you avoid these canvases?

Founder Startup Bioreceptive Concrete: Yeah, the reason the reason is that I I tried to talk much more with people from from the the scene from the building sector from the municipality. Maybe maybe that helps to fill in such a model, by the way, but. Yeah, I I just don't like these generic models. For other uses than clarifying your own thoughts and assumptions.

Léon Collenteur: OK. Like I can understand that completely. **XXX** and also something you experience. Since you're advising a lot of companies, is that also something you? You see, what's the company she advise?

Founder Consultancy comp. in social BM development: Yes and no. I think it really depends on the exact situation that you use these tools in. So for ideation it's as has been said before, it's really not a good tool because it it it boxes your thinking and.

Founder Consultancy comp. in social BM development: It it doesn't allow for creativity. What it is good for is fleshing out already existing ideas that come out of an ideation phase where you've gone really wild with different methods, and then you channel those ideas into this kind of framework, setting to flesh them out into the different dimensions that you need to talk about when having this one idea. Because usually these ideas are quite raw and they need the flesh from the different dimensions, so that's what it's good for. Umm? And.

Founder Consultancy comp. in social BM development: I see it as kind of a a pre step to writing a business plan that comes afterwards which is just a long text document which is also sometimes hard to work in from the get go. So you need these kind of posted notes, things to then jump off into the into the main document.

Founder Consultancy comp. in social BM development: Umm? And obviously you always have people who like it and who don't like it. But in in general it helps to have. Yeah, to bridge this gap between ideation and long text text document of what the actual plan.

Léon Collenteur: So I would say first ideation, then the business model campus for instance, and then the business plan so.

Founder Consultancy comp. in social BM development: Exactly.

Léon Collenteur: OK. And **xxx**, and you're coming more from the academic field. Do you have a few on this or? What is your thought about this situation?

Environmental Economist at Jin Climate: Yeah, so so I think I put some of the posted notes. I think it could be good for some startups you know if they have some, you know collecting ideas mainly what Leon is mentioning, collecting ideas and brainstorming. It's nice to capture these things, but we also felt in our group discussion there was summing up what we already know. And the problem I got is, uh. The product still remains unclear to me. We are thinking from just a. Modular roof thing is just pure technology. Or are we also intending to like forward or backward integrate and have our own licensed or our own installers in place? Would you like to have a funding mechanism associated? You can offer it as a service, or at least the thinking about the product itself

Environmental Economist at Jin Climate: Like I don't know like depends like if the product changes then the whole canvas changes so. Umm? So so. That it remained a little bit high level of abstractness with. Which is for me is not always Useful.

Environmental Economist at Jin Climate: From from an academic point of view, like I'm often I'm also doing work in transition studies. For me it's not about the individual technology or the individual actor, it's the whole ecosystem of actors that need to get along and everybody needs to get a piece of the pie in order to make it work. You know, to scale up pilot projects are that for graphs you can have some. One our funding from the local government who likes your idea. So you have your pilot et cetera, but real scale up comes with understanding how markets work and the dynamics of markets . That's so. And then you need to understand how. Existing suppliers, existing buildings, existing buyers, how they act and decide. And if as soon as you understand that. You can find, let's say, the gap in the market and tune your product. Uh to that. So then you know, OK, I have a, you know, this roof service thing I need to offer it in this subsector as a service because that's the way the funding work and then this sector. I would target it as a you know people that would purchase it as fully so.

Environmental Economist at Jin Climate: Yeah, I I. I tend to work more with, uh, broader system analysis. Related from this more, you know company oriented approach. But that's purely from my my own

academic and research perspective.

Léon Collenteur: Yeah.

Founder Consultancy comp. in social BM development: Can I jump in there? With two comments Uh, because I really like I. I really like that idea and I think what we're trying to push for in the uh, in the company world is also exactly that understanding that you know, not just. It's not as in isolation that companies can solve particular sustainability issues or create that network value. It really has to have all those different interfaces with. Other companies, but also other types of organizations. So I really like the idea of systems analysis and then having maybe a systems map as a pre step to these kind of canvases that help understand the value generation from the different perspectives of the system that we're dealing with. So that could maybe be a pre step and another quick comment that I wanted to make was that I think obviously. It is hot, you know what you mentioned. I say about the product and how it's how the canvas is evolving. While you're thinking about the specifications of the product, I think that is probably due to the fact that we only had 30 minutes. Now you usually do these kind of things in a full day or even longer and keep filling them over the time with new ideas that come up while as you go along. So I think again, the use case of this kind of canvas is not to have a quick brainstorm. Session for 10 minutes and then have the perfect idea, but it is a kind of frame that you work into overtime and then it really unfolds its full potential.

Léon Collenteur: OK. Really valuable feedback. And what I already learned a lot is as well. So thanks for that.

Léon Collenteur: So I'm. From now on, if you have any feedback still, you can always put it under Mayo, or if you have something to say right now, that's also fine, of course, but I want to thank you all a lot for participating in the. The focus group. It will definitely help me a lot from my research, but on the other side, I also hope it was. Interesting or fun for you as well to see what's going on there as well on the research from students. And I also hope that you learned from each other. You're each other's insights. So, that's all from my. From my side, thanks.

Léon Collenteur: And I would like to leave some room for if you would like to speak to somebody. Which could be. Maybe useful for you as well. I left the breakout rooms open, I think. So if you would like to go in one, feel free to join any.

Founder Startup Bioreceptive Concrete: I'll have to leave.

Founder Consultancy comp. in social BM development: Me too unfortunately, but thank you so much for having us here.

Environmental Economist at Jin Climate: And good luck with the with the research.

Founder Startup Bioreceptive Concrete: Yeah, good luck.

Léon Collenteur: Got it alright bye bye.

C

The case

A small Amsterdam based company/start-up likes to introduce a new product on the market. Currently the company gives advice to organisations on the sustainability of their buildings.

The product they like to introduce is a new green(-blue) roof. Their main advantage is that they created an anchor which can make the roof (way) more modular.

Some facts:

- The company exists of 3 people
- The product is still in development and testing phase
- The owner owns other companies in building services (installatie techniek in Dutch)
- The employees have a good connection with the Technical University of Delft.

Please fill in the canvas with your group, you can make use of the guide and provided sections for filling in the canvas.

For questions, contact me through teams (I'll be joining both break-out rooms). Please add feedback in the frame to the right

Figure C.1: The case provided to the focus group during the meeting

D

Feedback

Figure D.1: Anonymously given feedback through Miro

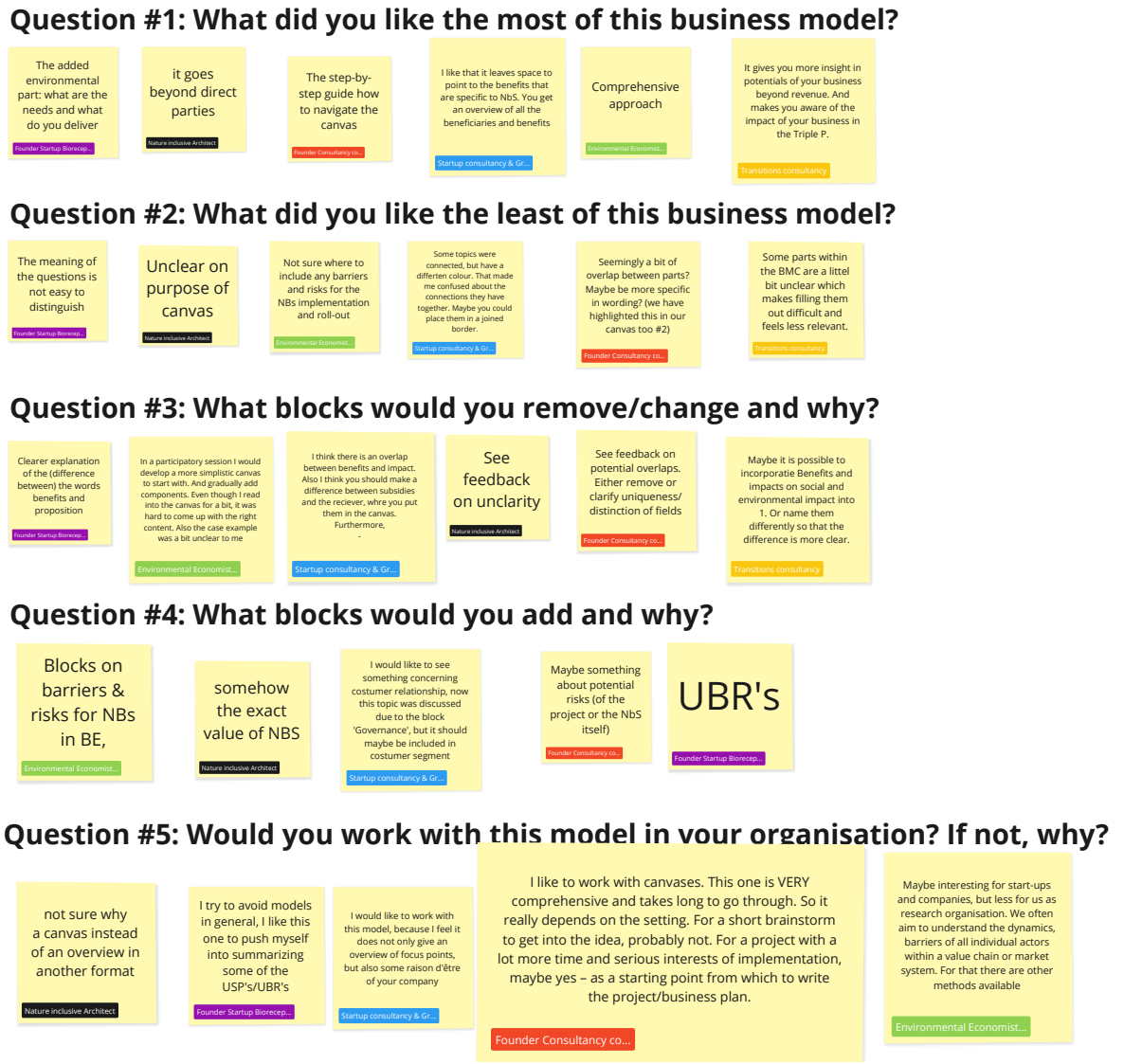


Figure D.2: Given feedback per question through Miro

E

Miro board

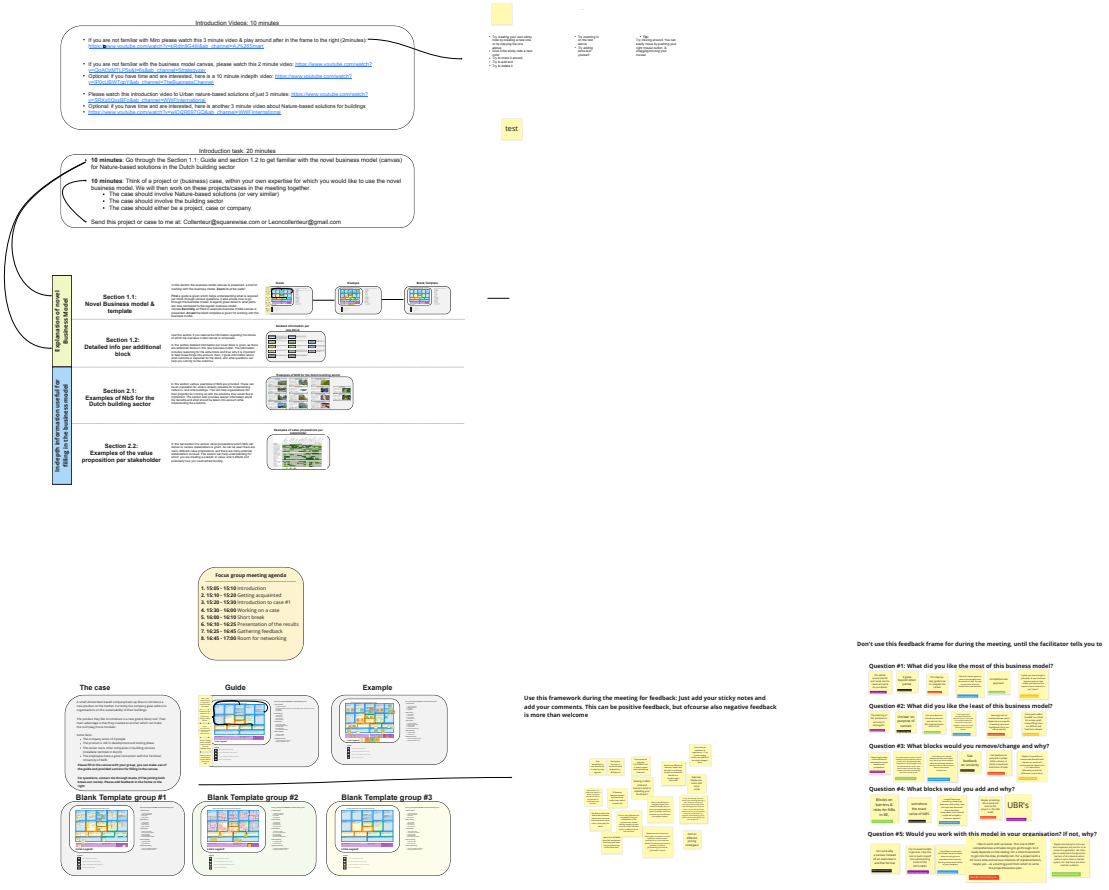


Figure E.1: Overview of the complete Miro board

The complete Miro board can be viewed through the following link: https://miro.com/app/board/uXjVOqk_Tjc=/?share_link_id=823389201364

F

Supporting Sections

F.1. List of NbS Examples for the DBS

Figure F.1: List of examples of Nature-based Solutions for the DBS

F.2. List of Value Propositions per Beneficiary

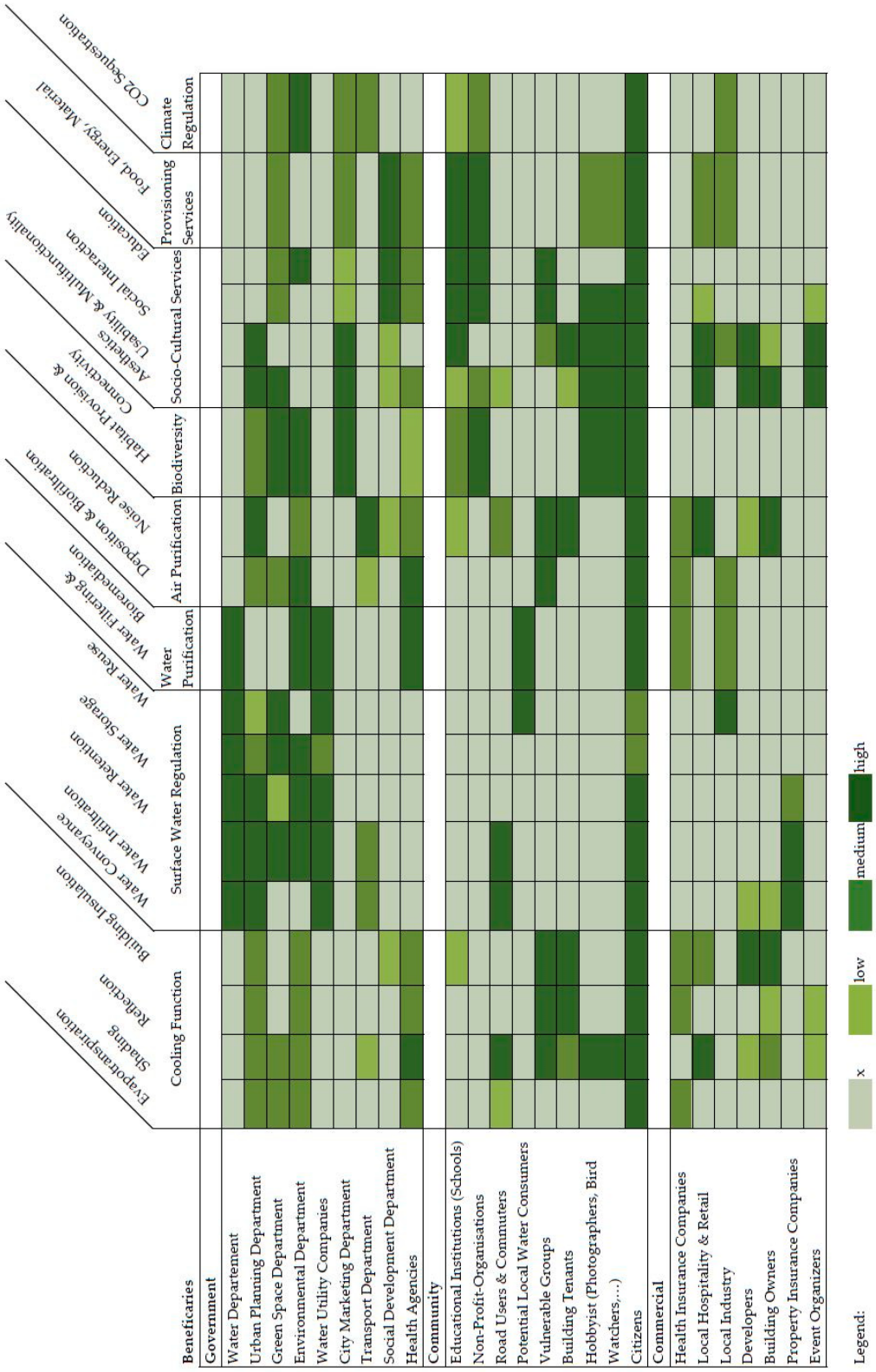


Figure F.2: A list of value propositions (x-axis) plotted against the beneficiaries (y-axis). Taken from:(Mok et al., 2021)