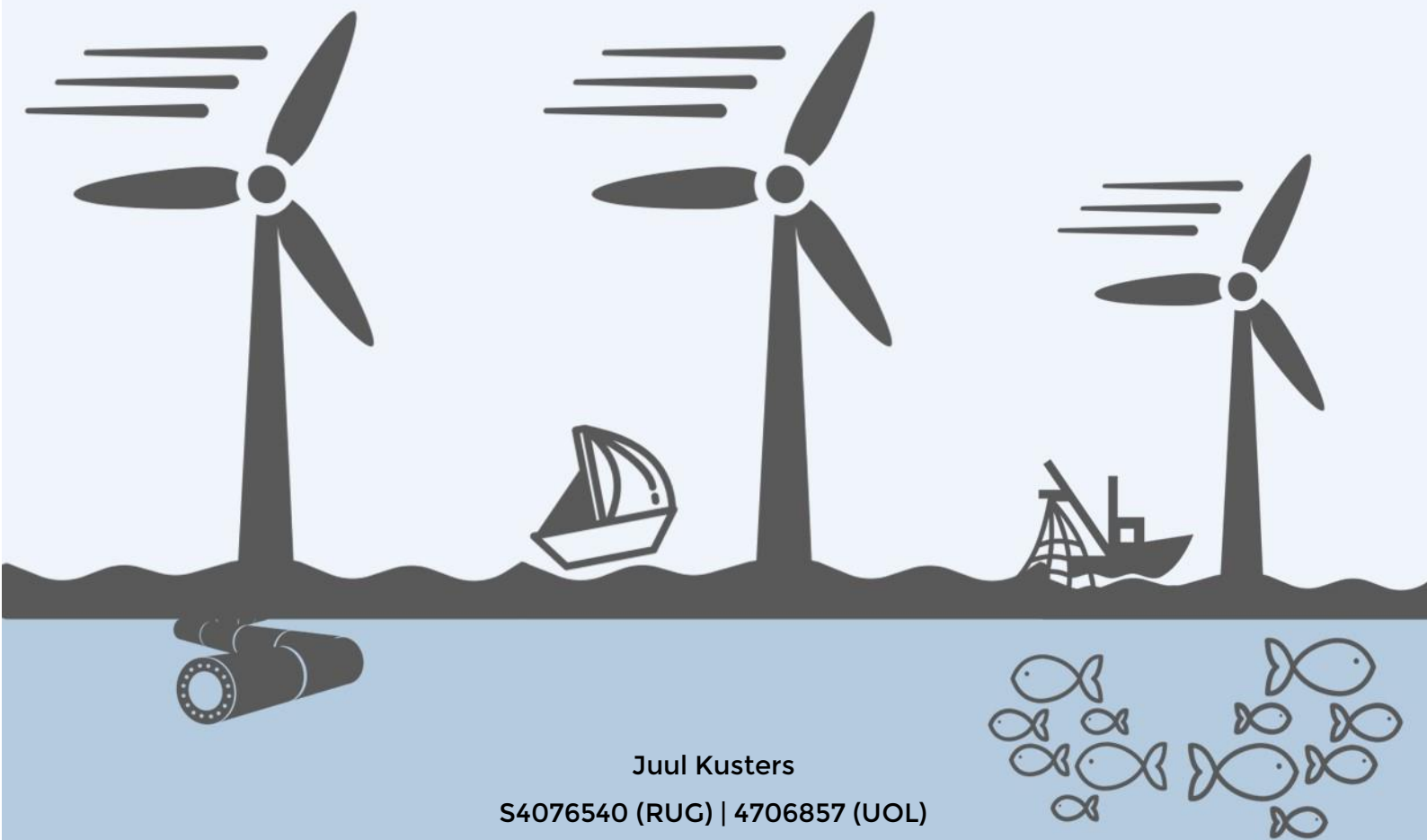


A monoculture of windfarms or a sea of possibilities?

Exploring multi-use implementation as a solution for efficient ocean planning in the Dutch North Sea



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Abstract

The spatial claim on the oceans is intensifying as many countries move offshore for various reasons. Particularly, offshore windfarms are expected to take over a large share of the North Sea due to the high pressure to meet renewable energy targets, use the more appropriate wind regime at sea and bypass the NIMBY syndrome on land. Still, space for other activities such as shipping, recreation and fisheries needs to be ensured. A multi-functional use of ocean space is a promising solution to efficiently manage space whilst also reducing environmental impact, enabling cost savings due to shared infrastructure and permitting procedures, and creating additional socio-economic benefits for the larger coastal region. This study aims to identify barriers and enablers to the implementation of multi-use in offshore windfarms in the Dutch North Sea and explores its implications for Dutch marine spatial planning processes. The Inter-Institutional Gap framework is adopted to explore formal and informal institutions on multiple scale levels and allows for cross-examination of those institutions.

The findings show that legally multi-use implementation is enabled through formal institutional laws, regulations and practices. Still, informal institutionalized practices, such as a low-risk and hesitant attitude of OWE developers, a lack of offshore knowledge and experience and a lack of communication between developers and potential multi-users, hinder multi-use implementation. Overall, the results of this in-depth case study indicate the existence of an institutional void between formal laws and regulations and informal institutionalized practices and suggest the need for greater regulatory involvement by the government. For an efficient marine spatial planning practice where a future in which windfarms dominate the North Sea is prevented, the effects of informal institutionalized practices on formal governmental laws and objectives need to be recognized and dealt with.

Key concepts: Marine Spatial Planning; multi-use; offshore wind energy; inter-institutional gaps; ocean governance; institutional arrangements.

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List of abbreviations

CoP	Community of Practice
EEZ	Exclusive Economic Zone
EU	European Union
GW	Gigawatts
IAD	Institutional Analysis and Development
IDON	Interdepartmental Directors Consultation North Sea
IIG	Inter-institutional gap
IOC	International Oceanographic Commission
Ministry of ANFQ	Ministry of Agriculture, Nature and Food Quality
Ministry of EA	Ministry of Economic Affairs
Ministry of EAAI	Ministry of Economic Affairs, Agriculture and Innovation
Ministry of EAC	Ministry of Economic Affairs and Climate
Ministry of EAC	Ministry of Economic Affairs and Climate
Ministry of IAKR	Ministry of Internal Affairs and Kingdom Relations
Ministry of IE	Ministry of Infrastructure and Environment
Ministry of PHSPEM	Ministry of Public Housing, Spatial Planning and Environmental Management
MSP	Marine Spatial Planning
NIMBY	Not in My Backyard
NZO	Noordzeeoverleg (North Sea Consultation)
OWE	Offshore wind energy
RvO	Rijksdienst voor Ondernemend Nederland
SES	Social-Ecological System
TSP	Terrestrial spatial planning
UNCLOS	United Nations Convention on the Law of the Sea

List of translations

Coalition Agreement	Coalitieakkoord
Energy Agreement for Sustainable Growth	Energieakkoord voor Duurzame Groei
National Climate Agreement	Nationaal klimaatakkoord
Nature Protection Act	Wet Natuurbescherming
North Sea Agreement	Noordzeeakkoord
The Code of Conduct to Safely Sail through Windfarms	Gedragcode voor veilig varen door windparken
Water Act	Waterwet

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1| Introduction

1.1| Increasing pressures on the North Sea

From prehistoric times up until today, water has been a constant factor in human life. Many human settlements developed along coastlines, using oceans and rivers for transportation of goods (Heidbrink, 2012). The North Sea also carries with it a long history. For instance, the Hanseatic League connected the North Sea to the Baltic Sea and functioned a popular shipping route for merchants trading salt, herring, timber and beer (Heidbrink, 2012). Many centuries later, the North Sea remains one of the busiest seas worldwide (Halpern et al., 2008) and is utilized for many different functions. Globally, about 40% of the population lives within 100 kilometers from the shoreline and about 350 million jobs are linked to the oceans (UNEP, 2016). Aside from land-based activities affecting the ocean, an increasing amount of marine activities is impacting the ocean as well. This includes marine activities such as fisheries, defense areas, aquaculture, oil platforms and marine protected areas. More recently, tourist traffic and construction activities for windfarms and other coastal structures are increasing (OSPAR, 2010). Additionally, the North Sea is home to some of the busiest shipping lanes globally, with maritime transport only growing further (OSPAR, 2010). Within the entire European Union (EU), about 4 million people are employed in this *blue economy* (EC, 2019). This economic dependence on the marine environment only further intensifies ocean use. Subsequently, the oceans have become politically important to us as well (Emeis et al., 2015). If we want to continue benefiting from its resources, there is a need for a sustainable form of ocean management. This needs to happen sooner rather than later, as changed ecological and physical conditions of the ocean are already emerging (Ritchie & Ellis, 2010). It shows us the spatial limitations of the marine environment and the need for careful and conscious planning.

Marine Spatial Planning (MSP) emerged in the 1980s in Australia's Great Barrier Reef as a zoning tool for environmental protection (Day, 2002). Back then, it did not lead to much debate on ocean zoning in Europe. Compared to the current marine spatial plans which are geared towards the achievement of multiple objectives, the Australian concept was very different in character, as marine conservation was its primary goal (Ehler et al., 2019). In Europe, the approach only really took off in 2007, through the EU *Integrated Maritime Policy* (Ehler et al., 2019). The policy identified three areas of major importance, including the adoption of MSP to contribute to a sustainable decision-making practice (EC, 2007). This was followed by the 2008 *Roadmap for Maritime Spatial Planning* (EC, 2008), eventually leading to the adoption of the *Maritime Spatial Planning Directive* in 2014 (EC, 2014). Nevertheless, there is still a considerable debate about the exact nature of MSP (Ehler et al., 2019; Van Tatenhove, 2017); many different approaches and differences in implementation exist, partly depending on the various institutional contexts it is embedded in. A commonly used definition

of MSP by the Intergovernmental Oceanographic Commission (IOC) of UNESCO is as follows: “a process of analyzing and allocating parts of three-dimensional marine spaces to specific uses, to achieve ecological, economic, and social objectives that are usually specified through the political process” (Ehler & Douvère, 2007, p. 13). That is, MSP is a tool or instrument that helps planners and policymakers to distribute human activities in marine areas both over space and time, to manage to marine environment in a sustainable way.

Whereas MSP is supposed to provide planning with an integrated and holistic tool for ocean use, research has shown it is often too focused on achieving sectoral objectives (Jones et al., 2016; Schupp et al., 2019). Particularly in a busy marine area such as the North Sea, which is subject to a diversity of pressures (Halpern et al., 2008), multifunctional use of space may be a way to move beyond this sectoral viewpoint towards a more sustainable marine management practice. By allocating more than one use to a specific area, planners are automatically required to consider implications for the respective sectors.

1.2| The case study – multi-functional offshore windfarms

Building further on the concept of MSP, allocating multiple uses to the same geographic area is a promising approach contributing to a sustainable ocean management practice (Christie et al., 2014; Kannen, 2014; Schultz-Zehden et al., 2018; Schupp et al., 2019). The multi-use concept can be largely understood as the “*the joint use of resources in close geographic proximity by either a single user or multiple users*” (Schupp et al., 2019, p. 4). Since the North Sea is already a highly congested sea basin, competition for space is high. Hence, it is crucial that multi-use of ocean space is considered to manage the sea more efficiently.

The concept has seen a rise in popularity in the last decade, but many academics have focused on the compatibility of individual uses (Przedzimirska et al., 2018; Schultz-Zehden et al., 2018), identifying potential locations for multi-use (Gusatu et al., 2020; Yates et al., 2015), the design of multi-use platforms (Quevedo et al., 2013; Van den Burg et al., 2016), or the legal conditions and implications of multi-use (Taljaard & Van Niekerk, 2013; Wever et al., 2015). The MUSES project did identify challenges for implementing specific multi-use combinations (Schultz-Zehden et al., 2018), however focused on certain (parts of) sea basins and did not examine it from the national jurisdiction of or included any case studies in the Netherlands. Przedzimirska et al. (2018) even articulated that “describing drivers and barriers and identifying feasible policy solutions is essential for successful MU [multi-use] deployment in the future” (p. 8). This thesis addresses this knowledge gap by carrying out an in-depth case study exploring the institutional gaps and enablers in implementing multi-use in offshore windfarms in the Dutch North Sea.

In a way, using particular areas for multiple uses is already inherent in many marine spatial plans. For example, in the current Dutch marine spatial plan (see *Figure 1*), shipping routes, defense areas and Natura2000 areas overlap. However, various scholars show that MSP is in practice often carried out from the viewpoint of the respective sectors instead of a holistic perspective aiming to achieve shared objectives (Jones et al., 2016; Schupp et al., 2019; Taljaard & Niekerk, 2013). If marine planners adopt the implementation of multi-use areas as an objective, it implies the consideration of multiple sectors' interests. Therefore, by identifying the drivers and barriers to multi-use implementation, concrete guidelines to planning practice can be developed on how to overcome these challenges or further stimulate its implementation.

The already apparent multi-use in the Dutch MSP mostly relates to the allocation of space for moving objects, such as shipping routes and defense areas. Nonetheless, the North Sea is home to an increasing amount of fixed and static objects as well, such as oil platforms and offshore windfarms. The multi-use of moving uses is already inherent to the wide-open ocean due to the UN Convention on the Law of the Sea (UNCLOS). For instance, the convention stipulates a 'freedom of navigation' which allows all vessels to freely navigate wherever (UN General Assembly, 1982). However, multi-use of static marine uses is not as straightforward and not directly regulated under UNCLOS. For that reason, multi-use of a static marine use combined with a (non-)static use is of interest here. Particularly, the planning process surrounding the implementation of the static multi-use of offshore wind energy (OWE) in marine spatial plans is examined.

Turning to the sea for OWE development is increasing in popularity (Ashley et al., 2014); space on land is scarce and the 'not-in-my-backyard' (NIMBY) syndrome is much less common sea (Spiropoulou et al., 2014). Specifically, in a country like the Netherlands, the scarcity of space is a problem due to its high population density. To deal with the competition over space and meet the targets from the EU Renewable Energy Directive (EC, 2009), the Netherlands could benefit from implementing multi-use in OWE to efficiently manage ocean space. Allocating other uses to offshore windfarms has also received attention from academics (Di Tullio et al., 2017; Gimpel et al., 2015; Haslett et al., 2018; Smytch et al., 2015), to which this thesis contributes to.

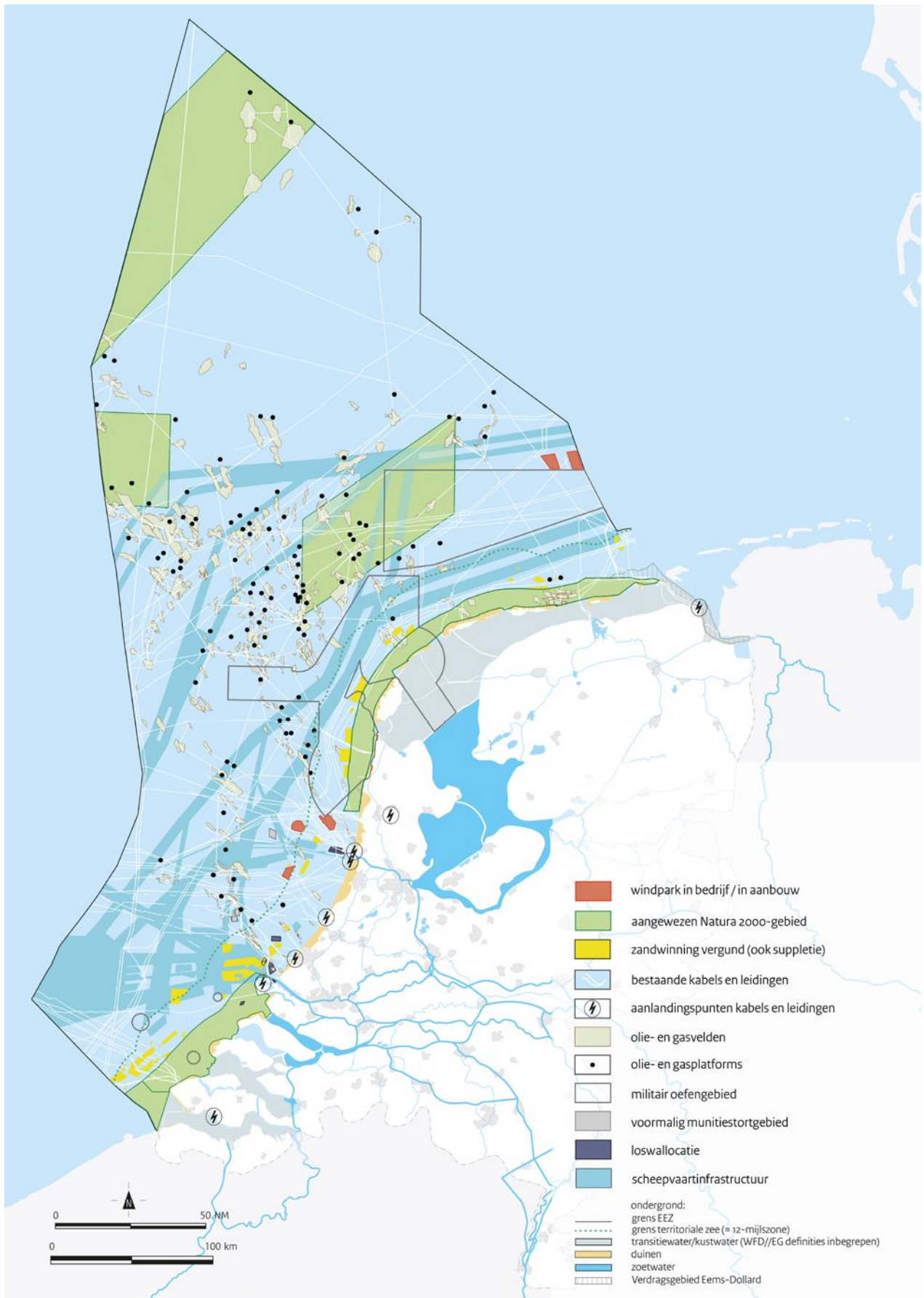


Figure 1 - A map of the Dutch Marine Spatial Plan (Source: Ministry of I&M and EZ, 2015, p. 40).

1.3| Research framework and outline

To evaluate the current state of multi-use implementation in the Dutch Exclusive Economic Zone (EEZ), this study adopts an institutional perspective. As both MSP and multi-use can be framed as a wicked problem *and* as addressing a wicked problem, without a single solution or stopping point, institutional theory helps to carry out a holistic examination of the case study. Therefore, it is important to include both formal institutions – i.e. explicit and written-down rules enforced by a defined set of actors with specific roles – and informal institutions – such as norms, rules and practices that originate from habit, verbal transfer or customary conduct (North, 1990). Hence, the laws and regulations addressing MSP are not solely responsible for the planning process and outcomes in practice. By incorporating an analysis of this informal ‘side’ in the planning process, the factors that influence the way formal rules are used are examined as well. Specifically, the Inter-Institutional Gap (IIG) framework is used to conceptualize the interlinkages of different rule-levels between formal and informal institutions. Though originally developed by Rahman et al. (2017) to study natural resource systems, it can provide interesting insights into the case of multi-use of OWE in the Dutch North Sea.

Overall, the aim of this study is to expand and evaluate current knowledge on multi-use in MSP. Moreover, the research adds to the general, European-wide MSP practice, where multi-use is becoming increasingly recognized, but not yet included in formal planning guidelines. More specifically, this thesis aims to find the underlying reasons for the current state of multi-use implementation in the Netherlands. The main research question and its sub-questions to-be answered are as follows:

What institutional barriers or enablers exist in the implementation of multi-use in offshore windfarms and what does it mean for the Dutch marine spatial planning process?

1. *What is Marine Spatial Planning and how does it address multi-use areas?*
2. *How is multi-use accounted for in Dutch marine spatial planning and offshore wind energy policy and how does it guide its implementation process?*
3. *What informal institutions are at play in the implementation of additional uses in offshore windfarms?*
4. *What do the relations between the formal and informal institutions at play mean for the implementation of additional uses in offshore windfarms?*

Considering the sub-questions and the institutional perspective, the thesis is structured as following. *Chapter 2* elaborates on the academic literature regarding MSP, multi-use and institutionalism and concludes with a conceptual framework which visualizes the interlinkages between the theoretical concepts. *Chapter 3* introduces the adopted research strategy and

design for data collection and analysis. Then, *Chapter 4* presents the findings according to Rahman et al.'s (2017) framework, after which *Chapter 5* discusses these findings and places them in the bigger academic debate. Finally, *Chapter 6* answers the research questions and includes a critical evaluation of the research process.

2| Theoretical framework

In a congested sea basin with an increasing number and intensity of sea uses, policies and ocean planning, which deal with several (groups of) societal actors, are crucial. All actors follow their own interests, but more importantly, look through different lenses at the same area and issues (Kannen, 2014), resulting in different user demands and actions. Therefore, there is a need for a holistic ocean planning practice, which integrates both ecological and socio-economic components within marine management. MSP is such a policy instrument bringing together multiple perspectives to manage anthropogenic uses of the seas (Kannen et al., 2010). To ensure a thorough analysis of policy and actors involved in multi-use in offshore windfarms, this chapter provides an overview of the academic literature on MSP and multi-use of ocean space. Also, it presents and justifies the institutional perspective and visualizes the interlinkages between theoretical concepts utilized in the conceptual model.

2.1| Marine Spatial Planning

2.1.1| *Marine or maritime spatial planning?*

In the last two decades, MSP has emerged as a means of managing (use of) national and international waters. The concept and practice of MSP established itself in Europe with the *Directive 2014/89/EU establishing a framework for maritime spatial planning* (EC, 2014). This directive legally binds member states to have an MSP implemented by 2021. Already evident here, are the differences in terminology used – i.e. *marine spatial planning* (Ehler & Douvère, 2009; IOC, 2020; Foley et al., 2010; Lester et al., 2013) or *maritime spatial planning* (Acker & Hodgson, 2008; EC, 2014; Schultz-Zehden et al., 2018). Looking at academic articles published, *Figure 2* shows that the prefix *marine* is more commonly used, Backer (2011) reaffirms this.

Many times, these terms are used interchangeably without much difference in meaning, with some authors even changing between the two (Douvère, 2008; Douvère & Ehler, 2011). However, one could also interpret the two concepts differently. The EU has differentiated between *marine* and *maritime* research, where *marine* refers to the environmental state of the oceans – such as marine organisms, ocean currents etc. – and where *maritime* points towards (innovative) solutions for exploiting the oceans and its resources (EU, 2008). The OECD (2016) understands the dichotomy in the following way: *marine* refers to “*of, found in, or produced by the sea, marine plants*” (p. 21) taking a marine biology perspective, whilst, *maritime* refers to “*being connected with the sea, especially in relation to seafaring, commercial, or military activity*” (p. 21).

It is important to examine the implications of this semantic difference for planning. Using the understandings presented by the EU, it can be stated that marine spatial planning has a larger environmental focus and relates mostly to the conservation of the oceans and its environment. In contrast, maritime spatial planning then takes a more economic perspective and focuses on the utilization and allocation of ocean space, often for human and/or commercial purposes.

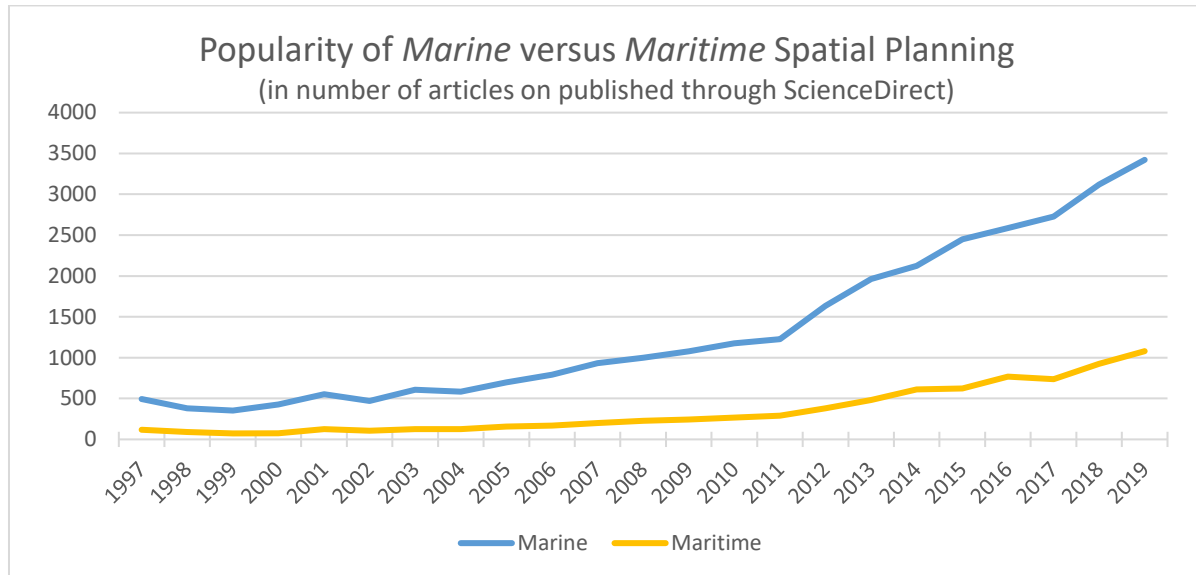


Figure 2 – Graph displaying the popularity of Marine versus Maritime Spatial Planning. Based on a ScienceDirect search of the terms ‘Marine Spatial Planning’ and ‘Maritime Spatial Planning’ on February 24th, 2020 (made by author).

Two widely used definitions of MSP exist. First, the IOC report *Marine Spatial Planning: a step-by-step approach toward ecosystem-based management*, defines Marine Spatial Planning as “a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that usually have been specified through a political process” (Ehler & Douvère, 2009, p.18). Further, the EU *MSP Directive* defines Maritime Spatial Planning as “a process by which the relevant Member State’s authorities analyze and organize human activities in marine areas to achieve ecological, economic and social objectives” (EC, 2014, p. 140). Comparing the two, they seem fairly similar. Yet, Ehler & Douvère (2009) are more specific in the sense that MSP is about both spatial and temporal distribution and the inclusion of the political process. With that – and as it is more commonly used internationally and popular among academics (Kidd & Ellis, 2012, p. 49; Papageorgiou, 2016, p. 18; Schachtner, 2017, p. 207) – the rest of the thesis uses the concept of *Marine Spatial Planning* and the definition as developed by Ehler & Douvère (2009). Adding to this definition, Ehler & Douvère (2009, p. 18) identify six characteristics of effective MSP: ecosystem-based, integrated, place-based or area-based, adaptive, strategic and anticipatory, and participatory.

As becomes clear from the elaboration above, MSP aims for an integrated and area-based ocean management. However, research shows that in practice the focus predominantly is on achieving sectoral objectives (Jones et al., 2016; Schupp et al., 2019). Also, MSP processes are often complex, fragmented, emerge on an *ad hoc* basis where top-down processes tend to dominate, and economic growth is still favored over marine conservation (Jones et al., 2016).

2.1.2 | *Marine and terrestrial spatial planning*

Whilst not originally developed by planners, MSP shows large similarities with and may seem inspired from the well-established practice of terrestrial spatial planning (TSP). One could even assume that it can be transferred to the sea with only slight adaptation. Still, it is often not regarded as a planner's task to look at the ocean. Also, it is not as simple as it sounds; MSP takes place in a substantially different context – more delicate, highly dynamic and not as well-defined – than TSP. The bio-physical characteristics of the marine environment are unlike anything on land. They are more dynamic and ecologically fragile (Kidd & Ellis, 2012). With this highly dynamic nature of the marine environment, comes a great uncertainty regarding the consequences of our human actions. Further, the very nature of the wide-open ocean space holds great possibilities for human activities on water (Jay, 2018; Kidd & Ellis, 2012). Still, the lower accessibility and the lack of permanent settlements on sea do limit the amount of possibilities to a certain extent. Lastly, MSP deals with issues that are inherently transboundary (Kannen, 2014), which is not the case necessarily for TSP. Many marine activities and resources cross borders and are mobile in nature (Van Tatenhove, 2017). This contrasts with TSP, where national administrative boundaries are often physically visible and can even limit mobility and cross-border use. In addition, the ecological processes at work also are transboundary in nature. Separate sea basins make up a part of the larger water system on Earth and changes in one, might have ramifications for ecological processes with global implications. Whereas the need for transnational policy coordination and regional coherence is widely acknowledged within MSP, domestic and sectoral interests are still put at the forefront (Hassler et al., 2018).

2.1.3 | *MSP as a wicked problem*

This highly dynamic, uncertain and multi-scalar context shows that MSP is confronted with problems that can be considered 'wicked' (Rittel & Webber, 1973; Jentoft & Chuenpagdee, 2009; Jentoft & Knol, 2014; Morf et al., 2019). Wicked problems, opposed to 'tame' ones, have no one definitive formulation, they are difficult to define and delineate from other and larger problems (Rittel & Webber, 1973). There is no stopping rule for wicked problems (Rittel, 1972).

They cannot be solved once and for all, but are continuously challenging planners and require constant attention. In that sense, problems can at best be ‘tamed’. Therefore, it is important they are examined in a holistic and thorough way – i.e. these problems need to be placed in their wider context. Jentoft & Chuenpagdee (2009) see the wicked problem as a governability issue in which issues of biological, economic and social nature are closely linked and their objectives stand in each other’s way. Simultaneously, wickedness increases due to conflicting concerns by proponents of biological, economic or social objectives, which are difficult to reconcile. Although marine conservation often seems to be of high priority, any resource utilization may damage marine ecosystems (Jentoft & Chuenpagdee, 2009). Planning ocean space is also wicked because planners operate within limits that are uncertain – i.e. threshold levels after which ecosystems cannot continue to exist in current form are insufficiently understood for planners to know when to intervene.

To address the wicked problems that MSP must deal with, Jentoft & Knol (2014) and Morf et al. (2019) recognize the need for stakeholder involvement. As stakeholders perceive problems in different ways, negotiation is needed to reach decisions or compromises when agreement is not attainable. The area-based and integrated nature of MSP implies that multiple interests need to be considered when developing marine spatial plans. This makes MSP a wicked problem in itself. As oceans become more congested, planners find themselves in situations where appointing more space for one user, means less for others (Jentoft & Knol, 2014). Appropriate allocation of space then requires negotiation and cooperation among different user groups. That way, the wicked problem of MSP is two-fold; both the problem addressed by MSP as well as the practice of MSP itself are deemed wicked.

To address this wickedness, aligning institutional arrangements used by stakeholders in a holistic manner is critical. They service as instruments for human cooperation and structure human interaction (North, 1990). Particularly for these wicked problems, it is not sufficient to solely address policy or formal processes of stakeholder involvement; the wider context and informal practices also play a considerable role. Gray & Gill (2009) suggest tackling wicked problems holistically by adopting an institutionalist perspective in policymaking. Carey et al. (2018) call for a balance between formal institutional change and informal institutionalized practices. However, one can image that this is easier said than done in this case of a wicked problem of conflicting objectives, whilst also dealing with the environmental consequences of resource utilization, uncertainty regarding the limits of the natural system and implications of one use for others. For that reason, studying MSP through an institutional perspective is appropriate, as it allows for thorough examination of formal and informal practices across multiple levels. After elaborating on multi-use in MSP, the following

sections build further on the need for an institutional perspective, as it helps to build the story towards the implementation of multi-use within offshore windfarms.

2.2| Multi-use in marine spatial planning

A multifunctional use of space is a promising idea to partly ‘tame’ the scarcity issue and the competition for space on the North Sea, whilst protecting the marine ecosystem, as explained later. Ample research has been conducted and various names have been given to the concept: co-location (Christie et al., 2014; Yates, 2015), co-existence (Kyriazi et al., 2016), multi-functional (Spijkerboer et al., 2020), or multi-use (Buck & Langan, 2017; Flikkema & Waals, 2019; Gusatu et al., 2020; Schultz-Zehden et al., 2018; Schupp et al., 2019). Part of the literature however refrains from naming the practice or examines only one potential combination of uses, such as offshore renewable energy and nature conservation (Ashley et al., 2014; Haslett et al., 2018; Spiropoulou et al., 2014), decommissioning options for offshore wind energy (Smyth et al., 2015), or offshore windfarms and aquaculture (Gimpel et al., 2015; Di Tullio et al., 2017). The term multi-use seems to be the most popular term and can be understood as “*the joint use of resources in close geographic proximity by either a single user or multiple users*” (Schupp et al., 2019, p. 4). By consistently using only one term throughout this thesis, any confusion regarding the readers’ perceptions of the different terminology is prevented.

Several benefits of ocean multi-use exist. Aside from the more efficient use of ocean space and resources, it allows planners to concentrate uses in one area and save other areas for future generations (Schultz-Zehden et al., 2018). More specifically, the spatial efficiency can lead to a reduced footprint and a reduction of losses in terms of ecosystem services (Kyvelou & Ierapetritis, 2019). Also the private sector can benefit from the multi-use as it can generate cost savings through the shared planning, legal and permitting procedures, and through reduced maintenance costs because of shared infrastructure, logistics and supply lines (Gimpel et al., 2018; Krause et al., 2011; Schultz-Zehden et al., 2018). Moreover, socio-economic benefits apply for the larger coastal region (Schultz-Zehden et al., 2018). For example, for the multi-use of offshore wind farm and tourism, Schultz-Zehden et al. (2018) show that local communities can benefit from it in the form of additional jobs and income from the windfarm. Moreover, in a case study on Xiamen, China, Peng et al. (2006) identified that ocean zoning can resolve major use conflicts, promote growth and enhance efficiency in marine industry sectors.

These benefits are recognized by the EU, as illustrated by the funding of several European-wide research projects on the topic (Kyvelou & Ierapetritis, 2019), including

MERMAID (2014), TROPOS (2014), H2Ocean (2012), and MA RIBE (2016), Space@Sea (2020) (Flikkema & Waals, 2019; Schultz-Zehden et al., 2019). Recently, the MUSES project (2018), funded under the EU Horizon2020 program, specifically addressed multi-use implementation in Europe identifying suitable multi-use combinations and challenges for implementation (Schultz-Zehden et al., 2018).

2.2.1 | A typology of multi-use

Schupp et al. (2019) developed a typology of ocean multi-use, as displayed in *Table 1*. The following section briefly explains the dimensions behind the typology as they are useful in exploring the current situation of multi-use implementation in the Netherlands.

Table 1 - Typology of ocean multi-use with descriptions given for each identified type (Source: Schupp et al., 2019, p. 5).

Type	Dimensions				Description
	Spatial	Temporal	Provisioning	Functional	
<i>Type 1:</i> <i>Multi-purpose/multi-functional</i>	X	X	X	X	Takes place in the same area, at the same time, with shared services and core infrastructure
<i>Type 2:</i> <i>Symbiotic use</i>	X	X	X		Takes place in the same area, simultaneously, and peripheral infrastructure or services on sea or land are shared.
<i>Type 3:</i> <i>Co-existence/co-locations</i>	X	X			Take place in the same place and at the same time.
<i>Type 4:</i> <i>Subsequent use/repurposing</i>	X				Takes place in the same ocean space, but subsequently.

The *spatial dimension* sees the ocean space as three-dimensional. Uses are connected when their occupied spaces overlap. The *temporal dimension* refers to the time frame in which the marine activities take place. If uses take place simultaneously, we can speak of multi-use. If the uses take place subsequently, there is no connection. The *provisioning dimension* includes all uses that service and support the main function of a use. For example, a combination of uses here takes the form of sharing these services and/or their financial burden. Sharing these services can result in a trade-off between the users, i.e. it might limit other

activities. The *functional dimension* looks at the main function of a use, for example renewable energy generation or aquaculture for seafood production. A connection of uses takes the form of a direct linkage of one function to another. Through these dimensions, Schupp et al. (2019) end up with 4 types of multi-use. The types that Schupp et al. (2019) identify, vary between the limited view of repurposing and on the other end, a ‘true’ multi-functional use where several marine activities take place in the same area, at the same time, and employ shared services and a core infrastructure. *Table 1* shows these types and provides a description for each.

Based on this typology, I build further on the previously presented definition of multi-use by adding the temporal dimension. This is because this research specifically examines the potential combined use of offshore windfarms during its operational phase. Thereby, the construction and decommissioning phases, and previous and later uses of the same geographical area are largely outside the scope of this study. The decommissioning phase has received considerable interest already (Smyth et al., 2015; Topham & McMillan, 2017), other phases may present interesting opportunities for further research.

Therefore, the operationalized definition of multi-use becomes as follows: *the simultaneous and joint use of resources in close geographic proximity by either a single user or multiple users*. The focus is on what Schupp et al. (2019) call a Type 3 co-location/co-existence. However, when critically reflecting on Schupp et al.’s (2019) typology, a question arises regarding the ‘order’ of the typology. Can multi-use not be observed with only the provisioning or functional dimension being present? That is, can just using shared services and/or the same core infrastructure also be deemed a degree of multi-use? The answer is negative, because a functional multi-use implies a shared location. For instance, using the sub-surface area of an offshore wind turbine for aquaculture, implies that the uses take place at the same location. Therefore, this study understands that the provisioning and functional dimensions can be higher ambitions of co-location, but are not required nor sufficient to coin something a multi-use area.

Schupp et al.’s (2019) typology understands multi-use as an umbrella term that covers a range of use combinations of ocean space. The concept is defined according to the distinction between “exclusive resource rights” and an “inclusive sharing of resources by one or more users” (Schupp et al., 2019, p. 4). Another typology differentiates between the time of development of multi-uses and identifies two types (Przedzimirska et al., 2018). First, a *joint development of uses* can take place, i.e. two or more combined uses simultaneously enter planning and licensing phases. Second, a *staggered development of uses* occurs when one use is already in place and a new use is being planned or considered at the same geographical location. By researching opportunities for multi-use development in ten sites in European seas, Bocci et al. (2019) found that a majority referred to a staggered multi-use development. The

present study looks at the Dutch implementation of multi-use. Whereas both scenarios regarding time of development fall within our operational definition of multi-use, they are not studied individually as it is not the main focus of the study and to prevent greater complexity. Still, the gathered data may show interesting implications of the time of development for multi-use implementation.

Still, Schupp et al.'s (2019) typology restricts itself to the legal and formal aspect of exploitation rights of different activities and actors. It does not refer to the more informal side of multi-use, i.e. the cooperative models and interactions of stakeholders. To plan for and implement multi-use of offshore windfarms it is crucial that stakeholders agree on or reach compromises to both use the same geographical area. The present study carefully treads into that subject by examining formal and informal institutional components on multiple levels. After delving into the multi-use of offshore windfarms in the following section, the institutional perspective is discussed in *Section 2.3*.

2.2.2 | The multi-use of offshore windfarms

Many potential combinations for multi-use exist. *Figure 3* presents an overview of potential multi-use combinations and their compatibility. The focus is here on the spatial compatibility and it does not consider other socio-economic or aesthetic criteria. As illustrated, ambiguities (shown in blue) exist between the different studies. For instance, Kannen (2014) deem offshore windfarms and fisheries incompatible, whereas Buck & Langan (2017) state that the combination is feasible. Naturally, multi-use is not limited to only these combinations and to the combination of just two uses.

When looking at OWE, *Figure 3* below shows compatibility with pipelines and cables, tourism, aquaculture and nature conservation. There are diverging results for the multi-use of offshore wind energy and fisheries. Other research even shows the three-fold compatibility of offshore windfarms, environmental protection and tourism (Schultz-Zehden et al., 2018). More authors elaborate on potential multi-use combinations. Gusatu et al. (2020) found that for the Netherlands there is medium potential for offshore windfarms to co-exist with fisheries, marine protected areas, local shipping routes, and oil and gas installations. Gee et al. (2006) largely agree with this, but additionally argue that offshore windfarms are also compatible with cables, ports, coastal service centers and coastal protection. Schultz-Zehden et al. (2018) show preferred multi-use combinations for offshore wind are tourism, fisheries and aquaculture (Schultz-Zehden, 2018).

	Wind energy	Fisheries	Pipelines and cables	Tourism	Shipping	Sediment extraction	Oil and gas exploration	Dumping zones	Aquaculture	Nature conservation
Wind energy		Blue	Green	Green	Blue	Red	Red	Red	Green	Green
Fisheries	Blue		Orange	Green	Blue	Orange	Green	Orange	Red	Green
Pipelines and cables	Green	Orange		Green	Blue	Red	Red	Red	Green	Red
Tourism	Green	Green	Green		Green	Green	Green	Green	Green	Green
Shipping	Blue	Blue	Blue	Green		Blue	Red	Blue	Red	Green
Sediment extraction	Red	Orange	Red	Green	Blue		Red	Red	Red	Blue
Oil and gas exploration	Red	Green	Red	Green	Red	Red		Red	Blue	Green
Dumping zones	Red	Orange	Red	Green	Blue	Red	Red		Red	Blue
Aquaculture	Green	Red	Green	Green	Red	Red	Blue	Red		Orange
Nature conservation	Green	Green	Red	Green	Green	Blue	Green	Blue	Orange	

Figure 3 - Feasibility of multi-uses combining two uses (made by author). Based on research by Holm et al. (2017), Przedzimirska et al. (2018), and Kannen (2014). Note: the color blue was given in two instances: when all three studies stated a different result (incompatible, compatible, and conditionally compatible/in the near future compatible); or when one or two studies stated (conditional) compatibility and one or two stated incompatibility. The color red was given when all studies indicated incompatibility. The color orange was given if at least two of the studies stated conditional compatibility and the third studied stated a similarly positive compatibility, or if all three studies stated conditional compatibility. The color green was given when all studies indicated compatibility, or if one of three stated conditional compatibility.

Having discussed the general benefits of multi-use previously, this section briefly goes into the benefits of multi-use combinations of offshore windfarms. For the combination of offshore windfarms and aquaculture, Röckmann et al. (2017) identify the benefit of ‘eco-facilitation’. This refers to the improvement of biodiversity and production, for example by offering more available food and shelter, which in turn attracts more flora and fauna. Kyvelou & Ierapetritis (2019) describe further benefits of this multi-use combination, including additional income for the region, potential cost reduction by co-use of infrastructure and maintenance costs and reduced environmental impacts compared with nearshore aquaculture. Nevertheless, challenges exist too, including potential detrimental impacts on the marine environment, conflicting views on favorable uses or non-uses, and limited know-how of aquaculture farming (Kyvelou & Ierapetritis, 2019).

Similar to the two-fold wickedness of MSP, it can be argued that multi-use also is a wicked problem in itself. For instance, it deals with the integration of various sectoral objectives as does MSP, but these uses are also positioned at the same location which intensifies the impacts on each other. The integration of sectoral objectives is thereby made more difficult. Przedzimirska et al. (2018) identified a trend that in European sea basins, already dominant sectors strongly influence multi-use development. For instance, in the Mediterranean, tourism was prioritized due to the sea basin-wide importance, but research suggest that multi-use of offshore wind is also highly feasible (Przedzimirska et al., 2018). This thesis adopts a combination of these two perspectives of wickedness – i.e. multi-use is a

solution to the increasing competition for scarce space on the North Sea, but has to be dealt with carefully to avoid falling victim to sectoral objectives such as prioritizing one use over or at the expense of the other.

As stated in *Section 2.1.3*, coordination of institutional arrangements adopted by stakeholders is crucial in multi-use implementation. Schultz-Zehden et al. (2018) acknowledge this and have found stakeholder perceptions to be major barriers to multi-use development. Institutions act as instruments for human cooperation and thereby provide a stable structure for human interaction (North, 1990). Hence, studying institutions related to multi-use is of special significance, as coordinating different ocean uses and users is a critical element of implementation within MSP. It is thereby of great interest to see how laws, policies and regulations interact with the informal institutionalized practices and what this means for implementation.

2.3| An institutional perspective

To analyze the implementation of multi-use in the MSP process in the Dutch North Sea, an institutional perspective is adopted. Much has been written about institutionalism and many authors have applied it to natural resource management (Acheson, 2006; Ananda & Proctor, 2013; Rahman et al., 2019; Sokile et al., 2003). As stated previously, aligning institutional arrangements is crucial to combine sectoral objectives of various user groups (*section 2.1.3*) and that users are on the same page regarding the multi-use (*section 2.2.1*). Aside from formal legislation, it is thereby critical to understand the informal components (Carey et al., 2018; Van Assche et al., 2012). Besides, these formal and informal institutional processes do not just take place on one level; more general decision-making at the highest levels of government has implications for the practical implementation of multi-use. Both the differentiation between formal and informal as well as the multiple scales, are elaborated on below. The choice for this institutional perspective was made for the following reason: the two-fold wickedness of implementing multi-use areas calls for a holistic approach in management. Using institutionalist thinking – i.e. a holistic approach which allows for examination of formal and informal institutions and their cross-scalar implications – contributes to a better understanding of the implementation of multi-use in offshore windfarms and allows for the identification of institutional enablers or barriers, as posed in the main research question.

First, it is important to elaborate further on the meaning of institutions. Institutions are the rules of the game in society, i.e. they are “*humanly devised constraints that shape human interaction*” (North, 1992, p. 477). Ostrom (2008) defines institutions as “*rules that humans use when interacting within a wide variety of repetitive and structured situations at*

multiple levels of analysis” (p. 24). Institutions, also commonly referred to as rules, can be subdivided in formal and informal (Healey, 2007; North, 1990). Formal institutions are explicit and written-down rules enforced by a defined set of actors with specific roles, such as laws, policies and their enforcement apparatus (North, 1992; Rahman et al., 2017; Van Assche et al., 2012). Van Assche et al. (2012) add to this that power creates formality, i.e. powerful actors have the capacity and ability to create these formal rules. Informal institutions are implicit, enforced within certain groups, and refer to a rule system that lacks any clear specification (Kingston & Caballero, 2009; North, 1990). Informal rules often originate from habit, verbal transfer, or customary rules or conduct (North, 1990; Rahman et al., 2017).

These formal and informal rules are engrained in human behavior and form their institutional frameworks. Healey (2007) states that these frameworks of norms, rules and practices structure the “interactional processes through which preferences and interests are articulated and made” (p. 64). Humans act according to these internalized strategies, expect others to adhere to them as well, and change their perceptions of those who do not act accordingly. This all is placed in a wider social context and all these internalized strategies together are part of larger processes. Informal institutions are by definition shared among groups of people and they do not take place in a bounded action space. Thereby, institutional frameworks originate from the interaction between formal and informal rules (North, 1992).

Ostrom (2005) states that these institutional frameworks form multi-layered, nested hierarchies of rules and therein recognizes three levels. *Operational rules* address practical, day-to-day decisions of individuals who are authorized or allowed to take these decisions (McGinnis, 2011; Ostrom, 2005). It includes more practical questions of when, where and how to act and what rewards or sanctions can be assigned to combinations of actions and outcomes (Ostrom, 1990). *Collective rules* affect these operational activities – i.e. as they determine who is eligible to participate and determine the specific rules through which operational rules can be changed (Ostrom, 2005). The difference between operational and collective choice rules is about the actual application of a right versus the determination of the right to be applied (Ostrom & Schlager, 1996). Lastly, *constitutional rules* are the highest level of the rule hierarchy. They set procedures under which the collective choice rules are formulated (Rahman et al., 2017). They define and determine who will take part in collective decision-making procedures. This includes the legitimization and constitution of what relevant collective entities will be involved in the collective or operational choice processes (McGinnis, 2011). These linkages among rules and related levels of analyses are shown in *Figure 4*.

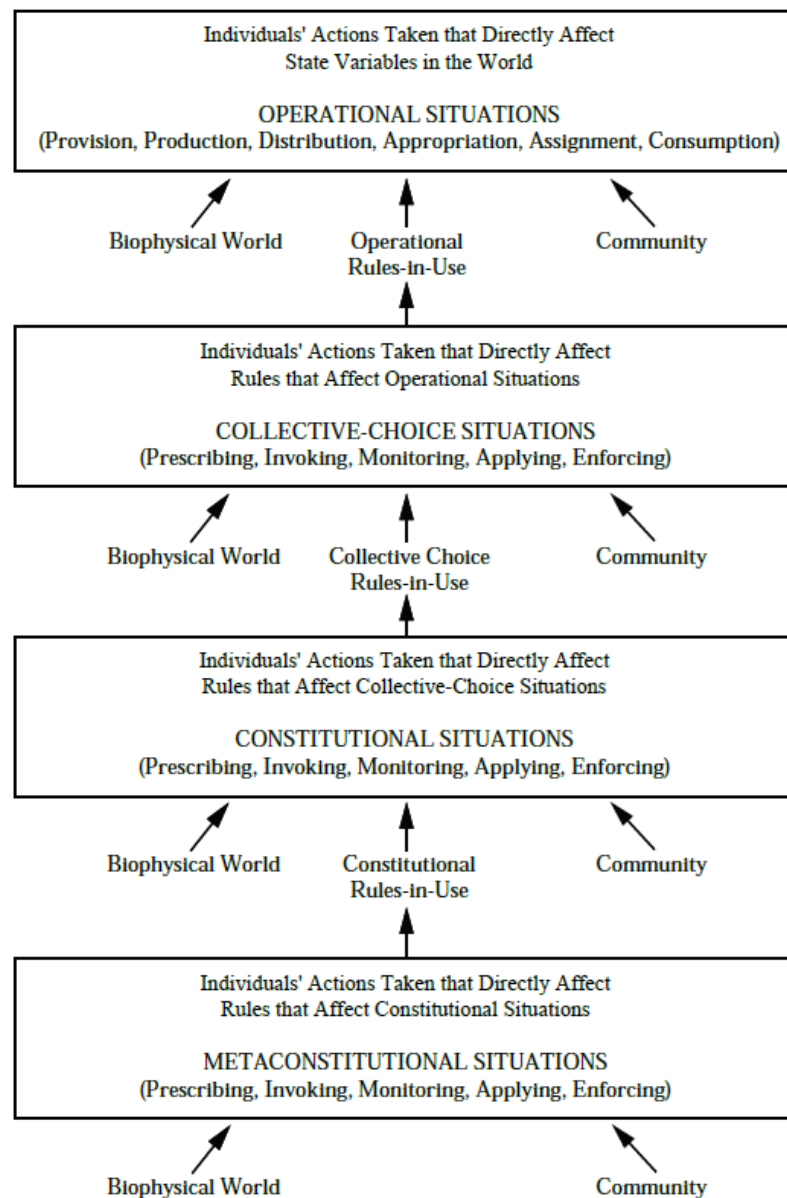


Figure 4 - Levels of analysis and outcomes (Source: Ostrom, 2005, p.59)

Moreover, it is of relevance to recognize that there is not one set of institutions that leads to optimal outcomes. Particularly in environmental management, practitioners need to realize that the environment acts in a non-linear, dynamic, and self-organizing way – i.e. the environment in itself is a wicked problem that cannot just be ‘tamed’. Therefore, the multiple objectives and spatial and temporal scales should not be ignored (Ostrom, 2008).

Overall, the institutional perspective is appropriate for researching implementation of multi-use in offshore windfarms, because it allows for a thorough analysis of formal and informal rules at play. Implementation is not only about the formal policies and laws which regulate it, but also about how informal rules influence the functioning of those policies. That is, it shows us if the implemented policies of the Dutch government enable or hinder implementation. This relates to the multiple levels of analysis, as formal rules exist on multiple

levels of analysis, thereby influencing both other formal and informal rules on 'lower' levels. Thus, to stimulate implementation of multi-use of OWE, formal and informal institutions at play need to be sufficiently understood, whilst considering the multiple levels of analyses. The following sections discuss several analytical frameworks and concludes by presenting one that meets both these requirements.

2.3.1 | Influential institutional frameworks

Within the intellectual community working on institutionalism, two analytical perspectives have been developed by Vincent and Elinor Ostrom, together with various other academics affiliated with the Workshop in Political Theory and Policy Analysis (McGinnis, 2011). First, the Institutional Analysis and Development (IAD) framework aims to understand how institutions operate and grasp the course of their change over time. The framework examines the structural variables that are, to a certain extent, present in all institutional arrangements, but whose values differ per type of institutional arrangement (Ostrom et al., 1994; Ostrom, 2011). As can be seen in *Figure 5*, the 'action situation' is at the core of the framework; it is the 'black box' where policy choices are made.

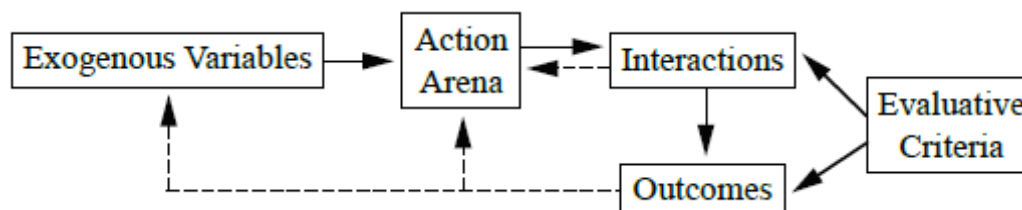


Figure 5 - Basic components of the IAD framework (Source: Ostrom, 2005, p.13)

The action situation is made up of working components that are dependent on particular exogenous variables called 'rules' (*Figure 6*). These rules can be understood as "shared understandings among those involved that refer to enforced prescriptions about what actions [...] are required, prohibited, or permitted" (Ostrom, 2011, p. 17). These rules are often interdependent, meaning that they are nested in another set of rules that in turn affect how the first set of rules can be changed (Imperial, 1999). This is explained in the previous section, where the (interlinkages between the) three levels of analysis are clarified (see also *Figure 4*). Ostrom (2011) differentiated between seven rules that influence the action situation. This differentiation is a useful classification tool for institutions at play in the action situation. An elaboration on all seven is included in *Appendix I*.

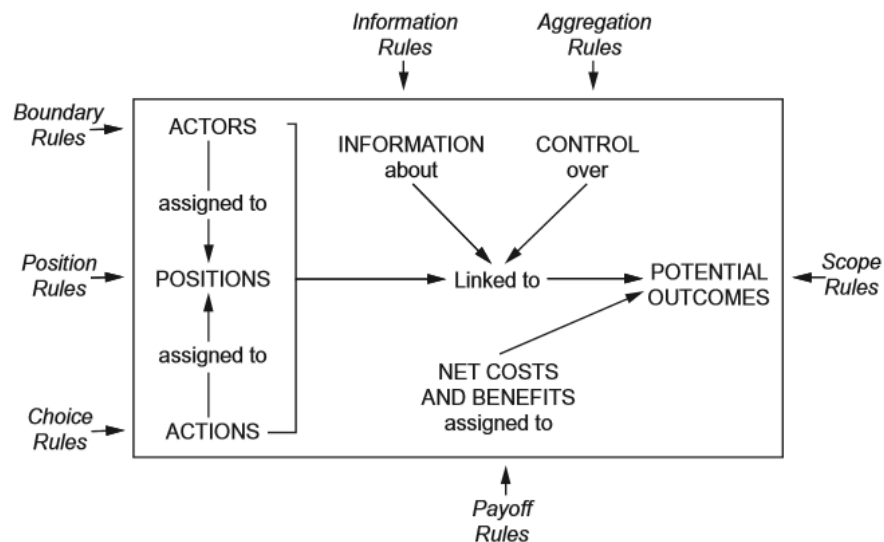


Figure 6 - The internal structure of an action situation and the rules that directly affect the elements (Source: Ostrom, 2011, p. 20).

The IAD framework is said to be a promising approach to examine institutions involved in implementing ecosystem-based programs such as MSP (Imperial, 1999; McGinnis, 2011). Among other reasons, the framework considers the wider context, it contains no normative bias – i.e. it does not presume that there is one institutional arrangement that leads to the ideal outcome – and it employs a variety of criteria to identify strengths and weaknesses of specific institutional arrangements (Imperial, 1999). Still, some arguments against using this framework exist too. Its original aim was to simplify institutional analysis, but over time the framework became quite complex in itself (McGinnis, 2011). Moreover, the framework pays insufficient attention to relevant social and ecological variables affecting social interactions (Cole et al., 2014).

Partly based on these shortcomings, Ostrom (2007) developed the Social-Ecological System (SES) Framework that equally considers the biophysical and ecological foundations of institutional arrangements (McGinnis, 2011). It is a framework for analyzing interactions and outcomes between human groups and their environment (i.e. linked SES's), nested in a series of tiers, using categories that are applicable to diverse resource sectors, geophysical regions, political entities, and cultural traditions (Ostrom, 2007). The framework, as displayed in *Figure 7*, also uses the levels of rules-in-use similar to the IAD framework.

Its overarching purpose is to situate governance mechanisms in natural resource management within the wider concept of social-ecological systems. Whereas the SES framework did solve the issues of the IAD framework, it fails to consider the ways in which different variables interact to generate specific outcomes, or even predict or prescribe certain sets of variables to change these systems over time (Cole et al., 2014). In addition, Ostrom's

SES framework insufficiently considers processes of social and political change (Cote & Nightingale, 2012; Rahman et al., 2017).

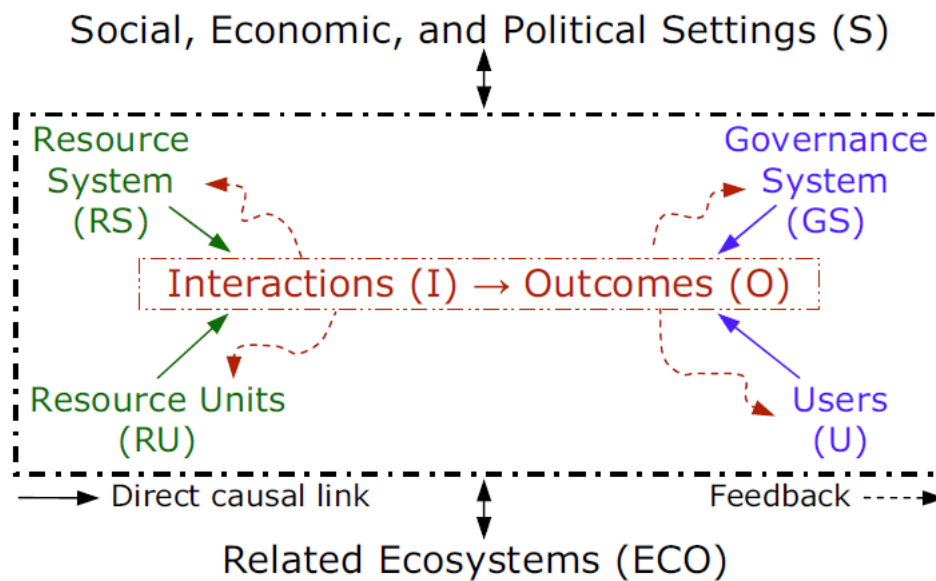


Figure 7 - A multitier framework for analyzing an SES (Source: Ostrom, 2007, p. 15182).

Reflecting on both frameworks, they fail to explicitly consider the distinction between formal and informal institutions and their interplay. Particularly in the case of multi-use in MSP, this is essential as formal laws, policies and regulations do not solely determine the degree of implementation; an analysis of informal institutions shows what their interplay with formal rules means for multi-use implementation. Therefore, the following section presents a framework that meets both these requirements and contributes to the identification of institutional enablers or barriers, as posed in the main research question.

2.3.2| The Inter-Institutional Gap Framework

Based on the two institutional analytical frameworks by Ostrom as presented above, Rahman et al. (2017) have developed the Inter-Institutional Gap (IIG) framework (Figure 8). With this framework, they include an analysis of multi-level governance mechanisms as well as the interaction between formal and informal institutions. An IIG is defined as “an absence of agreed upon ‘rules of the game’ between autonomous institutional regimes in a social-ecological system” (Rahman et al., 2017, p. 827). It builds further on the IAD framework by addressing the interconnectivity of rule-level changes between individual actors and groups, as well as across the levels of analysis (Rahman et al., 2017). Thereby, it aims to improve the understanding of the ‘black-box’ which is the action situation of institutional analysis (Rahman et al., 2017). The IIG framework is also embedded in the wider SES framework which requires

the analysis to start with a consideration of the historic and place-specific social, economic and political peculiarities (Cote & Nightingale, 2012).

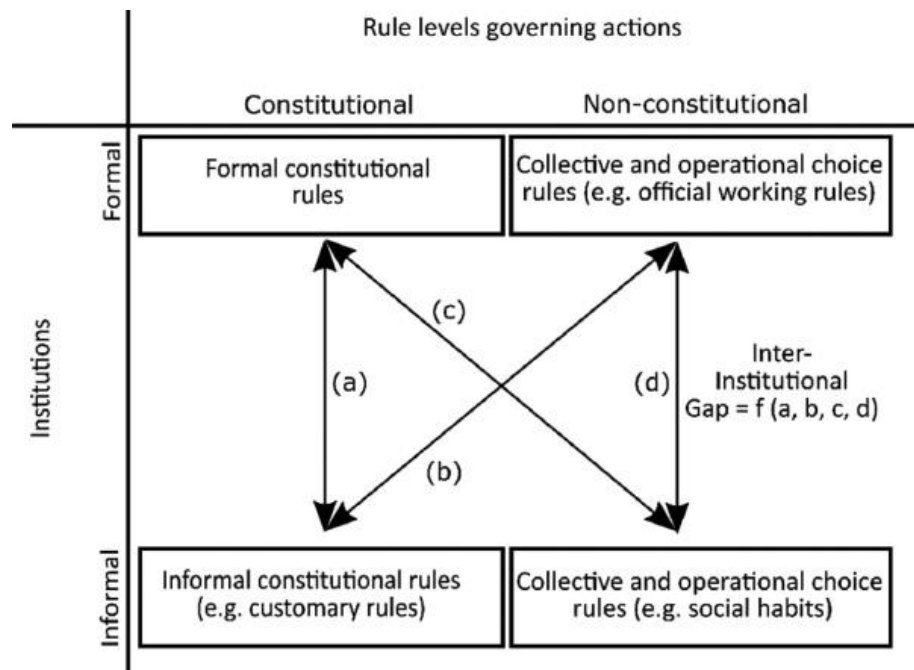


Figure 8 – The Inter-Institutional Gap (IIG) Framework (source: Rahman et al., 2017, p. 832).

The framework is based on the distinction between formal and informal institutions and further distinguishes between constitutional and non-constitutional rules. Both the formal-informal distinction, as well as the multiple levels of analyses are explained previously. Constitutional rules provide direction for the overall institutional structure and thereby helps to establish norms that define the extent to which actions may be taken at lower levels (Rahman et al., 2019). The latter is a combination of the collective and operational choice rules as developed by Ostrom (1990; 2005) and explained earlier in *section 2.3*. These generally operate under constraints imposed by the higher rule levels. Rahman et al. (2017) have combined these for analytical clarity – they are similar in terms of degree of rigidity and enforcement – and as there are no relevant theoretical concepts that precisely examine the gaps between these two types of rules. Regarding the fluidity of the two rule levels, Rahman et al. (2019) deem the constitutional rules as more resistant to change compared to non-constitutional rules, as they represent the overarching regulatory structure. In other words, changes in the constitutional rules come with a higher transaction cost than the lower rule levels (Rahman et al., 2017). Taking these formal and informal institutions and their corresponding rule levels, Rahman et al. (2017) form them into an analytical framework that better captures the interplay between the formal and informal institutions.

The above differentiation of institutions is a useful first strategy to sort the institutions, however, it remains rather vague on how the institutions are identified. To further

operationalize and simplify the identification of the institutions according to the different types and scale levels, Ostrom's (2005) seven types of rules provide useful, as referred to in *Section 2.3.1* and presented in *Appendix I*. Not only does it help to uncover important authority relationships across scale levels, it also clarifies the links between specific rules at one level (Ostrom, 2005).

Moreover, the framework builds further on four already existing concepts, recognizes their limitations and links them to the inter-institutional gaps that are identified throughout an analysis. These four concepts are legal pluralism, institutional void, structural hole, and cultural mismatch. These concepts and their limitations are shown in *Table 2*.

Table 2 – Summary of the four concepts used in the IIG Framework (Based on Rahman et al., 2017, p. 829).

Concept	Problem addressed by concept	Limitations of concept
<i>Legal pluralism</i>	The co-existence of multiple sets of legal systems or constitutional choice rules.	Does not address the spinoff of multiple constitutional level rules into divergent rulemaking at subsequent rule levels.
<i>Institutional void</i>	A situation where there is a lack of accepted rules and norms to guide how the political process between formal and informal institutions operates and with an absence of agreed upon policy measures.	Lacks consideration of gaps at other rule levels than the collective rule level, which are associated with diverse rule-making interests.
<i>Structural hole</i>	When a network of two groups of actors (operating across formal and informal institutions) are not connected, but there is a third party which ties to both parties.	Fails to demonstrate the way in which this disconnect may originate from the absence of common understanding and rulemaking between operational actors.
<i>Cultural mismatch</i>	The lack of recognition by formal institutions of informal constitutional rules, associated with the ethnic diversity of groups in post-colonial societies.	Does not address how cultural differences can interfere with common understanding and rulemaking at other rule levels.

Figure 8 shows the inter-institutional gap as a function f of four possible interactional gaps that can occur. The gaps are now shortly explained with reference to the four concepts. Gap (a) appears when formal constitutional rules fail to recognize the current existing informal constitutional rules and their actions. For instance, this gap emerges as a result of differences between laws, policies and regulations set by the government and local norms, values and customs regarding resource use. A situation of legal pluralism can then be recognized. Gap (b) appears when formal collective and operational choice rules are formed without a correct

cultural understanding of informal constitutional rules. This materializes when governmental non-constitutional actors (e.g. planning practitioners implementing the policy) do not acknowledge local norms and values. They act solely according to the rules and thereby create an institutional void. Gap (c) links to the structural hole concept. This gap emerges when the formal non-constitutional choice rules are not adhered to by actors guided by informal non-constitutional rules. For example, non-state actors may organize themselves or consciously decide to disregard the rules and thereby staying outside of formal institutions. Lastly, gap (d) appears when the non-constitutional rules of formal institutions are at odds with the informal non-constitutional rules. As an illustration, this cultural mismatch may emerge from an inadequate public participation process within a formal non-constitutional rule enforcement process. After case analysis, Rahman et al. (2017) identify the degree of the gap either as *mediated*, *latent*, or *co-exist* as seen in *Table 3*. Relating this to our case, one can identify a ‘gap’ as either stimulating or at least not hindering implementation of multi-use or, to being a barrier for implementation.

Table 3 - Description of degree of gap in the IIG framework (Source: Rahman et al., 2017, p. 835-836)

<i>Degree of gap</i>	<i>Description</i>
Mediated	Formal rules exist for facilitating coordination between formal and informal actors.
Latent	Temporary mechanisms or rules (not incorporated into formal legal frameworks) exist for coordinating formal and informal actors, particularly as a result of the actions of boundary organizations.
Co-exist	Situation where no legal/negotiated settlement has been made for coordination among formal and informal actors based on their active involvement.

So far, this chapter justified the institutional perspective on the implementation of multi-use of offshore windfarms by showing the need for aligned institutional arrangements, consisting of both formal as well as informal institutions and their interaction, taking place on multiple levels of analysis. The IIG framework provides an analytical framework that allows for identification of so-called inter-institutional gaps. By coining these gaps as either mediated, latent or co-existent, they provide insights into institutional barriers or enablers in multi-use implementation. Naturally, the extent to which something is a barrier or enabler is not clear-cut. One could see them as falling on a spectrum (*Figure 9*), where, at one extreme, a fully mediated gap would constitute an enabling factor and, on the other extreme, institutions would solely co-exist without any interaction between them constituting a barrier for the implementation of multi-use of OWE in the Dutch North Sea. Still, this operationalization of the gap does not exclude the possibility that a gap may be mediated, but nonetheless hinders multi-use implementation.



Figure 9 - Spectrum of enablers and barriers related to Rahman et al.'s (2017) degrees of IIG (made by author).

2.4| Conceptual model

After a full elaboration of the theoretical concepts that lie at the basis of the study, a conceptual model is presented (*Figure 10*). The conceptual model is a visual representation of the theoretical concepts connected to the object of study. It starts by framing MSP and multi-use as wicked problems by themselves, as well as framing them as approaches that deal with wicked problems. Therefore, an institutional perspective was found to be appropriate.

Within the institutional perspective, two things were deemed important: the interaction between two types of institutions (formal and informal) which take place across two levels of analysis (constitutional and non-constitutional). Combining those two categorizations, an appropriate analytical framework was found in the IIG framework by Rahman et al. (2017). Within the framework, four types of IIG's can be identified by examining formal and informal constitutions on constitutional and non-constitutional levels. These IIG's are coined mediated, latent or co-existing and thereby show if they enable or hinder the implementation of multi-use of offshore windfarms. Therein, institutional barriers occur when the IIG shows “*an absence of agreed upon ‘rules of the game’*” (Rahman et al., 2017, p. 827) – i.e. the institutions co-exist alongside each other and do not address each other. For instance, certain institutional rules could be at odds with each other or be fully contradicting and thereby do not contribute to an appropriate resource management. Institutional enablers may occur when agreed upon rules are present: either institutions are latent, in which there are temporary mechanisms governing the interaction between the institutions, or institutions are mediated, in which there are formal rules which facilitate interaction between the institutions. Nevertheless, as stated above, the absence of a gap does not directly imply the presence of an enabler. The interpretation of the theoretical framework is further discussed in *Chapter 5*.

By studying the implementation of multi-use of offshore windfarms through the IIG framework, institutional barriers or enablers are identified and contribute to answering the main research question regarding the implementation of additional uses in offshore windfarms. The following chapter discusses the methodology adopted to study the implementation of multi-use in offshore windfarms in the Dutch North Sea.

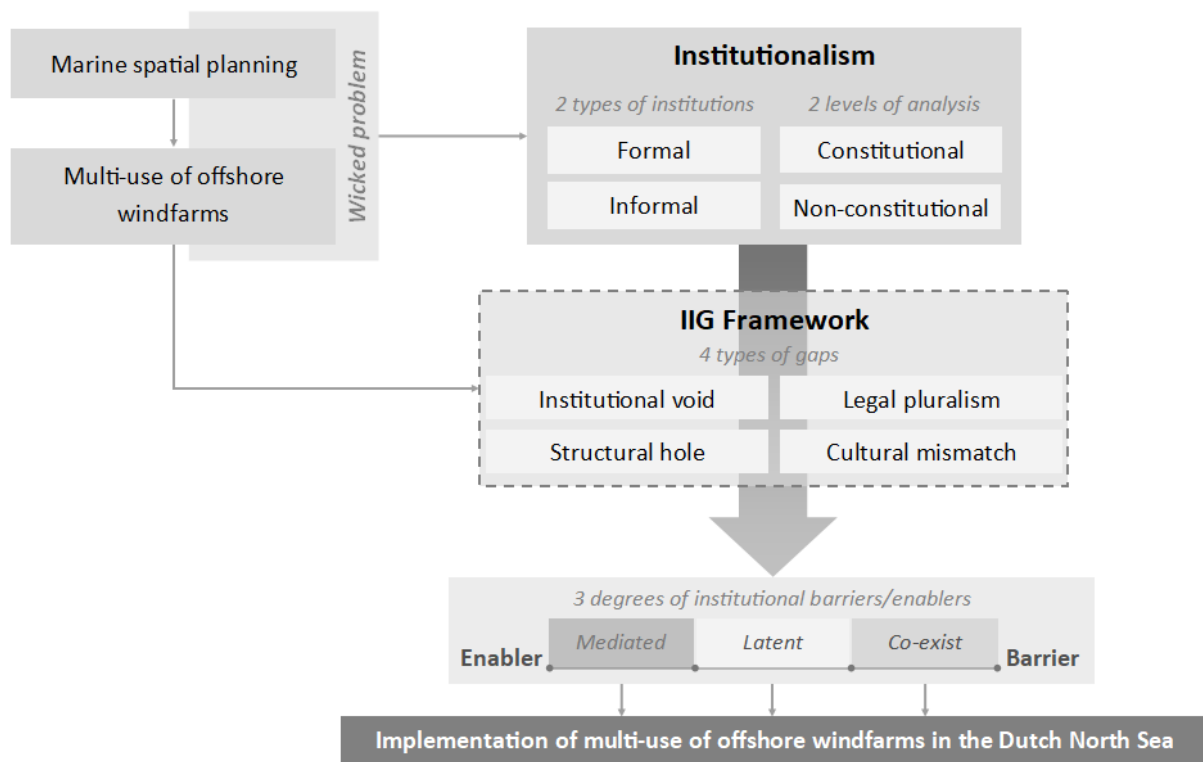


Figure 10 - Conceptual model of the study (made by author).

3| Methodology

After outlining the theoretical background of this thesis, the following chapter explains the methodological approach. It is directed at presenting a systematic and organized effort that helps to answer the main research question. The study examines the institutional components of the marine spatial planning process in the Netherlands and its implications for the implementation of multi-use offshore windfarms within that process. The following main and sub-questions are formulated:

What institutional barriers or enablers exist in the implementation of multi-use in offshore windfarms and what does it mean for the Dutch marine spatial planning process?

1. *What is Marine Spatial Planning and how does it address multi-use areas?*
2. *How is multi-use accounted for in Dutch marine spatial planning and offshore wind energy policy and how does it guide its implementation process?*
3. *What informal institutions are at play in the implementation of additional uses in offshore windfarms?*
4. *What do the relations between the formal and informal institutions at play mean for the implementation of additional uses in offshore windfarms?*

3.1| Research design

To identify the factors that influence the implementation of multi-use – specifically the underlying reasons of the case – this thesis adopts a *qualitative* research design. Adopting a qualitative approach contributes to a “*better understanding of social realities and to draw attention to processes, meaning patterns and structural features*” (Flick et al., 2004, p. 3). In contrast, using a quantitative approach would provide different insights resulting from largely numerical data (Muijs, 2011). Moreover, the adopted epistemological stance and theoretical perspective of a quantitative research approach typically understands reality as objective and independent of human consciousness (Frey, 2018; Gray, 2014). However, as this study looks at the formal and informal institutions surrounding the implementation of multi-use in offshore windfarms, human interpretation and subjectivity may play a significant role (see *Section 3.6*). Therefore, a quantitative approach is deemed less appropriate for the complex phenomenon under study.

Qualitative approaches are useful to gain new insights into issues where much is already known or in circumstances where relatively little is known previously (Strauss & Corbin, 1990). As shown previously, the latter is the case here. The qualitative approach allows the thesis to provide a cross-section of events, by uncovering the underlying institutional framework that

contributed to the current situation. Lastly, the choice for a qualitative approach is a logical one, as it allows for a holistic exploration of the wider context. The present study explores the underlying, institutional frame of the MSP process, and therefore cannot be taken out of its context.

Two more aspects of the research design need to be elaborated upon. First, the study uses a mixture of both deductive and inductive approaches. Starting with a theoretical basis (*Chapter 2*) allows for an appropriate basis to start the research and serves a pivotal function in the research design (Parkhe, 1993) by presenting an analytical framework upon which the following chapters build. Starting from scratch with a blank slate is “*neither practical nor preferred*” (Perry & Jensen, 2001, p. 1). Subsequently, a more inductive method is adopted – i.e. the gathered data guides the identification of certain themes relevant to the research questions (Mills et al., 2010). Specifically, this inductive perspective allows for institutions to emerge that impact the implementation of multifunctional offshore windfarms. Several authors have reaffirmed the complexity of genuinely separating inductive and deductive methods (Miles & Huberman, 1994; Popper, 1972; Richards, 1993), with Parkhe (1993) arguing for a “continuous interplay” (p. 256) between the two.

Second, the timeframe for the research is addressed. The study adopts a cross-sectional research strategy, which provides a ‘snapshot’ of the situation. Data is collected at one point in time (Salkind, 2010), instead of multiple observations carried out over a longer period in a longitudinal design (Yin, 2017). A cross-sectional approach is suitable for this research, as it explores the current state of affairs regarding multi-use implementation, in contrast to focusing on identifying changes over the years which would fit to a longitudinal perspective.

This research design underpins all research activities. Due to the time and money constraints and the broad research scope (i.e. multi-use in the Dutch MSP process), a single case study research is the most appropriate research method, elaborated upon in the next section.

3.2| Case study design

This research uses a single case study approach. Yin (2009) defines a case study as an “*empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident*” (p. 13). Case studies explore situations and issues where relations between factors may be uncertain or ambiguous (Gray, 2014). They can be adopted as both a quantitative *and* qualitative method (Dooley, 2002). Nevertheless, they are more strongly associated with the latter, as a qualitative method allows for generating multiple perspectives through multiple

data collection methods or through creating multiple accounts from one single method (Lewis, 2003). According to Gray (2014), case studies are particularly useful when there is no opportunity to control or manipulate variables, but still an interest in explanations and analysis of a certain situation. This all applies to the present study, which frames MSP and multi-use within MSP as a ‘wicked problem’ and requires a thorough and in-depth examination of the situation. Therefore, a case study is appropriate in this thesis. Still, the reliability, objectivity and legitimacy of this approach is not universally accepted. For instance, a single case study is not deemed useful for generalizing based on its findings (McLeod, 2010). It might however be useful in informing practice for other cases. Also, case study research can be particularly useful in addressing issues that involve complex interactions between different factors (McLeod, 2010, p. 158).

After providing a justification for the choosing a case study method, the following section delves deeper into the design of the case study. A single case study is chosen since the Dutch situation represents a unique case – i.e. the Netherlands is among the few countries that have largely stepped away from subsidized OWE. Whereas the government still subsidizes research, cables and their connection to the electricity grid, unsubsidized OWE is now the preferred option and is enabled in regulation (Minister of Economic Affairs, 2017). It remains to see whether multi-use is accounted for in this more mature OWE market. Exploring only a single case study allows for a deeper understanding and a rich description of the studied phenomenon (Dyer et al., 1991; Siggelkow, 2007).

Further, the study is designed as an embedded case study. That means that it focuses on sub-units within the larger case, contrary to a holistic case study which views the case as a complete entity in itself (Platt, 2007). The embedded nature of the case is two-fold, as visualized in *Figure 11*. First, the presented theoretical framework (*Chapter 2.3.2* and *Figure 7*) is an embedded case study by itself. All four to-be-studied institutional components, among which the relations are investigated, can be seen as sub-units. These sub-units are then again sub-divided into two themes: offshore wind and potential multi-uses with offshore wind. Relating it back to the theoretical framework, the study examines the policy on both themes to uncover the formal institutions at play and discerns their working in practice to uncover the present informal institutional rules.

As stated in *section 3.1*, the overall study adopts a mixture of deductive and inductive approaches. This fits well to case research, by relying on a theoretical basis for the study to define a framework through which data is gathered (*Chapter 2*), after which relationships are analyzed and identified in an inductive manner (Cavaye, 1996). The validity and reliability of this case study are ensured by explicitly discussing the operationalization of theoretical

concepts, using multiple data sources, and by generally being transparent about the research process (Gray, 2014).

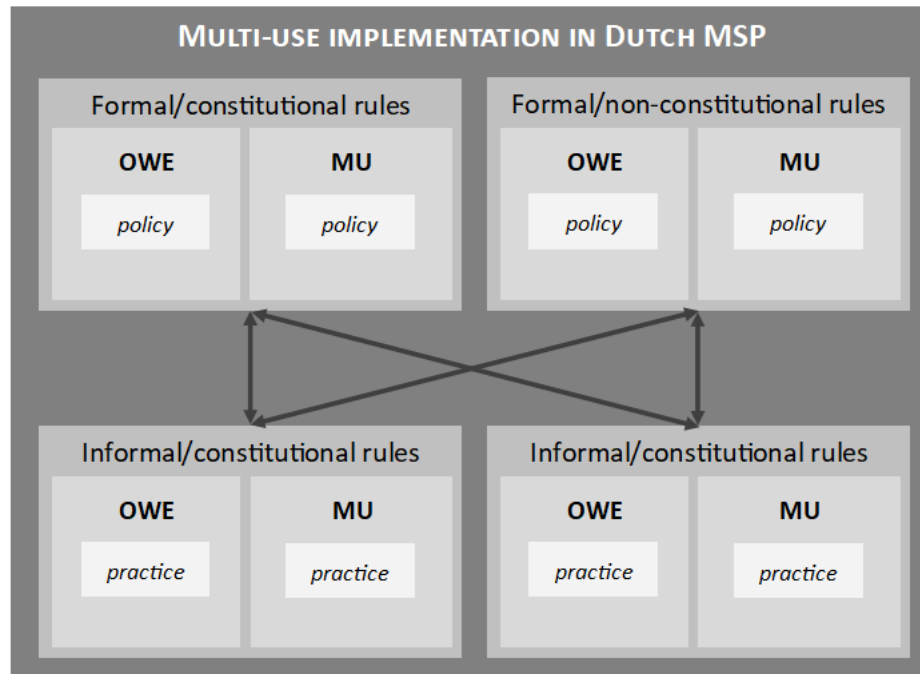


Figure 11 - Visualization of the embedded case study (made by author)

3.3| Case study selection and demarcation

The case study selected for this thesis is the implementation of multi-use in offshore windfarms within the Dutch MSP process. This choice is based on two reinforcing and increasing needs: the increasing competition for space on the North Sea and the preference to move wind energy offshore to maneuver the issue of public opposition (Halpern et al., 2008; Spiropoulou et al., 2014). Multi-use can be a solution to the increasing pressure on the limited available space. Besides the topical relevance, this geographical location of the case study was selected for practical reasons, such as easy communication and travel for data collection, as well as academic relevance, as no specific research has been done on the Dutch context so far. When discussing the Dutch North Sea, the study follows the administrative boundaries as stipulated by UNCLOS. For this EEZ, marine spatial plans must be created under the EU Marine Spatial Planning Directive by 2021 (EC, 2014). *Figure 12* shows the delineation of the Dutch EEZ, up to 200 nautical miles. As stated previously, the research adopts a cross-sectional research design. That is, the study focuses on the current situation regarding the implementation of multi-use in offshore windfarms in the Dutch EEZ.



Figure 22 - Dutch Exclusive Economic Zone on the North Sea (made by author; data source: Directorate-General for Environment, 2010).

3.4| Methods of data collection

Fitting to the adopted case study approach, multiple data collection methods are used; to carry out a holistic and meaningful inquiry into the Dutch case, in-depth and content-rich data

should be collected from multiple sources of information (Shoaib & Mujtaba, 2016). Including multiple data collection methods allows for the triangulation of data which strengthens the depth and breadth of the findings (Yin, 2017). The data is gathered through relevant documents and semi-structured interviews. *Table 3* shows the strengths and weaknesses of the chosen data sources.

Table 3 - Overview of the strengths and weaknesses of the chosen data sources (Based on Gray, 2014).

Data source	Strengths	Weaknesses
Documents	<p>Stable – can be examined continuously</p> <p>Unobtrusive – research-independent source, not created as result of the case study.</p> <p>Exact – contains specific details, such as names, positions, events</p> <p>Broad coverage – long span of time, events and settings</p>	<p>Access – problems of confidentiality in many organizations</p> <p>Reporting bias – reflects (unknown) bias of document author</p> <p>Incompleteness or inaccuracy of data</p>
Interviews	<p>Targeted – focus directly on case study topic</p> <p>Insightful – provide original and illuminating data about perspectives of interviewees</p>	<p>Response bias - inaccurate or false responses, among others due to phrasing of questions, demeanor of the researcher, or desire of interviewee to provide socially desirable responses</p> <p>Time intensive – data transcription and analysis</p>

3.4.1 | *The documents*

A document analysis is a form of qualitative research that uses a systematic procedure to analyze data and answer certain research questions (Frey, 2018). Gray (2014) coins it an ‘unobtrusive measure’, which he understands to be a non-reactive method of data collection. Using documents can be useful to uncover insights and gain a greater understanding of the topic of study. Thereby, it is important to realize that all documents have to be interpreted in their wider context, i.e. time- and place-specific socio-economic, political and cultural factors have influenced their creation and should be taken into account in the study. Before starting the document analysis, contextual factors such as publication year, author, legal status and relation to other (policy) documents are retrieved. When relevant, these are mentioned in *Chapter 4*.

The thesis investigates the institutional components of implementing multiple uses in OWE areas in the Dutch MSP process. Specifically, the data gathered from the documents is

mostly expected to contribute to the understanding of the *formal* institutional rules at play. It is thereby geared at uncovering the written down and formally established rules relating to the implementation of the multi-use of offshore windfarms within MSP. For that reason, the focus is on governmental documents, which are publicly accessible. These can include, but are not limited to laws, regulations, policies, and reports of policy development processes.

As the document analysis limits itself to governmental documents, official government databases are used to search for relevant and suitable records. They were chosen based on the following selection criteria. First, the documents discuss either MSP processes or OWE development and make some mention of multi-use of marine space. Second, already selected policy documents may refer to others which also relate the study's research objective. Third, if certain (not yet selected) documents come up during the interviews, they may also be deemed relevant for the following analysis. Lastly, chosen documents represent the most recent versions of relevant laws, regulations and policy documents.

Table 4 shows the documents listed by year, English title, and reference. *Appendix II* includes a more elaborate overview including original Dutch titles, full description of authors and analyzed sections. The specific sections to be analyzed are chosen based on a brief review of every document. This allowed for a selection of the most relevant parts given the aim of this thesis and the previously described selection strategy. Lastly, it needs to be recognized that these documents are not a first-hand account. That is, government documents often go through a long process of development, revision, public participation opportunities before being officially published and take effect. Particularly, documents authored by multiple branches of government, suggest rigorous collaboration and negotiation prior to publication. The documents should be seen as a product of socio-economic, political and cultural contextual factors.

Table 4 – Brief overview of policy documents. Selected by author. A more elaborate overview can be found in Appendix II.

Year	English title	Reference¹
2011	Integral Management Plan North Sea 2015 – Revision of 2005 management plan	IDON et al., 2011
2014²	North Sea 2050 Spatial Agenda	Ministries of IE & EA, 2014a
2014	Governmental Structural Vision Offshore Wind Energy	Ministries of IE & EA, 2014b
2014	Governmental Structural Vision Offshore Wind Energy– Note of Answer	Ministries of IE & EA, 2014c
2015	National Water Plan 2016-2021	Ministries of IE & EA, 2015a
2015	Policy Document North Sea 2016-2021	Ministries of IE & EA, 2015b
2016	Plot Decision I wind energy area Hollandse Kust (South)	Rijksoverheid, 2016a
2016	Plot Decision II wind energy area Hollandse Kust (South)	Rijksoverheid, 2016b
2016	Governmental Structural Vision Offshore Wind Energy – Addition Area Hollandse Kust	Ministries of IE & EZ, 2016
2018	Letter to Parliament on Roadmap Wind Energy at Sea 2030	Minister of Economic Affairs & Climate, 2018
2018	Plot Decision III wind energy area Hollandse Kust (South)	Rijksoverheid, 2018a
2018	Plot Decision IV wind energy area Hollandse Kust (South)	Rijksoverheid, 2018b
2019	Letter to Parliament on Progress of Executing the Roadmap Wind Energy at Sea 2030	Minister of Economic Affairs & Climate, 2018
2019	Plot Decision V wind energy area Hollandse Kust (North)	Rijksoverheid, 2019
2020²	Negotiators Agreement for the North Sea	NZO, 2020
2020	Offshore Wind Energy Act	Rijksoverheid, 2020

¹ These references are used in the analysis in Chapter 4. To prevent confusion regarding documents and authors, they are all referred to in English. For purpose of clarity, abbreviations and translations can be found in Appendix II. Also, page 3 contains a list of abbreviations and translations used throughout the entire thesis.

² These documents have no legal status. Whereas the government is not obliged to act accordingly, they do indicate the line of thinking by the government.

3.4.2| *Semi-structured interviews*

The second method of data collection depends upon in-depth, semi-structured interviews. A semi-structured interview is a “a qualitative technique that requires the researcher to have a schedule of questions, but implements them flexibly allowing the participant to guide the direction of the interview” (O’Reilly & Dogra, 2017, p. 37). The choice of interview type fits to the case study approach: an in-depth research which also addresses the wider context around the object of study (Yin, 2009). Also, the flexibility of a semi-structured interview allows for new and unexpected information to come up as well (O’Leary, 2010). Overall, there is more control over topics in the interview compared to an unstructured interview, yet there is no fixed range of responses to each question compared to a structured interview or questionnaire (Given, 2008).

To allow for flexibility whilst covering all necessary components, a written interview guide is developed in advance. To limit the response bias (*Table 3*), the interview guide is constructed thoughtfully by formulating neutral questions and was checked for mistakes, clarity and flow by peers. It can be found in *Appendix III*.

The selection of interviewees is based on the positioning of the data collection methods within the theoretical framework, as presented in *Figure 11*. This means that interviewees addressed are either (1) governmental professionals working on MSP and multi-use, (2) non-governmental professionals working in and/or with the OWE industry, or (3) potential multi-users. Potential interviewees are approached via email, either through general contact forms found online or directly after having been referred to them through others. The interviews are all conducted in Dutch through an online video-call software or by phone. The main reason for this is the current situation of the COVID-19 virus, which prohibited any face-to-face meetings. *Table 5* shows an overview of the conducted interviews.

The reliability and validity of the interview process are strengthened by creating a ‘safe space’ that build trust and thus giving interviewees the scope to express themselves (Gray, 2014). Practically this was executed by starting the interview with a short informal conversation, explanation about the use of the information, and the confirmation that no direct quotes would be used without approval of the interviewee. Used quotes are translated into English after which they were sent to interviewees for approval. Moreover, selecting a sample size that reflects all different relevant perspectives and a careful and neutral phrasing of questions contributed to the reliability and validity (Gray, 2014). *Chapter 6* further discusses the limitations encountered during the data collection process.

Table 5 - Overview of the conducted interviews. The abbreviations used for the categorization of interviews is as follows: 'GO' refers to governmental professionals working on MSP and multi-use; 'OW' refers to non-governmental professionals working in the OWE industry; 'MU' refers to potential multi-users.

Category/no.	Organization	Date and duration	Medium
GO/1	Netherlands Enterprise Agency	6-5-2020, 59:05	Google Hangout
GO/2	<i>Rijkswaterstaat</i>	13-5-2020, 41:48	Phone
GO/3	Ministry of Infrastructure and Water Management	22-5-2020, 1:06:34	Phone
GO/4	<i>Rijkswaterstaat</i>	8-6-2020, 34:13	Microsoft Teams
OW/1	NWEA	7-5-2020, 42:52	Google Hangout
OW/2	Ørsted	7-5-2020, 30:42	Microsoft Teams
OW/3*	Pondera	11-5-2020, 51:29	Phone
OW/4	Eneco	20-5-2020, 48:05	Microsoft Teams
MU/1	<i>Programma de Rijke Noordzee</i>	11-5-2020, 22:51	Microsoft Teams

*Interview OW/3 was conducted with two professionals from the same organization.

3.5| Methods of data analysis

To appropriately analyze the data and come to relevant results in light of the research objectives, a codebook is developed based on the theoretical insights presented in *Chapter 2* - i.e. in a deductive manner. A codebook consists of a “*set of codes, definitions and examples*” (DeCuir-Gunby et al., 2011, p. 138), and provides a formalized operationalization of codes. Particularly, the codebook is based on the distinctions between formal and informal institutions and constitutional and non-constitutional rule levels. Ostrom’s seven rule types, as explained in *Section 2.3.2*, are used to further differentiate in the codebook. This proves useful for a more specific identification of institutions in the data and allows for further exploration of specific rules at one level (Ostrom, 2005). The codebook can be found in *Appendix IV*.

The first step of the analysis is to prepare the raw data. The documents are prepared by identifying the relevant sections through a quick scan. Afterwards, the data is inserted into the ATLAS.ti software and coded according to the codebook. The documents are analyzed firstly. This is beneficial for the interviews as preliminary findings from this analysis, could be brought up in the interviews to check for accuracy and their practical implications. Subsequently, the interviews are transcribed, inserted into the ATLAS.ti software and coded according to the codebook. Using ATLAS.ti, the selected sections were sorted according to the code groups (formal/informal and constitutional/non-constitutional) and further categorized according to Ostrom’s (2005) seven rule types, after which themes are inductively identified. Using Ostrom’s (2005) rule types allows for greater support and a clearer operationalization. By

comparing the identified themes between code groups after exporting the coded sections, the concepts included in the IIG framework can be explored. Subsequently, *Chapter 4* is developed and answers to the research questions are formulated.

3.6| Epistemological foundations

To justify the chosen methodological approach, it is crucial to briefly discuss the epistemological foundation and theoretical perspective underlying this thesis. The epistemological stance taken provides a philosophical background for deciding what kind of knowledge is legitimate and adequate when conducting research (Coghlan & Brydon-Miller, 2014). It is in turn grounded in the researcher's ontological attitude, which refers to the general attitude taken towards knowledge, truth and legitimacy (Parke & Doak, 2012). This thesis takes a constructivist perspective, which holds that truth and meaning is created by a subject's interactions with the world, i.e. meaning is constructed (Gray, 2014). This corresponds with the foundations of institutional thought, as explained in *Chapter 2*, which considers institutions to be created through processes of interaction and placed in a wider social context (Healey, 2007). The theoretical perspective connected to this epistemological foundation is interpretivism, which explores "*culturally derived and historically situated interpretations of the social life-world*" (Crotty, 1998, p. 67). Again, this corresponds to the present case study research by recognizing that human interpretation is context-dependent and socially constructed (Mathison, 2005). Overall, the methodology was developed based on these foundations. *Figure 13* shows the elements of this thesis' research process.

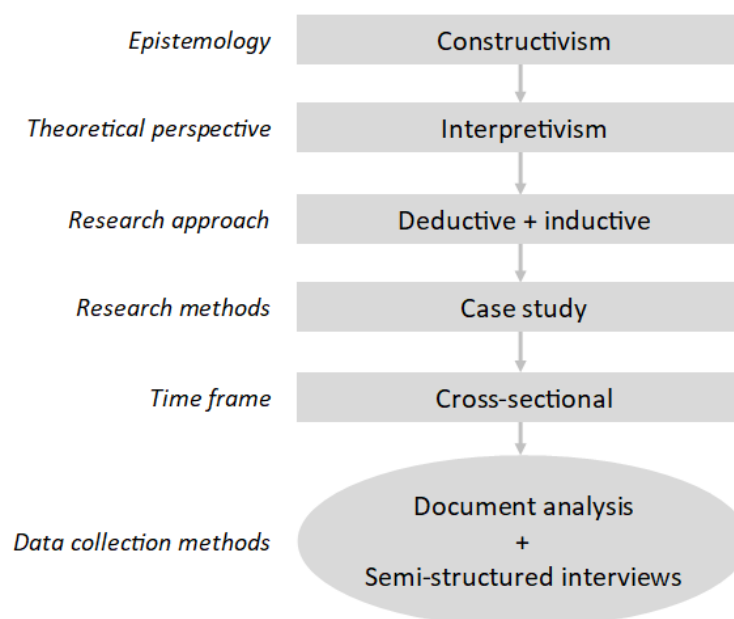


Figure 13 – Overview of the research process (Source: made by author; as based on Gray, 2014, p. 35).

3.7| Ethical considerations

To ensure this research is conducted in a responsible and morally defensible manner, four main ethical principles are followed: avoiding harm to participants, ensure informed consent of participants, respect the privacy of participants, and avoid the use of deception (Gray, 2014). It is evident that the researcher aims to conduct the study in an independent and unoffensive manner. The nature of this research assures that there is no harm done to participants, i.e. physical and/or psychological harm is not applicable. To ensure informed consent, respect interviewees' privacy and avoid deception, the interviews start with a short explanation of the research topic and stating that participation and responding to all questions is voluntary. Following, anonymity is ensured within the research, how that is done is explained to the interviewees and approval for the audio recordings for further analysis is explicitly asked for. During the interview, the aim is to create an open atmosphere in which questions take a non-steering and non-suggestive form. This is to ensure that the interviewees feel comfortable and are not stimulated to respond in a certain way. The recordings are used for transcription. If certain parts of interviews are directly quoted in this thesis, they are previously sent to the applicable interviewee to allow for a check if the information is appropriately interpreted. Only after approval, the data is included in the analysis. The data is stored safely using servers of the University of Groningen and is not kept longer than necessary.

4| The case study: multi-use in offshore windfarms in the Dutch EEZ

Having elaborated on the theoretical background and methodological approach, the following chapter presents the findings. *Section 4.1* presents a brief overview of the Dutch governance situation regarding North Sea policy of relevance for multi-use in offshore windfarms. This is of importance as the wider context does shape and embeds the so-called ‘action situation’ (illustrated in *Figure 6*). Following, the *Section 4.2* discusses the formal institutions at play, on constitutional and non-constitutional levels respectively. *Section 4.3* is similarly structured and goes into the informal institutions at play. Afterwards, the relations between the varying institutional levels and types are explored, based on the concepts provided by the IIG framework.

4.1| Current situation in the Dutch North Sea

As stated in *Section 2.3.2*, the IIG framework requires the analysis to start with a short consideration of historic and place-specific social, economic and political peculiarities (Cote & Nightingale, 2012). Due to the limited scope of this research, only a short overview is given of the current policy context that embeds the planning and implementation process of OWE and multi-use.

Firstly, it is important to elaborate on the process of OWE planning in the Netherlands. *Figure 14* illustrates the phases in the OWE planning process. First, a suitable area is appointed in the National Water Plan and is substantiated in the Policy Document North Sea (Ministries of IE & EA, 2015a; 2015b), which also includes the Dutch marine spatial plan. New OWE developments are only allowed in these appointed areas. The appointed areas in the National Water Plan can be revised through Governmental Structural Visions – i.e. a strategic policy document regarding spatial and functional developments indicating where specific uses are desirable. For instance, two visions have established additions to the OWE areas (Ministries of IE & EA, 2014b; Ministries of IE & EA, 2016).

Second, a Roadmap Offshore Wind is published and reveals the order of development (Minister of EAC, 2018; 2019). A roadmap is published in the form of a letter to parliament by the responsible minister. Currently, the Ministry of Economic Affairs and Climate (EAC) is responsible for renewable energy generation and therefore the roadmap’s author. For instance, the 2018 Letter to Parliament established what plots would be tendered and ready for operation by 2023 (Minister of EAC, 2018) and the 2019 Letter to Parliament secured the tender processes to ensure operation by 2030 (Minister of EAC, 2019). The third step involves

an assessment of the plan and a research on all physical and geographical characteristics of the area (Wind op Zee, 2020). These assessments explore all necessary information surrounding wind speeds, water depth, wave height, soil condition, presence of shipwrecks and unexploded ammunition. This way, the government supports developers by providing them with this information, saving developers time and resources. Fourth, and largely simultaneously to the previous step, the connection to the onshore electricity grid is prepared and built. The government has appointed TenneT as the network operator.

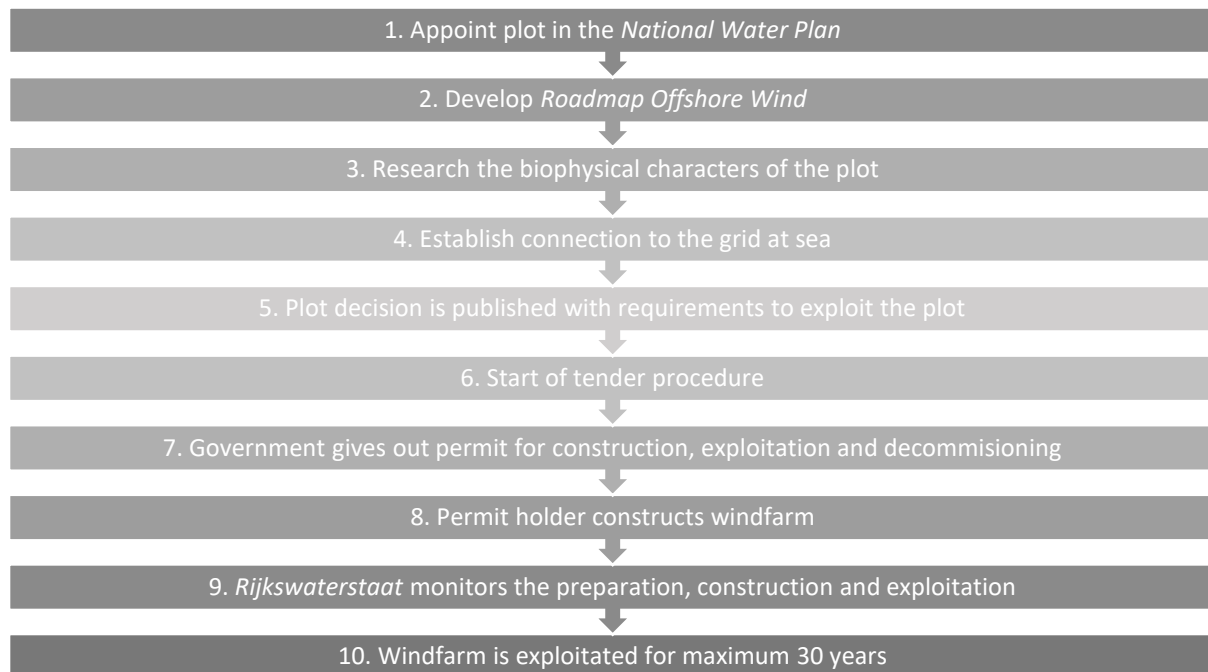


Figure 14 - Phases in constructing a windfarm (source: made by author)

Fifth, Plot Decisions are made; they establish the exact requirements and location for OWE development (Rijksoverheid, 2019). It provides a basis for the OWE developers to work on their bid for the tender procedure. The Offshore Energy Act provides the legal basis for the plot decisions and came into force in 2015, but was most recently revised in 2020 (Rijksoverheid, 2020). The act was implemented to guide the planning and permit process of OWE and stipulates the responsibilities of the government and the criteria used in permit procedures. The government organizing the tender procedure is the sixth step, the winner of which is permitted to build and exploit the windfarm (step 7). As of January 1st, 2020, the Offshore Energy Act enables a subsidy-free tender procedure in which a comparative assessment decides the winner (Rijksoverheid, 2020). Before, the bidder with the lowest subsidy request would automatically win the tender. Now, the government first aims for permitting a subsidy-free offshore windfarm; only if no suitable bidders apply, they move towards a subsidized OWE procedure (Rijksoverheid, 2020). Step eight and nine include the construction and exploitation of the windfarm and the monitoring function of *Rijkswaterstaat*.

A permit is given for maximum of 30 years, after which a developer is forced to decommission the windfarm (Rijksoverheid, 2020).

Having elaborated upon the consecutive steps in the OWE planning process, it is important to see where the policy development on OWE stems from. The 2013 Energy Agreement for Sustainable Growth calls for OWE generating at least 4.45 GW by 2023 (Ministry of EA, 2013). The 2017 Coalition Agreement of the current cabinet (VVD et al., 2017) and its 2019 National Climate Agreement (Ministry of EAC, 2019) commit to generate 11 GW by 2030, representing a share of 8.5% of all energy in the Netherlands.

The other side of multi-use, i.e. the additional use on top of OWE, is also guided by current planning processes. Based on the Water Act, *Rijkswaterstaat* hands out permits for so-called permit-obligatory activities, based on five criteria from the general assessment framework for activities on the North Sea stipulated in the Policy Document North Sea 2016-2021 (Ministries of IE & EA, 2015b). Activities for which no permit is needed include shipping, defense and recreation. This is the exact same framework used for monofunctional marine uses subject to a permit. *Figure 15* shows the criteria to be met to receive a permit.

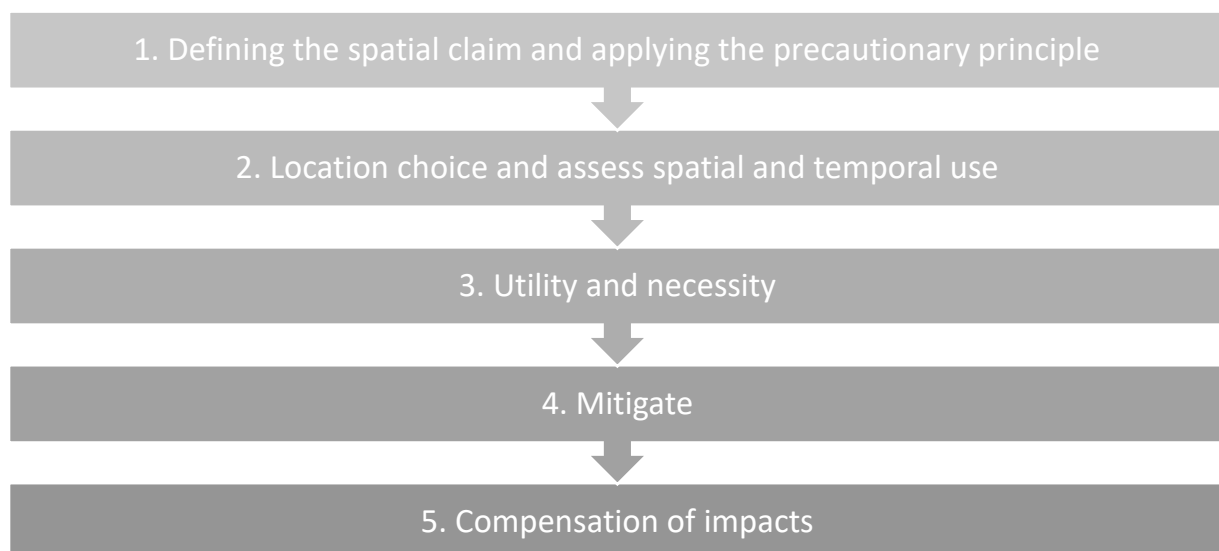


Figure 35 - Steps in the assessment framework for permit-obligated activities on the North Sea (Source: Ministries of IE & EA, 2015b, p. 96).

If the first two steps are met and no significant effects are identified, *Rijkswaterstaat* either accepts (with conditions) or declines the permit application. Step 3 only follows in case of significant effects of the activity. If the utility and necessity of the activity is demonstrated, step 4 and 5 follow to see whether there are sufficient mitigation measures to compensate the identified effects (Ministries of IE & EA, 2015b).

This brief overview shows that the Netherlands have policies in place to guide the spatial planning process on the North Sea and have great interest in the development of OWE.

The following sections delve into the formal and informal institutions which guide the implementation of multi-use in offshore windfarms in the Dutch EEZ.

4.2 | The formal institutions

This sub-chapter focuses on the formal institutions at play and respectively discusses the constitutional and non-constitutional level. After, the following sub-chapter similarly explores the informal institutions. Formal institutions are explicit, written-down rules enforced by certain, pre-defined actors (North, 1992). Here, the Dutch national government is the formally responsible actor for the spatial planning of the North Sea (Ministries of EA & EA, 2015a).

4.2.1 | *Constitutional level*

Formal institutions on a constitutional level include observations from relevant laws, policies and regulations. Particularly, the laws and regulations regarding OWE, ocean planning and multi-use are examined to gain insights in the implementation of multi-use in offshore windfarms. Based on the gathered data, three institutions are identified inductively: many responsible actors in offshore policy; OWE is of national interest; and no multi-use in the Offshore Wind Energy Act.

Many responsible actors in offshore policy

Starting from one kilometer offshore, the Dutch part of the North Sea does not fall under provincial or city boundaries anymore (IDON et al., 2011). That is, the national government is responsible for management and policymaking of a large share of the territorial sea (up to 12 nautical miles) and the complete EEZ. Within the national government the many different functions and policy areas relevant to the North Sea, belong to different ministries and departments. The variety of actors involved has implications for multi-use policymaking and implementation. Specifically, it impacts actors and their roles in the action situation – i.e. a position rule according to Ostrom's (2011) institutional rules. *Appendix V* shows the current involvement and specific tasks of the six ministries and two governmental executive agencies involved. Important to note is that a redistribution of tasks is possible; an election and shift in political power may change the current allocation of responsibilities. For instance, after the 2017 national elections and cabinet formation, the ministry of Internal Affairs and Kingdom Relations (IAKR) started playing a role in OWE development (GO/2).

Representatives from the offshore wind sector also point to these fragmented responsibilities to show the challenge of working with the government (OW/2; OW/4). The government recognizes this fragmentation of responsibilities and coordinates all North Sea policy development and management through the Interdepartmental Directors Consultation North Sea (Ministries of IE & EA, 2015b). The responsible ministry brings up the relevant topic in this gathering. The reasons for bringing up the matter can be simply to inform, to get all ministries on the same page or to put something up for decision (GO/3). However, this platform is intended to align internal decision-making, not for outward information spreading. Thus, the fragmentation of responsibilities presents a challenge for non-governmental professionals as there is no one point of contact for all North Sea matters, but different professionals connected to e.g. OWE generation, fisheries or multi-use.

OWE is of national interest

Within the National Water Plan 2016-2021, the government deemed certain activities being ‘of national interest’ (Ministries of IE & EA, 2015a). This includes the following activities: oil and gas extraction, carbon capture, shipping, sand mining, generating renewable energy, and defense activities. The Policy Document North Sea 2016-2021 calls for: “*sufficient space for offshore wind energy and other types of renewable energy*” (Ministries of IE & EA, 2015b, p. 35). More specifically, national interest means that “*in areas appointed for activities of national interest [...] other activities should not hinder that*” (Ministries of IE & EA, 2015b, p. 99). This characteristic of OWE in national policymaking is deemed a choice rule and thereby impacts the actions that stakeholders in certain positions can take in the policy arena. That is, for areas appointed for OWE, developers seem to hold a powerful position in comparison to potential multi-use parties. Developers also recognize and agree with this national interest, as it accounts for a large share of the ambition within the National Climate Agreement to transition away from fossil fuels (OW/3; OW/4). It is recognized also that electricity supply itself is crucial for society (OW/4).

However, as becomes clear from the interviews, OWE developers do not perceive this ‘national interest’ as putting them in a powerful position. Instead, they state that the government remains the competent authority that makes the decisions (OW/4). OWE developers simply get a permit to exploit that part of the sea to construct and maintain wind turbines, yet do not have any say about what else is done in the area (OW/2). Linking it back to Ostrom’s (2011) rules, a related aggregation rule shows that the national government is the competent authority to make the final decision (IDON et al., 2011).

No multi-use in the Offshore Wind Energy Act

The Offshore Wind Energy Act guides the OWE planning process, however, it lacks any mention of multi-use. This shows that there is no legal obligation for additional use of an offshore windfarm. Again, this impacts what stakeholders in certain positions can do – i.e. an institutional choice rule (Ostrom, 2011).

Currently the criteria in the tender procedures include the knowledge and experience of applicant, quality and capacity of the design, societal costs, quality of the risk assessment and analysis, and the quality of measures to ensure a cost-efficient windfarm (Rijksoverheid, 2020). The lack of mention of multi-use demonstrates that it is currently not considered in the government's decision of who receives the permit and thereby does not address the possibility for a joint development of uses. OWE market parties do see potential for a joint development of uses for a larger synergy between uses (OW/1). Nevertheless, there is also no mention of it being explicitly excluded from all development – i.e. OWE developers are essentially free to include it into their tender bids, however, they are not judged on it in the comparative review. For that reason, developers are unlikely to include it, as it adds costs and no benefits in the tender procedure (GO/1; OW/3). In addition, developers are not likely to break open all sorts of ongoing or finished procedures, just to include an additional use in mid-way development (OW/3). However, the solution is not as clear-cut as just including multi-use in the tender procedure, as it does add a cost increasing element (OW/1; OW/3). Overall, the lack of mention of multi-use in formal legislation guiding the OWE process does not legally hinder its implementation, yet also refrains from creating any urgency or perspective surrounding multi-use.

4.2.2 | Non-constitutional level

Formal institutional arrangements on a non-constitutional level include the operational activities of government officials. Based on the gathered data, four institutions were identified inductively: long time horizon of OWE development; a limited spatial scope of OWE permit; a formal ambition for multi-use; and the network of the Community of Practice North Sea.

Long time horizon of OWE development

On a non-constitutional level, the long-term nature of OWE development guides the operational activities of government officials regarding multi-use in offshore windfarms. To illustrate, *Figure 16* shows a simplified version of the development timeline for the plots Borssele I and II. These plots are the first to be realized from the 2023 Roadmap (Ministries of

IE & EA, 2014b). Sub-parts to be thought about too are the formal public consultation procedures of the plot decisions. As this example illustrates, the development of the two plots Borssele I and II took more than a decade, before the first energy is generated.

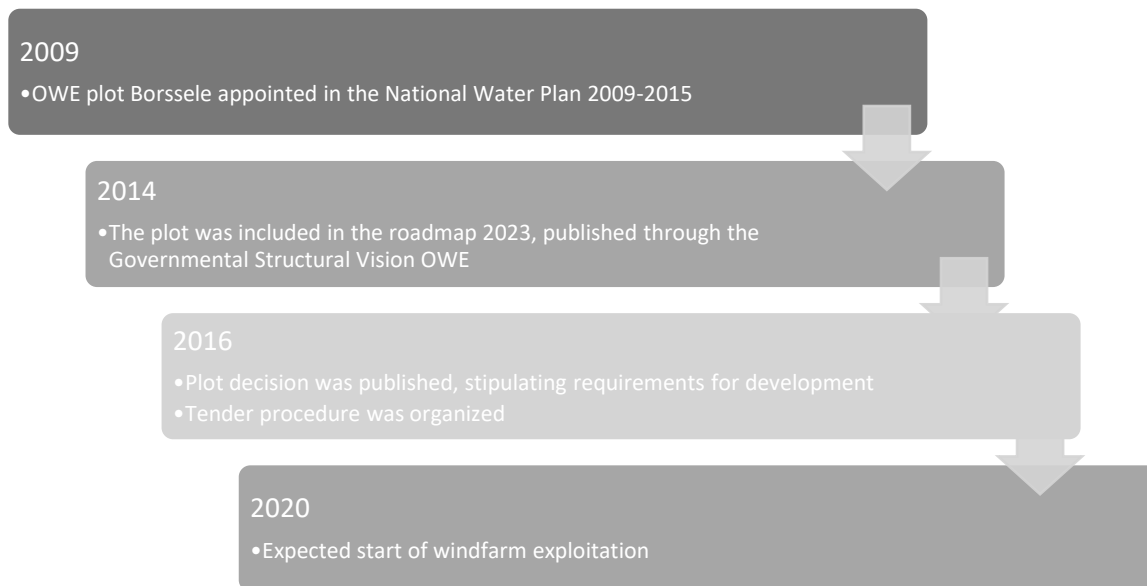


Figure 16 – Simplified timeline of development Borssele I and II (made by author)

This long time horizon is reaffirmed by several interviewees. “*Spatial planning is about thinking ahead an x amount of years, and at sea this may be even more the case. You have the grid at sea projects, which colleagues are working on right now, for wind farms that start constructing from 2027*” (OW/3). They add that it is inherent to these big developments and necessary to appropriately prepare them (OW/3). However, it also needs to be recognized that due to this long time horizon, combined with the tight schedule to meet the renewable energy targets, flexibility is lost to potentially implement multi-use in current and future windfarms (OW/3). In contrast, the government seems to want to facilitate flexibility for the market by creating space for market parties to develop proposals (Ministries of IE & EA, 2014a). It however does not seem to fit into the current high-pressure timeline.

GO/3 nicely illustrates the multitude of requirements and contracts to sign: “*It is a massive pile of paperwork and all agreements have to be written down and contracts need to be tightened. That quickly accumulates to 700 signatures: the bank, other financiers, the reinsurer for the energy generation, contractors and sub-contractors, the contracts for the maintenance and monitoring. You need an environmental permit aside from the regular OWE permit. You need a guarantee (from the bank) to ensure the decommissioning at the end of its lifecycle, even when the business goes bankrupt.*” Thus, the long time horizon formally guides the actions of the government (i.e. an institutional choice rule) as well as all other parties that hold a stake in the development of windfarms in the Dutch North Sea. Thereby, it limits the flexibility for multi-use implementation.

Limited spatial scope of OWE permit

The geographic domain of the offshore windfarm – and thereby the potential for multi-use implementation on a plot – is guided by the permit, i.e. an institutional scope rule. The permit allows the developer to generate OWE on a particular plot. It only gives them the sole right to exploit that specific activity, not for an overall usage of the area (IDON et al., 2011; IenM & EZ, 2015b). The Plot Decisions, which provide all information and requirements to the developers prior to the tender procedure, impose a safety zone of 50 meters around a turbine and 500 meters around a platform for permit-obligatory uses (Rijksoverheid, 2019). Inside those safety zones, other uses are never permitted. The remaining area is however open for other activities. For these permit-obligatory activities, parties can apply for permits based on the Water Act, as demonstrated by *Figure 14* in *Section 4.1*. This procedure is similar for all permit-obligated activities on the North Sea, whether a multi-use or not. However, an Assessment Framework for Co-Use in Offshore Windfarms is in development to specifically guide multi-use permit procedures.

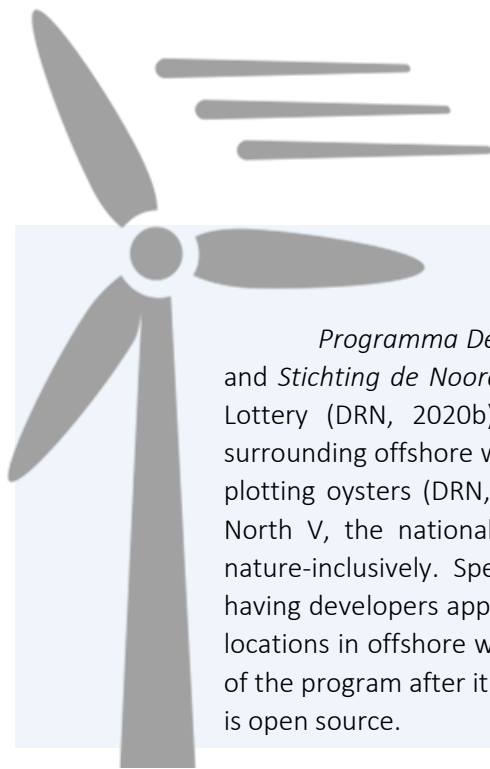
For activities not subject to a permit, the Code of Conduct to Safely Sail through Windfarms similarly stipulates that boats need to keep at least a 50-meter distance from turbines and 500 meters from a transformer platform (Rijkswaterstaat, 2018). This is valid for all existing (except for the Gemini plots) and newly constructed windfarms. The government can deviate from this by increasing the safety zone, but never decreases it (OW/4). As illustrated by this example, the multi-use combination of shipping and OWE is enabled in formal institutional arrangements. Overall, this limited spatial scope of the OWE permit legally allows for other uses to be implemented within an offshore windfarm and thereby enables implementation.

Formal ambition for multi-use

The Dutch government has established multi-use as a formal ambition in the North Sea 2050 Spatial Agenda (Ministries of IE & EA, 2014a) and the subsequent Policy Document North Sea 2016-2021 (Ministries of IE & EA, 2015b). It influences the operational actions of the governmental officials, i.e. a non-constitutional choice rule. Though not included in any laws or regulations, this formal ambition for multi-use has shone through in some policy changes. First, the Code of Conduct to Safely Sail through Windfarms allows for a co-use of windfarms and shipping (Rijkswaterstaat, 2018). Also, the starting principles in the Letter to Parliament on Roadmap Wind Energy at Sea 2030 aspires for “*multi-use where possible*” (Minister of EAC, 2018, p. 3). Following, the North Sea Agreement similarly states for appointing new areas for OWE: “*Where necessary, solutions in which multi-use of ocean space is possible are*

sought for, such as oil and gas extraction in a windfarm, or fishery-friendly windfarms” (NZO, 2020, p. 18-19).

Moreover, the OWE developers currently are obligated to make effort to build ‘nature-inclusively’ (Rijksoverheid, 2019). This holds that OWE developers must implement measures that enlarge the natural habitat for native North Sea species surrounding the foundation of turbine pilons (Rijksoverheid, 2019; 2020). Many interviewees mention the notion of nature-inclusive building in discussions around the definition of multi-use (GO/2; GO/3; GO/4; OW/2; MU/1). One could argue that it is the only type of multi-use being implemented on a large scale currently (MU/1). A valuable example here is the *Programma De Rijke Noordzee*. Whereas this is not a governmental project, it was established specifically for nature inclusive building of OWE. *Box 4.1* gives a brief overview of this program.



Box 4.1 - Programma de Rijke Noordzee

Strengthening nature by building offshore windfarms

Programma De Rijke Noordzee is a joint project of NGO's *Natuur & Milieu* and *Stichting de Noordzee* and financially made possible by the Dutch Postcode Lottery (DRN, 2020b). Together they aim to strengthen North Sea nature surrounding offshore windfarms, for instance, by implementing artificial reefs and plotting oysters (DRN, 2020a). Since the latest Plot Decision for Hollandse Kust North V, the national government prescribes that permit holders must build nature-inclusively. Specific projects are started by approaching developers or having developers approach the program. Currently, the program is active at four locations in offshore windfarms in the Dutch North Sea. To ensure a continuation of the program after it ends in four years, all information and knowledge gathered is open source.

A last example of the current developments in multi-use is the development of the new Assessment Framework for Co-use in Offshore Windfarms by *Rijkswaterstaat*. This document, when officially implemented, provides a framework to decide upon the permits and prioritize certain activities in windfarms (Erfeling, 2020). However, it is not implemented yet and only comes into force through the next Policy Document North Sea 2022-2027, renamed into Program North Sea (Erfeling, 2020).

Overall, the formal ambition for multi-use is slowly shining through in policy development. However, except for nature-inclusive building of OWE, it is so far not included

in any laws and/or regulations, limiting the operational activities of governmental professionals. Therefore, the formal ambition is no direct barrier or enabler for multi-use implementation.

Network of Community of Practice North Sea

The last identified formal institutional arrangement on a non-constitutional level is the Community of Practice (CoP) North Sea. It was established by the Netherlands Enterprise Agency and the Ministry of ANFQ. The community aims to create a network of North Sea stakeholders (RvO, 2019) and thereby guides the information present in the implementation of multi-use, i.e. an institutional information rule. Practically, new parties can easily join the CoP by approaching the responsible governmental actors; there is no fee or associated cost (GO/1). The CoP aims to meet five times a year, physically or through a webinar (GO/1). Parallel to these meetings, there are separate actions, for instance, to align funding for North Sea initiatives or to inform stakeholders about all the laws and regulations that have to be addressed when moving activities offshore (GO/1; GO/2; GO/4). The CoP facilitates connection between societal parties such as OWE developers and potential multi-use parties, as well as bridging the gap between business and government (OW/3). The latter is illustrated by the fact that the realization for the need of an assessment framework for multi-use emerged from discussions in the CoP (GO/1). However, formal consultation procedures still happen through already established channels.

The interviewees from the OWE sector are all connected to the CoP (OW/1; OW/2; OW/3; OW/4), yet that does not mean all OWE developers are. OW/4 recognized that OWE businesses not present at the CoP also have no ongoing projects to develop windfarms in the Dutch North Sea. Overall, the CoP contributes to knowledge and information sharing which may stimulate multi-use implementation, but is not the place for formal involvement in policy development and decision-making and is thereby also limited.

4.3| The informal institutions

The following sub-chapter discusses the informal institutions at play in the implementation of multi-use in offshore windfarms. Informal institutions are implicit and lack any clear specification (Kingston & Caballero, 2009). Specifically, this section explores the institutional arrangements guiding the non-governmental stakeholders. It needs to be recognized too that informal constitutional institutions define and authorize the informal institutions on a non-constitutional level.

4.3.1 | Constitutional level

The informal constitutions on a constitutional level include insights from customary rules in the decision-making process impacting multi-use implementation. Based on the gathered data, the following informal institution is identified inductively: OWE developers have a low-risk attitude.

OWE developers have a low-risk attitude

The implementation process of multi-use in offshore windfarms is affected by the low-risk attitude of OWE developers. That is, they deem multi-use a risk to their already limited business case. This limited business case and the need for a profitable OWE operation disincentivizes the OWE sector as it may contribute to their financial stresses – i.e. an institutional pay-off rule. Simply said, OWE developers do *“aim to contribute to the climate goals together with other uses in windfarms, however, we do not want to allow any risk without it being adequately insured”* (OW/4). Another user in the same area may infringe upon the operation causing not only a financial risk, but also a safety and technical risk (OW/4). Any risks to the operation need to be minimized (OW/1; OW/2).

Currently, offshore windfarms are spatially planned according to the maximum energy output, not according to optimal space for certain other uses (OW/1). Whereas a joint development of uses, and thereby adapting the design of a windfarm, could maximize the synergy between uses, it also undesirably increases costs (OW/1; OW/3; OW/4). Offshore windfarms already have a great number of requirements to meet: *“It has to strengthen the economy, has to deliver low-cost electricity to society, future offshore windfarm layouts need to accommodate activities in the area, they [wind turbines] have to turn off when a group of bats pass. It is all possible, but does have a cost increasing element”* (OW/2).

Also, a staggered development of multi-use may increase costs. In the needed revision of contracts, a greater risk may be identified simply due to the presence of another use (GO/4; OW/2; OW/4). One interviewee (GO/3) shared a specific example of a wind turbine that could also generate wave energy from Denmark. Whereas it was proven successful offshore and intensively tested, it was never rolled out on a large scale due to a lack of trust from financiers (GO/3). This increased risk assessment is not necessarily based on experience or knowledge, yet may represent a *“fear of the unknown”* (OW/1).

Overall, it appears that the already limited business case and resulting need for cost efficiency underlies the low-risk attitude. As explained previously, the Dutch OWE sector is maturing and moving away from front-end subsidies (Rijksoverheid, 2019), but this also

intensifies the pressures to develop profitable windfarms. Therefore, a call for an electrification of onshore heavy industry is emerging. For instance, the steel sector can move from using gas towards renewable energies to generate needed heat for production (OW/4). This would increase the demand and thereby the energy price, and positively impact windfarm operations. Currently though, the low-risk attitude hinders willingness of developers in the implementation of multi-use in offshore windfarms.

4.3.2| *Non-constitutional level*

The informal institutions on a non-constitutional level provide insights into the social habits in the implementation process. Based on the gathered data, three institutions were identified inductively guiding the non-governmental stakeholders: insufficient offshore knowledge and experience in multi-use; lack of communication between OWE developers and multi-use parties; and hesitant OWE developers to initiate multi-use.

Insufficient offshore knowledge and experience in multi-use

On a non-constitutional level, the lack of knowledge and experience regarding multi-use influences the available information in the action situation, i.e. an institutional information rule. As shown before, simply the presence of a second activity in an offshore windfarm is expected to increase the risks of OWE generation. For instance, increased traffic or an increase in prohibited areas due to other static uses, can hinder OWE maintenance traffic. So far however, there is only limited experience with implementing a second use in a windfarm. It is not yet a mature sector and initiators often do not know how it works at sea (GO/1; GO/4). This perspective is shared by an OWE representative, stating that “[second users] are sometimes just ambitious entrepreneurs with a good idea, but have no idea what it takes to realize a project offshore [...]. They just don’t know where to start” (OW/3). This particularly holds true for the very innovative ideas, such as floating solar (OW/3). Whereas the government is very willing to provide permits for offshore pilot projects or experiments (GO/2; GO/4) and may financially support marine innovation (through the *TKI Wind Op Zee*; GO/4), the transition towards becoming an economically feasible project is long and difficult, as solid financial supporters have to be found.

The CoP is established to facilitate knowledge sharing between potential multi-use parties, the OWE sector and governmental professionals. Yet, its existence does not imply that challenges do not exist. For instance, stakeholders involved in seaweed cultivation see each other as competitors and therefore refrain from collaboration (GO/1). However, as they are

competitors in such a small market, which is still in its infancy, collaboration is needed (GO/1). Only when the sector matures, competition is favorable (GO/1). Overall, the lack of offshore knowledge and experience hinders the implementation of multi-use in the Dutch North Sea. Therefore, collaboration is important and should continue to be facilitated to broaden knowledge and experience, for instance through the CoP.

Lack of communication between the OWE developers and multi-use parties

There is a lack of communication between OWE developers and multi-use parties influencing the implementation process of multi-use, i.e. an institutional information rule. The existing communication is facilitated by the CoP (GO/1). However, the CoP does not guide formal consultation in policymaking or implementation processes. Currently, the government advises potential multi-uses to seek informal contact with OWE developers before applying for a permit (GO/2; GO/4), yet does not facilitate it. The OWE sector calls for greater governmental involvement and guidance (OW/1; OW/2; OW/4). A preliminary consultation can create room for greater synergy or even joint development of uses by informing potential multi-users about specifics and safety requirements in windfarms. Overall, the lack of communication hinders a synergistic development and implementation of multi-use.

OWE developers are hesitant to initiate multi-use

Lastly, the hesitant attitude of OWE developers regarding multi-use affects their actions on a non-constitutional level, i.e. an institutional choice rule. As shown earlier, OWE developers generally have a low-risk attitude, which also affects multi-use implementation. However, this hesitant attitude relates to other aspects as well. Most importantly, the lack of governmental focus is mentioned as a reason for this by the sector (OW/1; OW/2; OW/3; OW/4). As OWE developers do not know where policy is headed, they will not act solely by themselves; the already limited business case cannot handle unnecessary additional costs. Simply put, *“the developer will never price that, as they estimate it will remove themselves from the tender, because multi-use is not included in the tender criteria (OW/3).* Developers do realize though that multi-use will become more important in the future, with an only intensifying spatial claim of OWE on the North Sea (GO/1; OW/2; OW/4).

The government recognizes this too: *“in order to be transparent about what is possible in a windfarm, we need to provide clarity on this” (GO/2).* Partly for that reason, the new assessment framework for co-use is in development. The new framework will allow for *“the licensing authorities to assess the permit applications for activities in offshore windfarms*

and appropriately balance the interests. Also, the framework offers permit applicants clarity in the steps to obtain a permit and the needed documents and resources” (GO/4). Still, the framework will not be implemented before 2022. Until then, the hesitant attitude of OWE developers hinders the implementation of multi-use as it limits their actions based on the need for a cost-efficient operation.

4.4| Bringing it together – identifying barriers and enablers

Having elaborated upon the formal and informal institutions at play on constitutional and non-constitutional levels, this section further examines their interrelations. *Chapter 2* defined four concepts that hint towards either enablers or barriers to the implementation process of multi-use offshore windfarms. The following sections compare and contrast all identified institutional rules and relate them to the four concepts. *Table 6* summarizes all institutional rules at play, so that they do not have to be repeated in each section. *Figure 17*, at the end of this chapter, visualizes the results as discussed below.

Table 6 - Overview of the formal and information institutions at play (source: author).

Formal/constitutional institutions	Formal/non-constitutional institutions
<i>POSITION RULE</i> : many responsible actors in offshore policy	<i>CHOICE RULE</i> : long time horizon of OWE development
<i>CHOICE RULE</i> : OWE is of national interest	<i>SCOPE RULES</i> : limited spatial scope of OWE permit
<i>CHOICE RULE</i> : no multi-use in Offshore Wind Energy Act	<i>CHOICE RULE</i> : formal ambition for multi-use
	<i>INFORMATION RULE</i> : network of Community of Practice North Sea
Informal/constitutional institutions	Informal/non-constitutional institutions
<i>PAY-OFF RULE</i> : OWE developers have low-risk attitude	<i>INFORMATION RULE</i> : insufficient offshore knowledge and experience in multi-use
	<i>INFORMATION RULE</i> : lack of communication between OWE developers and multi-use parties
	<i>CHOICE RULE</i> : OWE developers are hesitant to initiate multi-use

4.4.1 | *Legal pluralism*

The first concept revolves around the relation between the formal constitutional and informal constitutional institutions. It refers to the co-existence of multiple sets of legal systems or constitutional rules (Rahman et al., 2017).

Looking at relation between the national government and the OWE developers, it can be said that the government does not address the developers' low-risk attitude regarding multi-use. Particularly, current governmental policy may have partially contributed to and reinforced the low-risk attitude – i.e. the comparative assessment to decide who receives the permit is dominated by cost efficiency criteria. After largely moving away from front-end subsidies for OWE and making developers pay for exploitation, developers are not stimulated to spend additional money, and thereby create additional risks. Since the government does not address multi-use in the Offshore Wind Energy Act and deems OWE a national interest, OWE developers are not likely to pursue or actively seek out potential multi-use parties to collaborate with. It goes against the need for a cost-efficient business.

Though the formal and informal institutions do correspond to each other – i.e. they reinforce each other – the relation does not stimulate the implementation of multi-use. Therefore, legal pluralism is deemed *latent*. That is, the current legal systems are not at odds with each other and thereby do not directly hinder implementation of multi-use, yet the current policy disposition also does not enable its implementation. The government currently seems to make a conscious decision to exclude multi-use from the regulations and refrain from any concrete operational activities to stimulate, or *enable*, the implementation of additional uses in offshore windfarms.

4.4.2 | *Institutional void*

An institutional void materializes in a situation without any accepted rules and norms to guide the interaction between formal constitutional and informal non-constitutional institutions. It emerges from an absence of agreed upon policy measures (Rahman et al., 2017).

According to the Offshore Wind Energy Act, multi-use is not a formal criterium in the OWE tender procedures. Thereby, OWE developers are not obligated by the government to address potential multi-use parties. The most recent Plot Decisions do state that multi-use initiatives need to be requested based on the Water Act (Rijksoverheid, 2019) of which the steps are demonstrated in *Figure 15*. This illustrates that permits can be acquired, yet this follows a totally separate process than the OWE procedures and does not imply any direct

contact between the permit applicant and the OWE sector. That is, no policy measures guide the communication between developers and permit applicants.

Moreover, when exploring the relationship between the many responsible actors and the insufficient offshore knowledge and experience, they are reinforcing each other. Particularly when responsibilities are fragmented within the competent authority (being the national government), it creates additional difficulties for unexperienced initiators approaching the government. As OW/3 states “*you cannot ask that person to ‘just call and submit your request at counter x’.*” A similar notion goes for the hesitant position of the OWE developers. The multitude of responsible ministries and executive agencies does not provide the needed clarity to discard the hesitance.

Looking within the informal non-constitutional institutions, the three notions do not contradict one another. As there is insufficient offshore knowledge and experience in multi-users, this affects the attitude of OWE developers and vice versa. To diverge from both factors, the OWE sector is calling for a formally regulated preliminary consultation between them and potential multi-users. However, there are currently no accepted rules or norms in place to guide this interaction. For that reason, the institutional void is *co-existent*. This implies that the institutional void between the national government regulations and the insufficient offshore knowledge in multi-use, lack of communication between developers and multi-use parties, and the hesitant attitude of developers, is hindering the implementation of multi-use in offshore windfarms in the Dutch North Sea. Interviewees brought up potential solutions, such as creating specific financial incentives for multi-use, of which the OWE sector is not necessarily against or in favor (OW/2; OW/4), including it in the comparative assessment in the tender procedure (OW/1; OW/2), which would still pressure the limited business case (OW/4), or having the government take up a larger role by proactively facilitating preliminary consultation between OWE developer and additional user (OW/1; OW/3; OW/4). However, governmental representatives state that this is not a role they foresee being taken up by the government (GO/2; GO/4). Reasons for this are not directly political. Particularly, it is down to the nature of the government’s role as the competent authority; that is, it does not involve proactively reaching out to the market to stimulate multi-use implementation, yet only legally facilitates it happening. However, one does need to recognize too the influence of the quite stable political power of the liberals for the last decade. The retreating governmental role corresponds to the liberal values and ideas.

4.4.3| *Cultural mismatch*

This third concept revolves around the relation between the formal institutions on a non-constitutional level and the informal institutions on a constitutional level. A cultural mismatch emerges through a lack of recognition by non-constitutional formal institutions of informal constitutional rules (Rahman et al., 2017).

Both formal tools for public consultation (i.e. submitting a *zienswijze* as response to draft policy document) as well as informal efforts for consultation exist (e.g. webinars for the new Assessment Framework for Co-Use in Offshore Windfarms). Regarding the latter, OW/2 stated “*in that sense our voice is heard. We have a constructive dialogue with Rijkswaterstaat and other relevant government departments. [...] But we want to ensure that we are consulted when there is a permit application [for multi-use]*”. That is, both formal and informal rules exist for coordinating between formal and informal institutions on respectively non-constitutional and constitutional level. Theoretically speaking, the cultural mismatch is then *mediated*. That is, according to the IIG framework the mediated cultural mismatch enables multi-use implementation. However, having formal rules in place for coordination does imply that all policy developments are agreed upon and known beforehand by non-governmental actors. Submitting a formal view on a draft policy decision, does not mean that it will be considered. A similar reasoning goes for the informal communication between the parties. This is nicely illustrated by the development of the Code of Conduct to Safely sail through Windfarms. During its development, OWE developers active in the Dutch North Sea were included and were told the policy would not apply to already operational windfarms (OW/4), as it was not taken into account in their design. Only future windfarms would be opened for vessels up to 24 meters under certain conditions. Nevertheless, the policy ended up applying to all operational windfarms (except the *Gemini* plots). Though mechanisms are in place to prevent a cultural mismatch from happening, it does not directly imply that actors are on the same page about all developments. One can even recognize a minor contradiction within the formal institutional arrangements here; the formal ambition for multi-use and the establishment of the CoP suggest that multi-use implementation is stimulated. However, this does not shine through in OWE regulations, i.e. the long time horizon of OWE development does hinder multi-use implementation.

Additionally, the long time horizon of OWE development reinforces the low-risk attitude of the developers. The OWE sector has an interest in profitably developing OWE. As the procedures are already long, they are less likely to break these open to implement any multi-use (OW/3). Again, this shows that the lack of a cultural mismatch does not mean that multi-use is enabled. Unfortunately, a lack of data exists for the potential multi-use actors, as further discussed in *Chapter 5*. Still, results indicate that the reinforcing nature may hinder

multi-use implementation as it decreases flexibility (OW/3) and room to grow to a mature sector (GO/3), both of which are identified as factors strengthening multi-use implementation. Therefore, the identification of an inter-institutional gap or not does not directly imply the identification of barriers or enablers respectively. This deviation from the original theoretical framework is further discussed in *Chapter 5*.

4.4.4| *Structural hole*

A structural hole emerges when a network of two groups of actors (operating across formal and informal institutions) are not connected, but there is a third party which ties to both parties (Rahman et al., 2017). Particularly, it looks at the relation between formal and informal non-constitutional institutions.

Currently, the government facilitates the sharing of knowledge and information between the government, the OWE sector and multi-use parties through the CoP. Whereas the CoP is part of the national government, its work is not formally guided by codified laws or regulations, i.e. it functions on a non-constitutional level. This is illustrated too by the large dependence on the effort of two responsible civil servants for its operation (GO/1). In essence, the CoP is meant to create a network, not to provide another tool to formally respond to government policy. Thereby, it does not fully address the lack of communication between developers and multi-use parties. Therefore, the structural hole is deemed only *latent*. This holds that the CoP does enable the implementation of multi-use to a certain extent by creating an opportunity to share knowledge and experiences and linking governmental actors to the market. However, hindering factors are also at play: the long time horizon of the OWE planning process complicates multi-use development, as it is unlikely that developers greatly change plans once a permit is acquired. Still due to the limited scope of the OWE permit, room exists for other uses in windfarms. More specifically, multi-use implementation is hindered as the OWE sector is uninformed about future governmental action and experiences a lack of communication with potential multi-users, leading to a hesitant attitude. Institutions such as the formal ambition for multi-use and the existence of the CoP as a network are not sufficient to counter this.

Looking beyond the structural hole, several interviewees have identified a need to have the government facilitate a preliminary consultation of potential multi-use parties and the OWE developers (OW/1; OW/3; OW/4). As shown in *Chapter 2*, a joint development of uses, which may be stimulated through early communication, can be very beneficial. However, one of the governmental representatives (GO/2) clearly stated that it is not their aim to facilitate

this. So, whilst the sector is calling for a greater involvement of the government, the government consciously decides not to take up that role.

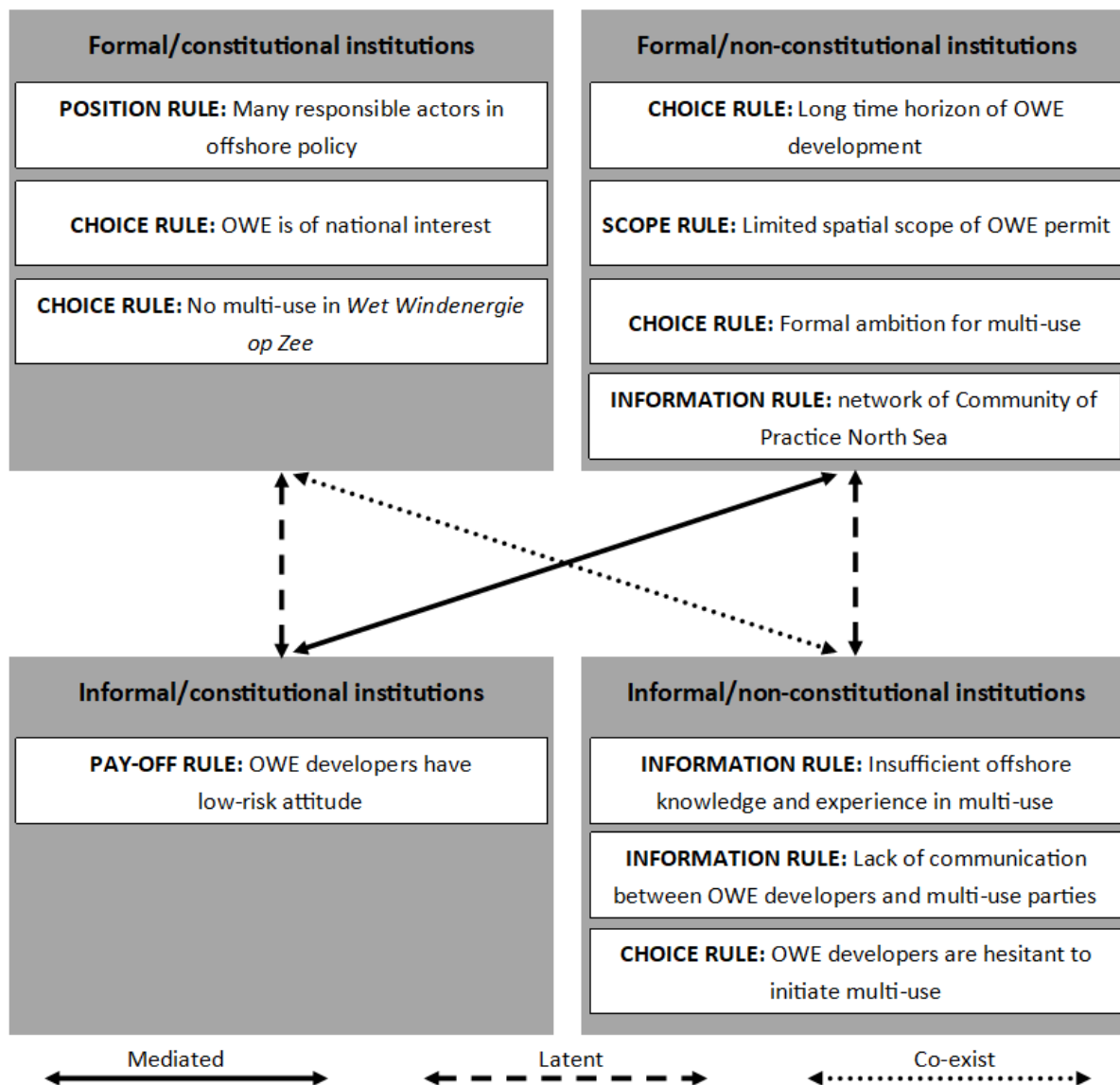


Figure 17 - Summary of resulting inter-institutional gaps in the case of multi-use implementation within offshore windfarms in the Dutch North Sea according to the IIG theoretical framework (made by author).

5| Discussion

The following chapter discusses the findings, reflects upon the present study and raises questions for further research. First, the findings are discussed with reference to present academic literature, after which the contributions of the study to planning theory and practice are demonstrated. After, the adopted research approach, data collection and personal research process are reflected upon. Finally, an outlook is presented by exploring opportunities for further research.

5.1| Discussing the findings

5.1.1| *Barriers and enablers to multi-use implementation*

The previous chapter has shown that both barriers and enablers exist in the implementation of multi-use in offshore windfarms in the Dutch North Sea. Subsequently, it is important to put to findings into perspective and see to what extent they can be generalized, correspond to current research, and contribute to planning theory and planning practice. Firstly, a mismatch is identified between the perspective of OWE developers and the governmental policy and perspective. Whilst the OWE sector is calling for greater regulatory involvement from the government, the government consciously decides to not take up that role and put financial or legal incentives in place to stimulate multi-use implementation. Nevertheless, scholars have shown that financial incentives may be beneficial to move towards a multifunctional ocean utilization outside of the Netherlands (Bocci et al., 2019; Calado et al., 2019; Schultz-Zehden, 2018). Aside from a greater regulatory role, the lack of a clear governmental vision for multi-use is reinforcing the low-risk and hesitant attitude of OWE developers. This suggest that implications of new policies best be known by stakeholders early in the development, as OWE planning processes are complex and long in nature. Again, this corresponds to findings of Bocci et al. (2019), Calado et al. (2019) and Prestrelo & Vianna (2016) who state that a clear legal framework is needed to counter either a lack of, restrictive or complex legislation. Still, results from other academic research do not directly imply its generalizability to this case. What it does suggest however, is that there is some degree of similarity between the case studies conducted in a European context, though the Dutch situation remains a unique case as OWE is largely unsubsidized. Therefore, other factors, such as cost efficiency and economic risks, must be taken seriously (I further discuss this in *Section 5.1.3*).

Other identified limiting factors hindering multi-use implementation include the low-risk and hesitant attitude of developers, lack of offshore knowledge and experience, and lack of communication between developers and potential multi-users. The results suggest that

economically, many potential multi-use combinations are not feasible yet, something Lobregt et al. (2020) have coined ‘the valley of death’. That is, an impasse exists between innovative ideas and a mature sector. This is where the willingness of the government comes into play; whereas it is not as clear-cut as previously mentioned legal, financial or technical barriers, governmental policymaking carries great implications. Though OWE only takes up a limited amount of small areas of the North Sea currently, present policy and future prediction show an exponential growth in both. Moreover, research shows that the size of the windfarm positively contributes to the economic feasibility of an additional use (Calado et al., 2019). Multi-use is thus expected to become of greater planning and economic importance, further increasing the urgency for a clear policy vision.

5.1.2 | Moving beyond the inter-institutional gaps – implications for planning theory

Firstly, the IIG framework equates the formal levels with higher governmental levels and the informal with local and/or indigenous users of natural, common-pool resources. Whereas no clear and explicit prescription of how to use the framework exist, previous interpretations and applications have limited it to resource management disputes between formal governments and informal management institutions, e.g. in indigenous communities. The framework is applied to a vastly different case here; among others, the North Sea knows no native people that reside in the area with their own institutionalized arrangements. Here, a broader perspective was taken up in which interrelations are recognized; whereas the national government mostly is most powerful regarding the formal institutional arrangements, societal stakeholders (such as the OWE sector and potential multi-users) are also of influence. A similar perspective goes the other way around, where the societal stakeholders are mostly guided by a set of informal institutional rules upon which the national government is also of influence. By recognizing the interrelations, valuable insights were gained regarding the barriers and enablers based on the IIG’s and even beyond.

By looking beyond the IIG’s identified by Rahman et al. (2017), this research also found that gaps can exist between formal institutions on the multiple scale levels. Here, the formal ambition present on a non-constitutional level does not fully correspond to the institutionalized regulations on a constitutional level, which prioritize OWE development and largely exclude multi-use from its planning process. The framework currently does not account for this incompatibility within formal or informal institutions, though a contradiction can very well exist, as shown by other research in natural resource management (Mansfield, 2004; Market et al., 2009; Sneddon, 2010). By adding a new inter-institutional gap between formal laws and formal institutionalized operational activities, to the framework – which I refer to as

‘formal institutional pluralism’ – new insights may be gained regarding the inner-workings of formal institutions across scale levels. Though no contradiction was found within the informal institutions, this also may very well exist and should be accounted for in further research efforts.

5.1.3| Tackling the barriers – implications for planning practice

Based on the findings, lessons can be carefully drawn for planning practice to further the implementation of multi-use in offshore windfarms. As stated before, the results cannot just be exported to different jurisdictions, but can only be generalized using other relevant research and needs to be adjusted to the specific national context. That is, the Dutch OWE planning process is rather centralized compared to other European jurisdictions and the lack of front-end subsidies is largely unique. Current insights for planning practice therefore focus on the Dutch context. First and foremost, it is of importance for a clear governmental vision to come rather sooner than later to address the low-risk and hesitant attitudes of OWE developers. In addition, a greater regulatory role for the government can positively contribute to the implementation of multi-use (Bocci et al., 2019; Calado et al., 2019). For instance, due to the inflexible nature of the largely centralized Dutch OWE planning process, early involvement and communication in pre-planning stages is crucial. (Bocci et al., 2019; Schultz-Zehden et al., 2018). Only then, both multi-use and OWE developers can make well-informed decisions about design, operation and maintenance of offshore activities. Also, to assist in the assessment of potential risks, the framework as developed by Van Hoof et al. (2020) may support all stakeholders, governmental and non-governmental, in a thorough assessment and appropriate management.

Above all, existing institutional networks, such as the CoP, need to be maintained and further developed to continue dialogue and cooperation (Bocci et al., 2019). So far, the CoP has proven to be successful in bringing stakeholders from all sectors together and seems to be of great importance to bridge the gap over this so-called ‘valley of death’ towards a mature sector. Whereas ongoing policy development regarding the new assessment framework for co-use and the evaluation of the policy on transit through windfarms shows the governmental recognition regarding multi-use, a generally more proactive role can bring even greater benefits to the implementation of multi-use in offshore windfarms in the Dutch North Sea.

5.2| Reflections

5.2.1| *Limitations of the study*

To present a realistic image about the utility and potential pitfalls of the present study, this section reflects upon the adopted research approach and efforts of data collection. Firstly, adopting a single case study design limits the generalizability of findings (King et al., 1994). On its own, the study cannot provide a valid empirical basis to derive lessons for other jurisdictions. However, this also was not the aim; rather, the present research aims to expand and evaluate current knowledge on multi-use in MSP. Thereby, this single case study provided an empirically-rich and context-specific case to learn from and use as a basis for further research. For pragmatic reasons, there were no options to do a similarly in-depth case study on a different jurisdiction in the same timeframe.

Regarding the data collection efforts, a conscious choice was made to conduct all interviews over the phone or videocall since in-person meetings were not possible because of the COVID-19 pandemic. Consequently, there is less opportunity to create a good interview ambience and ensure the comfort of participants. Also nuances of nonverbal cues may have been lost during both phone and videocall interviews (Given, 2008). To still establish some degree of comfort and trust, introductory emails and the interview guide including the main questions were sent after confirmation of the time and medium of the meeting. Also, the choice for medium was left to the interviewee, after which this was facilitated by the author.

Finally, the present research lacks sufficient data from the perspective of potential multi-users and multi-use combinations. This was not done purposefully or emerged from the research design, however, resulted from the lack available interviewees from that stakeholder group. Whereas a multitude of potential interviewees was approached, only one responded positively (focused on building OWE in a nature-inclusive manner). To some extent, this also paints an accurate picture of Dutch multi-use implementation, as this is the only combination that is actively stimulated in OWE policy. Still, the lack of interviewees from that stakeholder group has limited the richness of the data, which could have implications for the identified barriers and enablers. These implications were minimized to some extent by interviewees from the other two stakeholder groups who touched upon other multi-use actors active in the Dutch context and providing sufficient insights to explore the implications upon potential multi-users. However, it remains a serious limitation of the present study.

5.2.2| *Personal reflections*

In addition to the reflections upon the theoretical basis and the research design, it is also beneficial to reflect upon the personal process conducting this study. First, creating a thorough

outline of the content and a corresponding time plan greatly helped in finding a clear structure and generating simple points of action, that were easily achievable. In my experience, a large research like a thesis can be quite a daunting challenge at first, by breaking it up into smaller pieces it becomes easier to see what has to be done and has priority at any given time. One point of improvement however is to start earlier to find interviewees. More organizations were contacted who either did not answer the request or stated they did not normally contribute to student research. By doing this even earlier, more interviewees may be found whilst still having sufficient time to analyze the data afterwards. Lastly, the interview guide formulated neutral questions to avoid any response bias. Whereas I held myself strictly to the interview guide, the semi-structured nature of the interviews meant I had to improvise too and ask additional questions on the spot. Sub-questions were formulated in such a way that both extremes of the situation were mentioned. Hereby, the validity of interviews was guaranteed.

5.3| Opportunities for further research

The presented limitations of the study imply that opportunities for further studies exist. Firstly, a cross-case comparison between several European cases can provide a good starting point for further research. An in-depth exploration of multiple case studies can show the influence of legal, planning and socio-economic contexts on this specific planning process. Thereby, it may show what type of legal and/or planning system provides a conducive environment for the implementation of multi-use in offshore windfarms.

Whereas this study already added to the analytical perspective of Rahman et al. (2017), the framework can be further developed. By applying the framework to more resource management case studies and creating a multitude of interpretations, its validity can be more rigorously tested. Potentially, a wider interpretation can lead to greater contributions to the academic discipline of planning and bring additional benefits for planning practice.

Finally, a follow-up to this research may take a longitudinal perspective on multi-use in the Dutch North Sea. Much has happened over the past decades and many developments are currently underway, such as the new Assessment Framework for Co-use in Offshore Windfarms and the evaluation of the Code of Conduct to Safely Sail through Windfarms. By exploring the transition from a sectoral-managed ocean towards a true holistic and integrated ocean management including multifunctional uses, factors may be identified that contribute to such transitions in the Dutch or other national contexts. Overall, further research is needed into ocean planning and more technological innovation is needed for economically feasible uses that can hold their ground in a constantly moving and dynamic ocean.

6| Concluding thoughts

Implementing multi-use in offshore windfarms is presented as a promising tool to efficiently manage ocean space, with further advantages including ecological footprint, cost savings, and onshore socio-economic benefits (Gimpel et al., 2018; Krause et al. 2011; Kyvelou & Ierapetritis, 2019; Peng et al., 2006; Schultz-Zehden et al., 2018). To justify a holistic and in-depth case study approach by way of an institutional perspective, both MSP and multi-use are framed as wicked problems by themselves, as well as addressing wicked problems. The main research question was: ‘what institutional barriers or enablers exist in the implementation of multi-use in offshore windfarms and what does it mean for the Dutch marine spatial planning process?’ The IIG framework was used to analyze the relations between formal institutions and informal institutionalized practices on constitutional and non-constitutional scale levels. The following sections answer the sub-questions, providing a basis for the main research question to be resolved.

Exploring MSP and multi-use literature (*Sub-question 1*), it can be stated that multi-use is inherent to marine spatial planning, as many moving uses already overlap in marine spatial plans. Still, in defining multi-use, several dimensions are identified – from repurposing to true multi-functional use – and the time of development is also of relevance. Literature shows that a joint development of uses can lead to additional benefits in contrast to a staggered development of uses. Comparing it to current Dutch practice (*Sub-question 2*), the focus regarding multi-dimensionality of multi-use seems to be on the ‘co-existence’ or ‘co-location’ of uses in offshore windfarms, compared to a symbiotic or true multi-functional use which additionally implies shared services and core infrastructure. Subsequently, a staggered development of uses is more likely, as OWE is deemed of national interest and OWE developers are not legally obligated to consider it. Whereas the limited spatial scope of OWE permits and a formal ambition for multi-use legally enable its implementation, the inflexibility caused by the long time horizon for OWE development emerges as a hindering factor. Still, the existence of the CoP positively contributes to multi-use implementation by bringing together all relevant North Sea stakeholders

With regards to the informal institutions at play (*Sub-question 3*), the need for a low-risk operation of OWE guides the hesitant attitude of its developers. This is in line with literature, which reaffirms the infancy of the sector and the challenges that still need to be overcome to reach an economically feasible multi-use operation. Moreover, the lack of offshore knowledge in societal stakeholders and lack of communication between developers and multi-users hinder a synergistic development. These barriers correspond to calls from literature for greater collaboration and dialogue in cross-sectoral networks.

Exploring the relations between the formal and informal institutions at play (*Sub-question 4*) several observations can be made. First, the institutional void between governmental laws and regulations and informal institutionalized practices suggests the need for greater regulatory involvement by the government. For instance, a formally regulated preliminary consultation between developers and multi-users or implementing financial incentives for multi-use are raised as solutions which are reaffirmed by literature. Moreover, no cultural mismatch is identified according to the theoretical framework, yet that does not imply that no barriers exist. Whereas measures for formal and informal communication exist between government and non-governmental stakeholders, they come with challenges. Therefore, improvements to communication and collaboration remain necessary, as reaffirmed by literature.

Finally, legal pluralism and a structural hole are neither confirmed nor denied. These latent IIG's indicate that no barriers and no enablers are at play in the implementation of multi-use. It does hint at another important finding however, which is the willingness of the government to stimulate multi-use. Currently OWE is prioritized, partly due to the high pressure on the government for meeting their renewable energy targets. However, a more holistic approach is needed, clearly linked to other spatial planning processes, to come to a marine spatial planning practice in which multi-use is the regular instead of an exception.

Above sections have outlined several barriers and enablers. A general conclusion to the first part of the main research question articulates that legally implementation of multi-use in offshore windfarms in the Dutch North Sea is enabled. However, a wide variety of barriers does exist which mostly originate from the informal institutionalized practices and contradictions between institutional arrangements on varying scale levels. Therefore, a need emerges for multi-dimensional policy actions to improve informal institutionalized practices through regulatory and policy frameworks and to overcome technological constraints to make the transition to a mature multi-use sector. The development of the new Assessment Framework for Co-Use in Offshore Windfarms may help with this, however, needs to be carefully designed to address cross-sectoral concerns, such as OWE cost-efficiency, economic feasibility of multi-use and the lack of communication.

Lastly, it is important to look at what these influential institutional barriers and enablers mean for the Dutch marine spatial planning process – i.e. the second part of the main research question. MSP calls for an integrated and holistic approach to management, which is even more relevant when talking about co-locating multiple uses in the same area. OWE is of high interest to meet the renewable energy targets and receives greater planning, political and financial attention. Still, literature has shown the need for clear links to other spatial planning processes. Only then, the move can be made towards a joint development of uses and a true

holistic and integrated management approach. It seems to be up to policymakers and planners to see whether this fits the Dutch vision of MSP and its political context. Whereas the willingness of the government is thoroughly embedded in the governmental system and not simply changed, slight adaptations may be implemented on lower level, of which the CoP is a great example.

Overall, the government must decide to turn its written ambition into a reality and, most importantly, recognize the effects of the informal institutionalized practices on the realization of their objectives. Only then, can we overcome the challenges of multi-use implementation and prevent the future North Sea being dominated by a monoculture of windfarms.

7| Reference list

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8| Appendices

Appendix I – Ostrom's seven rules affecting the action situation

<i>Type of rule</i>	<i>Description</i>	<i>Action verb</i>	<i>Dutch action verb</i>	<i>Component of action situation</i>
Position	Create the positions that are filled by participants and to which specific action sets are assigned at junctures in a decision process.	Be	Zijn	Positions
Boundary	Define who is eligible to enter a position, the process that determines which eligible participants may (or must) enter a position, and how an individual may (or must) leave a position.	Enter or leave	Binnenkomen of vertrekken	Participants
Choice	Specify what a participant occupying a position must, must not, or may do at a particular point in the decision process, in light of conditions that have, or have not, been met at that point in the process.	Do	Doen	Actions
Aggregation	Determine whether a decision of a single/multiple participant(s) is needed prior to an action at a node in a decision process.	Jointly affect	Gezamenlijk beïnvloeden	Control
Information	Authorize channels of information flow among participants in positions at particular decision nodes, and the language and form in which communication will take place.	Send or receive	Verzenden of ontvangen	Information
Payoff	Assign external rewards or sanctions to particular actions that have been taken or to particular readings on outcome state variables.	Pay or receive	Betalen of ontvangen	Costs/benefits
Scope	Affect a known outcome variable that must, must not, or may be affected as a result of actions taken within the situation.	Occur	Gebeuren	Outcomes

Source: based on Ostrom (2005)

Appendix II – Elaborate overview of analyzed documents

Year	Title (<i>original Dutch title</i>)	Authors	Relevant section(s)	Reference ¹
2011	Integral Management Plan North Sea 2015 – Revision of 2005 management plan (<i>Integraal Beheerplan Noordzee 2015 – Herziening 2011</i>)	Interdepartmental Directors Consultation North Sea (IDON); Ministry of Infrastructure and Environment (IE); Ministry of Defense; Ministry of Economic Affairs, Agriculture and Innovation (EAAI); Rijkswaterstaat (RWS)	Chapter 3, 4, 5, and 6 (pp. 16-81)	IDON et al., 2011
2014 ²	North Sea 2050 Spatial Agenda (<i>Noordzee 2050 Gebiedsagenda</i>)	Ministry of Infrastructure and Environment (IE); Ministry of Economic Affairs (EA)	Chapter 2.2, 2.3 (pp. 25-38) and Chapter 4 (pp. 63-74).	Ministries of IE & EA, 2014a
2014	Governmental Structural Vision Offshore Wind Energy (<i>Rijksstructuurvisie Windenergie op Zee</i>)	Ministry of Infrastructure and Environment (IE); Ministry of Economic Affairs (EA)	Chapter 2 (pp. 13-22)	Ministries of IE & EA, 2014b
2014	Governmental Structural Vision Offshore Wind Energy– Note of Answer (<i>Rijksstructuurvisie Windenergie op Zee – Nota van Antwoord</i>)	Ministry of Infrastructure and Environment (IE); Ministry of Economic Affairs (EA)	Chapter 2 (pp. 7-22)	Ministries of IE & EA, 2014c
2015	National Water Plan 2016-2021 (<i>Nationaal Waterplan 2016-2021</i>)	Ministry of Infrastructure and Environment (IE); Ministry of Economic Affairs (EA)	Chapter 6, section <i>North Sea</i> (pp. 46-53).	Ministries of IE & EA, 2015a
2015	Policy Document North Sea 2016-2021 (<i>Beleidsnota Noordzee 2016-2021</i>)	Ministry of Infrastructure and Environment (IE); Ministry of Economic Affairs (EA)	Chapter 1, 2, 3, 4 and 5 (pp. 15-104)	Ministries of IE & EA, 2015b
2016	Plot Decision I wind energy area Hollandse Kust (South) (<i>Kavelbesluit I windenergiegebied Hollandse Kust (zuid)</i>)	Rijksoverheid	Complete document	Rijksoverheid, 2016a

2016	Plot Decision II wind energy area Hollandse Kust (South) (<i>Kavelbesluit II windenergiegebied Hollandse Kust (zuid)</i>)	Rijksoverheid	Complete document	Rijksoverheid, 2016b
2016	Governmental Structural Vision Offshore Wind Energy – Addition Area Hollandse Kust (<i>Rijksstructuurvisie Windenergie op Zee Aanvulling gebied Hollandse Kust</i>)	Ministry of Infrastructure and Environment (IE); Ministry of Economic Affairs (EA)	Complete document	Ministries of IE & EZ, 2016
2018	Letter to Parliament on Roadmap Wind Energy at Sea 2030 (<i>Kamerbrief routekaart windenergie op zee 2030</i>)	Minister of Economic Affairs and Climate (EAC), (Wiebes, E.)	Complete document	Minister of Economic Affairs & Climate, 2018
2018	Plot Decision III wind energy area Hollandse Kust (South) (<i>Kavelbesluit III windenergiegebied Hollandse Kust (zuid)</i>)	Rijksoverheid	Complete document	Rijksoverheid, 2018a
2018	Plot Decision IV wind energy area Hollandse Kust (South) (<i>Kavelbesluit IV windenergiegebied Hollandse Kust (zuid)</i>)	Rijksoverheid	Complete document	Rijksoverheid, 2018b
2019	Letter to Parliament on Progress of Executing the Roadmap Wind Energy at Sea 2030 (<i>Voortgang uitvoering routekaart windenergie op zee 2030</i>)	Minister of Economic Affairs and Climate (EAC), (Wiebes, E.)	Complete document	Minister of Economic Affairs & Climate, 2018
2019	Plot Decision V wind energy area Hollandse Kust (North) (<i>Kavelbesluit V windenergiegebied Hollandse Kust (noord)</i>)	Rijksoverheid	Complete document	Rijksoverheid, 2019
2020²	Negotiators Agreement for the North Sea (<i>Onderhandelaarsakkoord voor de Noordzee</i>)	Noordzeeoverleg (NZO)	Chapter 3 and Chapter 4 (pp. 14-23)	NZO, 2020
2020	Offshore Wind Energy Act (<i>Wet Windenergie op Zee</i>)	Rijksoverheid	Complete document	Rijksoverheid, 2020

Appendix III – Interview guide

Original Dutch version (English version below)

Het interview begint met een korte uitleg over het onderzoek en de rol/nut van dit interview daarin. Vervolgens wordt om goedkeuring gevraagd of het interview mag worden opgenomen, ten behoeve van de data-analyse. Doorvragen is afhankelijk van het antwoord op de initiële vraagstelling. De vragenlijst wordt de week vooraf aan het interview doorgestuurd aan geïnterviewden.

Introductie

Laten we beginnen met een korte introductie. Zoals u weet doe ik onderzoek naar de implementatie van meervoudig gebruik van offshore windparken in de Nederlandse EEZ. Hierbij kijk ik zowel naar de formele beleidskant als naar de manier waarop met dit beleid wordt omgegaan.

1. Op welke manier houdt u zich bezig met meervoudig gebruik van offshore windparken? Zijn er specifieke projecten, beleid, of regelingen waar u bij betrokken bent?
2. Wat zijn uw ervaringen met de implementatie van medegebruik van offshore windparken?

Werking van overheid in de praktijk

3. De ambitie voor medegebruik in windparken op zee wordt in vele beleidsdocumenten en kamerbrieven benoemd als belangrijke schakel in de energie-transitie voor Nederland. Is er één beleidsstuk wat bijzonder van invloed is op uw werkzaamheden en de implementatie van meervoudig gebruik van offshore windparken? En welke is dit dan?
4. Op welke manier ondersteunen deze beleidsdocumenten de implementatie van medegebruik in offshore windparken?
5. Naast de beleidsdocumenten, laat de overheid haar ambitie ook zien door middel van de Community of Practice en het TKI Wind op Zee (waarbinnen multi-use ook een programma-lijn is). Wat is de reden van het oprichten van deze initiatieven en wie is erbij betrokken?
6. Op welke manier ondersteunen deze initiatieven de potentiële medegebruikers en daarbij de implementatie van medegebruik bij windparken?
7. Zijn er naast de CoP en de TKI Wind op Zee nog meer overheidsinitiatieven die meervoudig gebruik van windparken stimuleren? En op welke manier gebeurt dit? Bijvoorbeeld door informatie te delen, subsidies te bieden etc.?
8. De overheid heeft een aantal gebruiken aangeduid als haalbaar binnen een offshore windpark. Ligt er prioriteit bij een over andere potentiële medegebruiken? Wat is in uw ogen het meest haalbaar op korte termijn?

Werking van offshore windenergie ontwikkelaars

9. Wat is jullie visie op meervoudig gebruik van offshore windparken?
10. Wat is jullie rol in beleidsontwikkeling in verband met meervoudig gebruik? Bv. in de ontwikkeling van de Gedragscode voor Veilig Varen door Windparken.
11. In hoeverre worden jullie, als OWE ontwikkelaar, gestimuleerd om meervoudig gebruik te stimuleren door de overheid?

Meervoudig gebruikers in de praktijk

12. Wat is de visie van uw organisatie op meervoudig gebruik van offshore windparken?
13. Hoe stimuleren jullie de verdere implementatie van meervoudig gebruik?
14. In hoeverre ziet u dat OWE ontwikkelaars rekening houden met de mogelijkheid tot toekomstig meervoudig gebruik?

Interactie tussen overheid en windpark ontwikkelaars/beheerders en medegebruikers

15. In hoeverre wordt er binnen een reguliere tender-procedure voor offshore windparken rekening gehouden met toekomstige medegebruiken?
16. Staan tender-procedures open voor aanvragen inclusief medegebruik en in hoeverre wordt dit meegenomen als criterium voor de besluitvorming?
17. Waar ligt het initiatief voor potentieel medegebruik binnen windparken. Ligt dit bij de overheid (bv door het uitschrijven van een tender-procedure), of bij de marktpartijen zoals OWE-ontwikkelaars (door het mee te nemen in hun plannen) of medegebruikers (die een plan hebben voor medegebruik)?
18. De overheid heeft Windenergie op zee aangemerkt als van 'nationaal belang'. Wat zijn de consequenties daarvan in relatie tot de implementatie van medegebruik?
19. Wat is de rol van de windpark beheerder in de implementatie van medegebruik?

English version

The interview starts with a short explanation regarding the research and the role and utility of the interview within that. Subsequently, permission is requested to record the interview, for the purpose of the data analysis. Further questions are asked based on the answers on the original questions presented below. This list of questions was sent to each interviewee the week before the interview.

Introduction

Let us start with a short introduction. As you know I am researching the implementation of multi-use in offshore windfarms in the Dutch EEZ. Within that, I look to the formal policy side as well as the way this policy is handled.

1. How are you involved in multi-use of offshore windfarms? Are there specific projects, policy, or regulations you are involved in?
2. What are your experiences with the implementation of multi-use in offshore windfarms?

Governmental regulations in practice

3. The ambition for multi-use in offshore windfarms is mentioned in multiple policy documents and letters to parliament as an important part of the Dutch energy transition. Is there one specific policy document of crucial importance on your work and the implementation of multi-use in offshore windfarms? And which one is that?
4. How do the policy documents support the implementation of multi-use in offshore windfarms?
5. Aside from the policy documents, the government shows its ambition through the Community of Practice and the *TKI Wind op Zee*. Why were these initiatives established and who was involved in this?

6. How do above mentioned initiatives support the potential multi-users and thereby the implementation of multi-use in windfarms?
7. Aside from the CoP and the TKI, are there more governmental initiatives that stimulate multi-use of offshore windfarms? How are they supporting? For instance, by sharing information, offering subsidies etc.
8. The government has appointed some ocean uses as feasible within an offshore windfarm. Are some uses prioritized over others? In your perspective, what second use is most feasible on a short term?

OWE developers

9. What is the vision of [your organization] on multi-use of offshore windfarms?
10. What was your role in multi-use policy development? For instance, in the Code of Conduct to Safely Sail through Windfarms.
11. To what extent are you, as OWE developer, stimulated to implement/develop multi-use?

Multi-users

12. What is the vision of [your organization] on multi-use of offshore windfarms?
13. How do you stimulate multi-use and further its development?
14. To what extent do you see that OWE developers take account of the possibility of future multi-use?

Interaction of government, OWE developers and multi-users

15. To what extent is multi-use a criterion within the current regular tender procedures for offshore wind energy?
16. Are tender procedures open for tender bids/applications including multi-use and to what extent is this assessed if included?
17. Where does the responsibility lie for initiating implementation of multi-use? For instance, at the government (by organizing specific tender procedures), at market parties such as OWE developers (by including it in their windfarms designs) or at potential multi-users (who have plans for multi-use in OWE)?
18. The government has appointed OWE as 'of national interest'. What are the consequences of this in relation to the implementation of multi-use?
19. What is the role of the OWE developer/exploiter in the implementation of multi-use?

Appendix IV – Codebook

<i>Category</i>	<i>Level of analysis</i>	<i>Description</i>	<i>Example</i>	<i>Rules*</i>	<i>Description*</i>
<i>Formal institutions in the MSP and offshore wind policy</i> 'explicit and written-down rules enforced by a defined set of actors with specific roles, such as laws, policies and their enforcement apparatus'	Constitutional	The formal processes through which non-constitutional procedures are defined.	Overarching codified laws on OWE, MSP and multi-use	Scope rules	Define the functional scope and geographic domain
				Boundary rules	Define eligible participants and method of selection
				Choice rules	Specify actions assigned to certain positions
				Aggregation rules	Determine what decisions and actors are needed prior to an action in the decision-making process
				Information rules	Define arrangements for information exchange
				Pay-off rules	Refer to (dis)incentives in terms of resources
				Position rules	Specify participants and their roles
	Non-constitutional	Formal processes through which institutions are constructed and policy decisions are made and implemented by actors, which are authorized through previous processes.	Official working rules, such as policy briefs and regulations based on implemented laws.	Scope rules	Define the functional scope and geographic domain
				Boundary rules	Define eligible participants and method of selection
				Choice rules	Specify actions assigned to certain positions
				Aggregation rules	Determine what decisions and actors are needed prior to an action in the decision-making process
				Information rules	Define arrangements for information exchange
				Pay-off rules	Refer to (dis)incentives in terms of resources available to exercise its authority
				Position rules	Specify participants and their roles
<i>Informal institutions in MSP and offshore wind practice</i> 'implicit, are enforced within certain groups, and refer to a rule system that lacks any clear specification'	Constitutional	The informal processes through which non-constitutional procedures are defined.	Customary rules in decision-making processes.	Scope rules	Define the functional scope and geographic domain
				Boundary rules	Define eligible participants and method of selection
				Choice rules	Specify actions assigned to certain positions
				Aggregation rules	Determine what decisions and actors are needed prior to an action in the decision-making process
				Information rules	Define arrangements for information exchange
				Pay-off rules	Refer to (dis)incentives in terms of resources available to exercise its authority
				Position rules	Specify participants and their roles
	Non-constitutional	Informal processes through which institutions are constructed and policy decisions are made and implemented by actors, which are authorized through previous processes.	Social habits in the implementation processes of OWE and multi-use	Scope rules	Define the functional scope and geographic domain
				Boundary rules	Define eligible participants and method of selection
				Choice rules	Specify actions assigned to certain positions
				Aggregation rules	Determine what decisions and actors are needed prior to an action in the decision-making process
				Information rules	Define arrangements for information exchange
				Pay-off rules	Refer to (dis)incentives in terms of resources available to exercise its authority
				Position rules	Specify participants and their roles

*The applicable rule levels are based on Ostrom (2005). Whereas Ostrom's thinking suggest that all rules emerge on all levels, it is not expected that data will be found for both formal and informal rules on all levels of analysis. For instance, we recognize that institutions at constitutional level are of influence for non-constitutional institutions and may fully dictate the action situation at the lower level. Additionally, some rules may only be recognized in a formal sense, whereas others are identified for both formal and informal institution

Appendix V – Governmental stakeholders and responsibilities

Actor (Dutch abbreviation)	Responsibility
<i>Ministries</i>	
Ministry of Economic Affairs and Climate (EAC)	Responsible for energy policy, including offshore wind energy, the electricity grid at sea and telecom-cables.
Ministry of Internal Affairs and Kingdom Relations (IAKR)	Together with EAC responsible for the spatial planning of large-scale energy projects, such as offshore wind energy. Also, responsible for MSP policy of the North Sea, among others through the National Water Plan.
Ministry of Agriculture, Nature and Food Quality (ANFQ)	Responsible for nature and fishing policy, as well as for environmental exemptions in the permit procedures.
Ministry of Infrastructure and Water Management (IWM)	Responsible for the permits based on the Water Act (through <i>Rijkswaterstaat</i>) as well as policy on shipping (safety) and sand extraction.
Ministry of External Affairs and Trade Promotion (EATP)	Cooperates with EAC regarding trade promotion for OWE. Both for Dutch businesses doing business abroad, or foreign business investing in the Netherlands.
Ministry of Defense	Coordinates the military defense areas at sea, and supervises the complete sea through the Coast Guard, including the areas relevant for OWE.
<i>Executive agencies</i>	
Rijksdienst voor Ondernemend Nederland (RvO)	The executive organization on behalf of the Ministry of EAC and the Ministry of ANFQ. Among others, they do the following: <ul style="list-style-type: none"> - Executes tender procedures for appointing lots for OWE. - Coordinates preparatory location research (into wind climate and soil conditions) to location appointment. - Facilitates information sessions for the OWE sector and maintains relations with companies and sector organizations (partly through the Community of Practice) - Supports the Ministry of EAC in communicating, environmental management and trade promotion - Coordinates permit procedures of large-scale energy projects and supports EAC in particular projects.
Rijkswaterstaat (RWS)	Is the executive agency of the Ministry of IWM. Regarding OWE, is responsible for: <ul style="list-style-type: none"> - ‘Manager’ of the North Sea - Appoints permits (based on the <i>Waterwet</i>) for activities on the North Sea - Supervises and enforces decisions and activities at sea - Co-writes Plot Decisions based on Offshore Wind Energy Act - Executes environmental research program on the ecological effects of offshore windfarms. - Coordinates the environmental management and communication, and regionally involved for grid connections from sea to land.

Source: *Wind op Zee, 2020*