Event Sequence Analysis: A Process Perspective on the interaction between Environmental Impact Assessment and Public Debate for offshore wind projects

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Abstract

The formal tool Environmental Impact Assessment (EIA) is to encourage the consideration of the environment in the planning and decision-making. Another purpose of the EIA arises due to the fact that the EIA is made available to inform the community of the possible impacts of the project. Therefore, the EIA may also support, oppose or mitigate the public debate and become a focus of controversy. This relation between the EIA and the public debate can be viewed from a process-oriented research methodology. The method Event Sequence Analysis can help in creating more insight in this process. This article provides the underpinning for the ESA method to research the process between the EIA and public debate and shows the added value through an empirical example. It shows how by taking a process perspective and using the ESA method new insights are created for the interaction between the EIA and the public debate.

Keywords: Event sequence analysis (ESA), Process Perspective, Environmental Impact Assessment (EIA), public debate (PD), offshore wind energy (OWE)

Introduction

In policy-making, different formal assessment tools such as cost bate analysis (CBA) or environmental impact assessment (EIA) are used (Beattie 1995). These tools are also used to view and to predetermine some of the public values related to safety, health and economy (Hertin et al. 2009). The main purpose of the EIA is to encourage the consideration of the environment in the planning and decision making phase. EIA's are made available during the project to local communities for them to be informed of the possible impact of the project resulting in another purpose of the EIA, namely to support, oppose or mitigate public controversy. Therefore, the EIA may become a focus of controversy (Beattie, 1995).

Impactful projects may generate considerable controversy (Beattie, 1995). Controversy is a dispute or debate in which divergent opinions and values are articulated. When there are many trade-offs within a project, a lot of uncertainty and even more controversy may arise, as is the case in energy projects.

(Axsen, 2014). Debates are shaped over time by the articulation of opinions and values in the media, articles or even the EIA. The shaping of those debates is also a form of assessment, only in a more informal way. That is, in such a debate people provide (more or less explicit) assessments of a project's impacts and related values such as safety, fairness of distribution of costs and benefits, costs, sustainability, etcetera. For this reason, we can refer to debates as an informal assessment.

The relation between EIA and the public debate is not a static relation and is changing over time. It may be viewed as a (dynamic) process. Process theory analyses sequences of events that lead to a certain outcome (for example: do A, then B to get to C) (Langley, 1999). Events are essential to understanding the discursive dynamics of the process and understanding patterns of events is key to developing a process theory. An event can be seen as a theoretically significant occurrence that influences the central subject (Poole et al., 2000). Events are at the heart of the explanation of the process (Sminia, 2009)(Peterson, 1998)(Poole et al. 2000). To observe the process, a deeper

study needs to be performed on the sequence of events that lead to outcomes in the process.

Event Sequence Analysis is a method that provides the tools for systematically identifying and comparing specific sequences of events (Boons et al, 2014). Event Sequence Analysis is a method to define events, the logical relation between events and how each event enables and expands other events. With ESA, it can be investigated how patterns arise, by defining the dependent variables as well as the meaning of these patterns for the future (Abbott, 1995).

To illustrate the additional value of using the ESA method for process research, the method will be used to analyse one case study, namely Gemini, an offshore wind farm that will be developed in the Netherlands. The selection of an offshore wind project is based upon a few reasons. The first reason is that offshore wind is becoming more important in the energy provision within many coastal European countries (Breton et al., 2009; Green et al. 2011). Therefore, offshore wind experienced a heightened profile in both the public debate and as a research topic (Ellis et al. 2007). Second, it seems to be a misconception that offshore wind sites are a problem-free alternative. On the contrary, the development of offshore wind projects is not without (some) opposition, conflicts or at least the lack of full support (Haggett 2011; Devine-Wright & Howes 2010; Ellis et al. 2007), thus resulting in long delays, public inquiries or on-going disputes. In their search for a deeper understanding of the public acceptance, policy-makers and professionals should take these issues into account (Ladenburg, 2008; Ladenburg, 2009). A better understanding could eventually speed up implementation of the policy programs. Therefore, it is relevant to study how the public response can be incorporated into policy decision-making (Firestone & Kempton, 2007).

This article presents the methodological approach to analyse the process between the EIA and the public debate for offshore wind. First, it is argued why to take a process perspective. Subsequently, the principles of the Event Sequence Analysis and the conceptual model for the interaction between the EIA and the public debate are explained. After that, the case will be presented and analysed concluding with a model for this process and the discussion of the applications of this method.

Outlining the perspective

Process research

Process research intends to understand how things evolve over time and why they evolve in a certain way (Van de Ven & Huber, 1990). In process research, narratives are broken down into smaller parts of data using the following sequence of questions: what happened and who did what when? The answer to the question “what happened” represents one or more events (Langely, 1999). The answer to the question “who did what” gives insight into the activities that took place and who was involved in them. Answering the question “when”, helps to pinpoint the moment in time when crucial decisions were made. There are different definitions for “process”. In this research, process is defined as: a longitudinal sequence of events (Boons, Spekkink, & Mouzakitis, 2011). The process perspective recognises a process itself as a potentially important cause of activities and outcomes. With a process research perspective, it is possible to look at what collected data will reveal about the process investigated in comparison to what we could theoretically expect to be part of the process (Boons, Spekkink, & Mouzakitis, 2011; Abbott, 1995). With a process research, one produces a form of story of the process investigated, it divides the process into smaller parts, called ‘events’, and explains the sequences of the events and how they lead to outcome(s)(Langely, 1999). Understanding patterns of events is thus key in process research (Boons, Spekkink, & Jiao, 2014; Sminia, 2009; Peterson, 1998; Poole et al. 2000).

Interaction between EIA and the public debate a process?

Environmental impact assessment (EIA) is a formal assessment tool used in policy-making (Beattie, 1995). EIA is a tool to help authorities make a decision concerning projects and spatial plan approvals. The Environmental Impact Assessment Directive (EC:85/337/EEC-EIA, 2009), which has been adopted in 1985, states that environmental consequences of projects are identified and assessed before they can be authorised (Vanderhaegen & Muro, 2005). The tool is also used to view and predetermine the potential impacts of projects related to some of the public values for safety, health and economy (Hertin et al., 2009)(Canter, 1977). The EIA helps in explaining which conditions must be fulfilled and what the possible environmental (and social) impacts on the project might be (Leknes, 2001)(Glucker, Driessen, Kolhoff, & Runhaar, 2013). EIAs are made available during the project to the local communities for them to be informed of the possible impact of the project

resulting in another purpose of the EIA, namely to support, oppose or mitigate public controversy. Therefore, the EIA may become a focus of controversy, a (public) discourse/dispute or debate concerning a matter of opinion, which could compromise its usefulness as a policy-making tool (Beattie, 1995).

Impactful projects may generate considerable controversy (Beattie, 1995). Controversy is a dispute or debate in which divergent opinions and values are articulated. When there are many trade-offs within a project, a lot of uncertainty and even more controversy, may arise, as is the case in energy projects (Axsen, 2014). Debates are shaped over time by the articulation of opinions and values in the media, articles or even the EIA. The shaping of those debates is also a form of assessment, only in a more informal way. That is, in such a debate, people provide (more or less explicit) assessments of a project's impacts and related values such as safety, fairness of distribution of costs and benefits, costs, sustainability, etcetera. For this reason, we can refer to debates as an informal assessment. Among EIA developers, project owners, a government for example, it is generally known that an EIA can be used by communities to develop or mitigate their opinions or ideas about the project (Beattie, 1995). Projects worldwide would most likely be less controversial if perspectives and concerns of different stakeholders are better understood and accommodated (Stidham & Simon-Brown, 2011). The perspectives of stakeholders tend to be shaped by their values. These values influence how they assess and perceive information from different sources. Understanding how the process of perspectives influences the shaping of values can help policy-makers to engage stakeholders more effectively (Axsen, 2014, Bond, Viegas, Coelho de Souza Reinisch Coelho, & Elig, 2010).

What makes that the relation between the EIA (formal assessment) and the public debate (informal assessment) can be defined as a process? Firstly, there is interaction between the EIA and the public debate which is shaped due to communication among groups. This communication can be interpreted as a constant negotiation. On both sides, values can change, converge or diverge, as a result of the exchange of thoughts and opinions between individuals and groups. The communication influences the way of thinking, actively or non-actively (Devine-Wright & Howes, 2010) and by that the activities (the "what?"). Second, the relation is dynamic and not static. It changes over time (the "when?"), due to the different moments of decision-making and communication among groups (the "what happened?"). There are one or multiple acts of choice, a moment or moments in an on-going process of decision making, where the decision-maker chooses a given course of action from a set of alternatives (Harrison & Francisco, 2011; Kolhoff et al., 2009; Runhaar, Dieperink, & Driessen, 2006). Lastly, the contextual influence can change as a result of decision-making outside the process or by (un-)intended events that shape beliefs or attitudes. The communication, the dynamics and the contextual influence are all important variables that influence the interaction between the EIA and the public debate, making it a process.

With a process research perspective it is possible to look what the data will tell about the process under investigation and what theoretically can be expected to be part of the process. The aim of this research is to create more insight in the interaction during decision-making between the EIA (formal assessment) and the public debate (informal assessment). By looking at the data from the process and what could be expected from the literature we aim to create more insight in the question *"How do the Environmental Impact Assessment and the public debate interact in decision-making on offshore wind projects?"*

Event sequence analysis

Explanation of the method

Common use of the Event Sequence Analysis is to understand patterns of development or to analyse effects of simple sequence effects as independent variables (Boons et al., 2014). Event Sequence Analysis is a method to define events, the logical relation between events and how each event enables and expands other events. In the Event Sequence Analysis, the central issue is to analyse if there are patterns among the sequences, either as a whole or within parts of them. With this method, questions can investigate how these patterns arise, what the dependent variables are, or what these patterns mean for the future (Abbott, 1995).

For this method, it is important to identify central subjects and relevant types of events, step 1. A central subject is an entity of any kind, such as a group of actors, an individual actor, a social movement or a machine. The events are significant changes that the central subject endures. These events can be coded to a type of event, depending on the conceptual framework (Poole et al., 2000; Boons et all., 2014). Aside from the identification of the relevant type of events, it is also important to use a theory to specify in what way the events are linked into sequences.

Providing ESA longitudinal data on the specific subject is needed, step 2. The dataset will contain raw data, empirical observations that will be ordered by date. The empirical observations are called incidents. In the data set, the incident with date, actor(s) or object(s), the action (interaction) and the source of the information will be reported. By doing so, an empirical and chronological data set will be developed for the case.

After the data is collected, the incidents are coded based on the conceptual model, step 3. Once all incidents have been coded, they are then grouped into different events: theoretically significant changes.

Once all the data for every case has been coded and categorised, the data can be analysed. Step 4 compares sequences using a theoretical template/ method for assessing similarities. Step 5 entails matching outcomes with sequence patterns.

Conceptual framework

For the Event Sequences Analysis, the relevant types of events to study should be identified based upon a conceptual framework. This conceptual framework also specifies the mechanisms that link the different types of events together into sequences (Abbott, 1995). The conceptual model will be based upon Walkers framework (Walker et al., 2011). Walker et al. (2011) developed a framework that attempts to represent the complex sets of processes, dynamics and interactions that are involved in understanding public responses to large-scale, developed, renewable energy technology developments. The choice for developing a conceptual model based upon Walker et al. (2011) is because their framework tries to represent a framework that shows three different perspectives; the process, the dynamic and the interaction perspective. The process and dynamic perspective have already been described above. In addition to that ,this study is looking at the interaction between the EIA and the public debate within offshore wind projects. This separates this framework from other developed frameworks and makes is suitable for this study.

The conceptual model contains four steps; the main interaction, expectations, actions and context. The first part, the interaction, is on one hand the EIA and on the other hand the public debate. Interaction occurs in different moments in time. Some interaction is mandatory (formal) though interaction also occurs in informal moments which is the main interaction. Second, there are the expectations. The public debate forms different expectations about aspects such as the form and impact of the project, the project developer, the process and the distribution of the benefits. The stakeholders developing the EIA also develop expectations involving the public's reaction on the process and the EIA. Stakeholders hold expectations of how the public might respond to the EIA development and contents (Pettersson, 2006). Third, actors will form kind of an engagement action. This is not a static process but rather a dynamic process that can be shown as two separate cycles, the EIA and the public debate cycle that interact throughout different moments in time. Lastly, interaction between the EIA and the public debate takes place in a context and therefore need to be added to the conceptual model. First of all, this context is important because the EIA is part of the legal system and therefore does not function independently from the contextual framework (Pettersson 2006). Secondly, the public debate also interacts with the social and political contextual environment (Bell et al. 2005). Integration of all the above parts together forms the conceptual model (Figure 1). This conceptual model will be used as the basis of the Event Sequence Analysis.

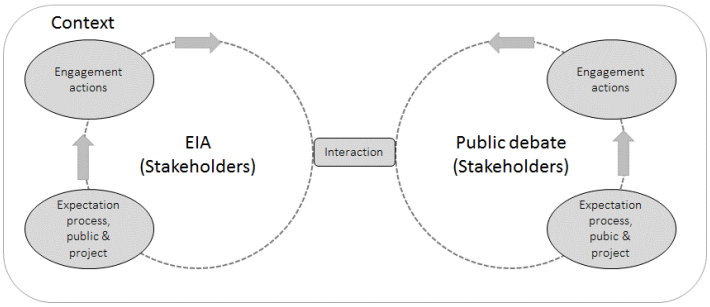

Figure 1 Conceptual model based on Walker et al., 2011.

Case study: Interaction between EIA and public debate for Gemini, Netherlands

Introduction to the case Gemini

Gemini is an offshore wind farm located in the Dutch EEZ (exclusive economic zone). It is located around 55-85km off the coast of Groningen (ARCADIS, 2011). The construction of Gemini started at the beginning of 2015. Gemini had different names during the project development plan. First, it was called BARD, and consisted of two separate offshore farms, Zee-energy and Buitengaards. After a few years, Typhoon offshore (Dutch company) took over the project from BARD Gruppe (German company) and the project received the name Gemini (twins in Latin).

What	State	What	Stat	What	State
State	Awarded SDE	Foundation	Grounded: Monopile	Length cables	102km
Developer	Van Oord nv	Area	68km2	Transmission type	HVAC
Owner	4 owners	Depth	32-34m	Voltage	220kV
Regio	North Sea	Distance shore (reported)	85km	Homes provided	424953
Capacity	600MW	Distance shore (computed)	70.2km	CO2 reduction	858830 tonnes
# turbines	150	Ports	Eemshaven. BOW Terminal-Vlissingen	SO2 reduction	19973 tonnes
Turbine model	SWT-4.0-130 (Siemens)	Connection point	Oude Schild	Expected life	20
Turbine height	154m	Landing	Oude Schild	EIA finised	October 2012
Rotor diameter	130m	Number export cables	2	Cable name	Gemini kabel/ Bard

Table 1 Technical background information on Gemini.

Data collection, coding and colligation

Primary data sources used for this case study are news items from LexisNexis, Energia and Howards Home database (ARCADIS database for news items) . Also, other sources will be used to collect additional incidents, such as governmental documents and web pages. These sources will be reported in a logbook. To validate the data, interviews with actors have been held who had an active role in the Gemini project. In total, over 200 incidents have been collected covering the period from 2006 to 2015. 83 Incidents were coded using a scheme based on the conceptual model, Figure 1.

The Reconstruction of Event Sequences

The reconstruction of the events in Gemini provide the following sequences, see Figure 2. The events are listed over time and classified in different event types based on the conceptual model. Two additional event types were added, which were important to take into consideration though did not explicitly come forward from the initiated conceptual model. The first events, coded as EIA_EIA, are events that are formal steps in the EIA procedure. Events typed in this category are the publication of the EIA study or the insight by the public on the EIA procedure. These are all formal obligations or steps in the EIA study, which are important to take into account, though do not belong to the event typed as EIA actions. The second event type that has been added is the ST, stakeholder. This event type deals with the moment stakeholders enter or leave the process. These events could not be included in the other types even though they showed interaction with the process and also affected the process. Table 2 shows the event types as well as their description. A full description of all the events can be found in the background documentation.

Event type	*Description*
EIA (EIA)	Activities aimed at the formal obligations or steps in the EIA.
Expectations (EIA)	Expectations of the EIA process or expectations of the public on the EIA process.
Actions (EIA)	Engagement actions aimed at the EIA process or on the expectations of the public on the EIA.
Expectations (PD)	Expectations of the public on the process and project.
Actions (PD)	Engagement actions aimed at the process and project.
Context	Activities that actors performed to influence the contextual process.
Stakeholders	Actors enter or withdraw from the process.

Table 2 Event types; supporting information in the background documentation.

Analysis

The analysis contains two different aspects. The first aspect is the ESA results of Gemini which will be discussed in different steps. First, the overall process will be described. After, two clusters of events will be discussed. Last, the patterns, which would be expected from the conceptual model drawn from the theory, will be shortly discussed. Through this step-by-step approach, the coherency of the sequence of events becomes clear, which is analysed in the second part.

ESA RESULTS

The process of the Gemini project comprises of 83 events, classified in different groups. When we look at the events placed on a time line, it is possible to draw a line between two groups of events. Events that happened between 2006 up to the beginning of 2011, the first round of the process, have been separated from those that took place from 2011 onwards (until begin 2015), the second round of the process. The dynamics and interaction between the process as drawn in the conceptual model is different in both rounds.

Round 1 of the process

Formal Assessment events in Round 1

Event number 2, May 2006, indicates the start of the public review on the project initiations (event 1) submitted by BARD Gruppe on the three offshore locations, Bard Offshore NI1, EP Offshore NL1 and GWS Offshore NL1. Event number 3 indicates the advice of the Ministry on the range and detail

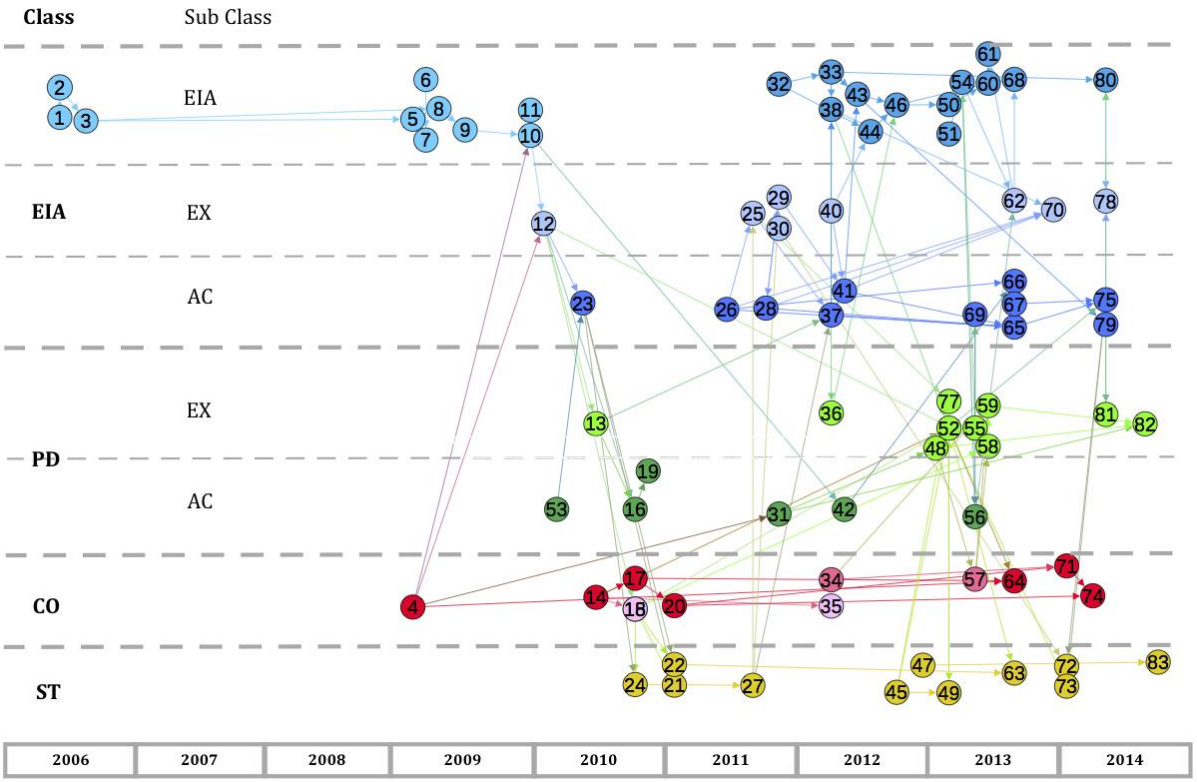

Figure 2 Linkages between identified events for Gemini project. The events are classified in main type and subtypes. The types of events belonging to the environmental impact assessment process circle are blue, sub classified in EIA, expectations (EX) and actions (AC). The public debate events are green, sub classified also in expectations and actions. Context events are red/ pink, red are the national policy, light pink are the local policy, in between are economic context events. Yellow indicated the stakeholder event type. The lines between the events mean that they link and influenced each other.

level of the EIA studies. 23 reactions were received on the project initiation documentation of Bard Offshore NL 1, 23. BARD Gruppe performed the EIA studies and the first public review period on the EIA study dated from 3-3-2009 up to 14-4 2009. In this period, the EIA commission received a total of 98 reactions on the EIA study of Bard Offshore NL1. The revisions on the EIA studies took place and in December 2009 the Wbr permits for all three locations were given (event 10) by the ministry (event 4). In January 2010, BARD Gruppe received subsidy for two of the three locations, for Bard Offshore NL1 and GWS Offshore NL1 (event 12) which was unexpected. This subsidy resulted in interaction with the informal assessment.

Informal Assessment events in Round 1

After the subsidies for the locations were allotted to the BARD Gruppe, Dutch parties were discontented (event 13). Energy Valley desired that BARD Gruppe would involve as many Dutch parties as possible for the development of the offshore wind farm (event 53) so that not all labour would go to German companies stopping the Dutch industry from profiting from the offshore development. Energy Valley convinced BARD Gruppe to involve more Dutch parties. Many Dutch parties showed interest and wanted to participate in the project (event 23). Nuon and Eneco made appeals to the Dutch court (event 16) as they did not agree with the decision of the Dutch Ministry. Nevertheless, they did not win this case, it was decided that the subsidies given to BARD Gruppe locations was based on the right grounds (event 19).

Context events in Round 1

Context events that had some influence on this interaction took place in 2010, which were mainly shaped by the Dutch national policy. Different sources claimed that this policy by the Dutch government would be too unclear for entrepreneurs to invest (event 14) making the risk for investment by Dutch entrepreneurs in this industry too high.

Round 2 of the process

After 2010, BARD Gruppe's role in the project changed and this affected the process. In August 2011, Typhoon became

the owner of the project. The switch of project leader had different influences on the whole process. Four blocks of events will be discussed.

Actions taken by FA stakeholders in Round 2

When Typhoon took over and became project owner, different actions influenced the Formal Assessment process. First of all, the project itself was changing. Initially, the farm and the station were in one proposal. However, Typhoon separated these two with the idea that it might be easier to find investors. Furthermore, the two separate parks, Bard Offshore NL1 and GWS Offshore NL1, were named Gemini. It became one project, yet with still two distinct licenses. Further to these changes, Typhoon had the opinion that the turbine type should be changed, resulting in that the EIAs made for the two locations were no longer applicable for the permits. All these actions caused for the first EIA documents requiring adjusting, meaning a second EIA study.

EIA changes in Round 2

After a while, it became apparent that the first EIA study for Gemini did not cover the new plans. In that period, the beginning of 2012, the ministry discussed performing one large EIA study for the Waddenzee for cables and pipes, for all the different aims and their effects (event 33). Event 43 indicates that the start notation now not only contains the Gemini cable but also the design of the farm.

Expectations of the IA stakeholders in Round 2

The expectations of stakeholders involved in Informal Assessment events regarding the project changed. Slowly, the project became more acceptable to them. Even more investors were found, something that was one of the main problems during the project. Step by step, the financial prospects gave the stakeholders more trust in the potential success of Gemini.

Context events in Round 2

The context in Round 2 also changed. The local political environment desired to stimulate the offshore wind industry in their area. They saw the offshore wind sector as a positive potential to generate more jobs and stimulate their local economy and even longed for more offshore wind turbines. They believed that more potential investors may be interested if TenneT would provide the offshore grid in that location. Lastly, the local Government invested in the nearest harbour, the Eemshaven making it more attractive for contractors to locate there and to stimulate the construction for Gemini at the Eemshaven. Potentially, other offshore wind farms would also be constructed there.

So between the two rounds, three main differences can be identified. In the first place, what triggers the sequence of events. The second difference that can be noted refers to the change in context. In the first part the context could be described as inconsequent. In the second part of the process, the context changed; the local government made an effort to create an environment, which would interest and attract investors. Third, the expectation in the public debate regarding the project and the owner slowly changed. In the first phase, the expectation was quite negative as the public was dissatisfied with the allocation to the German company. In the second round, the public debate became a bit more positive as now the project was in Dutch hands and the uncertainty was predominantly financial.

Cluster of events in the process

Reviewing the overall events, there was a period in which many events took place, a 'cluster', from the end of 2012 up to the beginning of 2013. This cluster can be divided into two sub-clusters. One contains many Informal Assessment (IA) events and the other many Formal Assessment (FA) events.

The first sub-cluster may be typed as an IA cluster. This cluster exists of events concerning the financial realisation for Gemini. This financial outcome was the result of finding the last investors and the last shareholders for the project, which was a major struggle. Yet when the technique changed and the EIB (European Investment Bank) signed the first loan, the trust in the project was restored. The fact that the EIB was willing to invest may be viewed as a central event (event 45) within this cluster. Once the loan was effected, other parties were more willing to invest. The reason for this was not the lack of interest for the project, but the financial uncertainty that made potential investors hesitant. Namely, event 15 indicates that companies did wish to be a part of the Gemini project. Yet event 14 also shows that the uncertainty of the offshore wind policy (context) shaped by the Dutch politics made it too risky for potential investors. Event 25 indicates that the expectations of success surrounding the project were still very low even when Typhoon took over. These events had a negative influence on achieving financial completion. The technology changed and the commitment of the EIB to the project created a shift from a low expectation of project success mid- 2011, towards a high expectation after 2013.

When the new EIA study was completed, the second sub-cluster emerges. The main input for this cluster was events indicating the change in turbine technology and the change of construction type used to attach the turbines onto the

seabed (FA event types). Other events resulting in an impact on the termination of the EIA procedure were events 55 and 56 (IA events). These events indicate the development of the controversy among the fishermen. Fishermen were concerned about the impact of the project on their own (fishing) activities (event 55) and made a formal objection to the project. Later, they withdrew this appeal due to the fact that they would be allowed to fish near the track of the cable (event 56). This ensured that the EIA study fulfilled the requirements to obtain the new Wbr license.

Within this cluster overview, two mayor completions in the project were achieved; the financial realisation and the ending of the EIA procedure. These finalisations occur almost simultaneously and together form a major cluster. Nevertheless, it can be seen that the clusters do not contain many events that are linked to both clusters. There is only one event that is connected to both sub-clusters, event 38, which is the new turbine type that required the farm to be redesigned. The redesign positively influenced the trust in the project. Due to this increase of trust, Typhoon was finally able to close the deals with investors. Also, the new technological design of the farm and its cable making a new EIA study necessary. The technical change has been important for both sub-clusters and therefore also the major cluster. Therefore, even the clusters are seen about the same time although they do not have many connections with each other. The connection between the two is the technology change, which positively influences the trust by investors and therefore financial closure was attained and the EIA study could be closed.

SEQUENCES

A sequence of events can be described as a pattern. Process theory helps us to understand patterns in events. In process theory, it is key to conceptualise the events so that patterns among them can be detected (Langley, 1999). Step one is to identify the event sequences in the overall event web. Step two is placing the events of the sequence in the conceptual model to identify the pattern. Step three is about identifying the mechanism that drives the pattern. Different sequences, patters and driving mechanisms have been identified.

First, the analysis showed that some sequences that were identified followed the pattern as defined by the theory. Where expectations are formed by either the stakeholders of the EIA or the public debate, those expectations are then followed by actions of the respective party. After that, the other party forms expectations and reacts again. It is a sequence of expectations formed by one group resulting in an action, based on which another group might form (or reform) their expectations and react in turn. This most common pattern can be pointed out as the linear sequences.

Second, the analysis indicated a different number of driving mechanisms lying behind the patterns. The mechanisms can either be classified as contextual variables or non-contextual variables. Non-contextual mechanisms that where identified all have to do with the stakeholders, namely the level of involvement, stakeholder switch and stakeholder's position change. Contextual mechanisms that were identified are "Place and Community", "Local Policy", "National Policy", "Economic and Business" and "Social-Economic System" which are briefly discussed below.

Economic & Business and Place & Community

These two mechanisms were for example identified in the events concerning the fishermen. Event 55 represents the expectations of the fishermen who were involved in the public debate. The effect of those expectations was a public review of the EIA study, forming an interaction between the stakeholders in the two process circles. After this viewing, it became clear to the stakeholders involved in the formal process, that there were objections and concerns against the project and that made that the stakeholders formed expectations regarding the public. This caused Typhoon (involved in the formal assessment) to react on the matter, event 69, which is an action. They made clear that the fishermen would be allowed to fish also during construction of the cable, thereby addressing the main cause of discontent among the fishermen. Consequently, the fishermen dropped their appeal against the EIA, event 56. This effected a change in the expectations of Typhoon (and others) regarding the process and the public, event 62.

The first mechanism that drives this pattern could be clarified by the contextual variable of "Economic and Business" (defined by Walker et al. (2011)). Gemini would be constructed within the waters of the fishermen. If the fishermen would not have been able to fish during a certain time period, this would have affected their income. One value that would have been harmed due to this is "economic benefit". Likely, the fishermen would not have benefited from the project but only be disadvantaged by it. By ensuring them that they would still be allowed to fish, their fear for economic loss was reduced. Also, the reaction of Typhoon can be explained by the context variable of "Economic and Business". Typhoon feared that the appeal of the fishermen against the EIA could negatively affect the project. It was their fear that the appeal could result in

project delay, mandatory adjustments or, in a worst case scenario, the cancellation of the project. All these scenarios caused concern for the profitability of their business.

Another mechanism that can be seen here is the context variable "Place and Community" (defined by Walker et al. (2011)). Gemini is located far from shore which made that a smaller amount of people had an attachment to the location. However, for the fishermen, the location was an important aspect. Especially the location of the cable was a factor which raised public discussion among the fishermen. The fishermen formed expectations based on the location and formed actions based on these expectations. For them the location influenced the evolution of events and by that the process.

Social-economic system

Social-economic was a driving mechanism for Energy Valley. The start of the pattern is event 12, where expectations were formed by BARD Gruppe regarding the further process as now they had received the permissions for construction. However, BARD Gruppe did not expect an action from Energy Valley, event 53. Even though event 12 was the inducement of the action of Energy Valley, this interaction is depicted by a dotted line to show that it is a non-intended interaction between the events. After the reaction of Energy Valley, an intended action was given by BARD Gruppe.

The mechanism driving the pattern can be described as the context variable "Social-economic system" (described by Kolhoff et al. 2009). Energy Valley (organisation that represents the local policy) wanted to protect the local economic situation and feared the lack of participation of local companies. They wanted to reassure that their local economy would benefit from the project with an equal distribution of the benefits by having local businesses participate in the project. If the work had gone to German , this could have harmed their economic situation. This mechanism is described by Kolhoff et al. as the social-economic system and can be pointed out as the driving mechanism behind the action 53 (IA event).

Local and national policy

The province of Groningen saw the advantages of offshore wind development in the Waddenzee (event 34). Offshore development near Groningen could generate jobs. Local political parties in Groningen stated that they preferred more offshore wind energy in open sea than on land (event 57). Ameland and its inhabitants were not happy with those local policy goals, they did not want more offshore wind energy near their island (59). The moment it became clear that the national policy had not selected the Waddenzee for more offshore wind energy (59), Ameland and its people were relieved.

The driving mechanism behind the pattern can be identified as the "Local Policy" but also the "National Policy". Note that here the mechanisms behind the patterns are also classified as an event, for the reason that they were mentioned in the media and are a theoretically significant occurrence, namely a decision.

The local policy-makers influence the expectation of the public in the first phase of the pattern. The local policy-makers wanted to find drivers for this project and any possible further projects. They wanted more local profit and consequently they formed a strategy. To stimulate this, they used a number of policy tools. One was to make the area more attractive for companies to settle. They invested and redesigned parts of the Eemshaven on only to make it suitable for Gemini onshore constructions, but also to attract other companies. The local Government also lobbied within the national Government for more offshore development. They set a quota for the number of inhabitants who would be employed in the offshore wind industry, getting at least 1'000 inhabits of Groningen to be employed in the offshore wind industry by 2030. The local policy with its policy tools affected the expectations of the inhabitants of Ameland.

The national policy made that the expectations of the inhabitants of Ameland changed. The national offshore wind policy was changing during the Gemini project. In the beginning of the process, the national policy was unclear. Around the year 2013, there was a lot of debate about the offshore wind policy. Mainly on whether or not the locations should be constructed closer to shore. The final decision that the Waddenzee would not be an offshore wind location made that the expectations changed and affected the process pattern.

Stakeholder

Furthermore, in some patterns we saw that when a stakeholder switches its position, or enters, this can be a mechanism that drives a pattern. One reason for this is that a stakeholder has expectations that can change when it changes its position within the own group. The stakeholder can adjust its expectation to fit its new role. Another reason can be that a stakeholder has more influence on actions because its position changed.

Also, the moment in time that a stakeholder is included in the process can be a driving mechanism. The fishermen, as well as nature and wildlife organisations, regarded Gemini as being situated in their backyard. The fishermen objected whereas the wildlife organisations did not. This can be explained by the fact that the project owner and initiator were actively consulted with the nature organisations at a very early stage of the project, which was not the case with the fishermen. The difference was therefore that the nature organisation had room to discuss their options and concerns, something the fishermen couldn't. The result was that the fishermen took action which resulted in a pattern.

MODEL

So overall, the initial conceptual model gives a valid representation of interaction between the EIA and the public debate. Figure 3 is the model that characterises the interaction between the EIA and the public debate for offshore wind projects. This model illustrates the linear sequence of events that can be expected. Further to that, the important mechanisms that drive patterns, non-contextual and contextual, are added to the model. It is important to keep in mind that the patterns itself are more predictable and mainly follow the linear sequence. However, the effect of the mechanisms on the patterns is less predictable. Thus, it is important for decision-makers to be aware of the mechanisms and their potential effect on the patterns. That way, a decision-maker can influence the mechanisms directly or indirectly by anticipating on them.

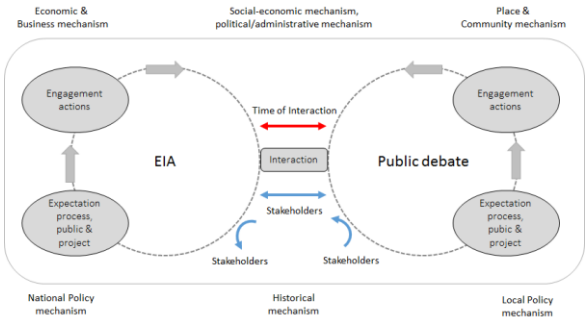

Figure 3 Model for the process between the EIA and the public debate.

Relevance for Future Research and Practice

As the illustration case shows, ESA allows a careful reconstruction of the process. It has been made clear that the application of ESA for the analysis of the data set has been very productive indeed and has provided a new analytical insight into the interaction between the EIA and the public debate. The application enables the researcher to carry out a critical assessment on what is observed in the process data and what theoretically is expected to be part of the process. The following intermediary results have further contributed to this outcome.

First, the ESA method has made it is possible to reconstruct the process in detail over time. With ESA it is possible to draw one big event web, which represents a reconstruction of the process. This event web gives a good overview of when an event occurred, what type of event it was and how it affected other events. Second, with ESA a process is reconstructed as a group of event sequences, making it possible to create insight in a particular part of the process. Third, ESA makes it possible to identify patterns among events. The sequences can be investigated separately and are compared with what would be expected from the theory as well as what can be deducted from the research. Fourth, theoretically founded propositions about certain roles or mechanisms concerning the process can be researched. Fifth, the ESA creates insight in the moment an event occurs and because of what other event it might occur. The insight in the moment of time of an event in the process can provide additional value for a project owner and stakeholder.

For the purpose of this study, ESA has only been performed on one case. If the number of case studies would be increased, it would enhance the insight in the sequences of events and by that the relation between the EIA and the public debate.

Nevertheless, the ESA method also has limitations. The first limitation is the amount of data that need to be collected, this could in some situations be a barrier. Besides, ESA is a rather time-consuming method which makes it harder to apply the method on many cases, which would be required to create more insight in the patterns and mechanisms. is the method being time-consuming is partly due to the coding of the incidents, something that also causes limitations. Namely, even though the coding is based on an underlying theoretical model and is carried out very carefully, there is always a factor of individual implementation of the researcher. However, complementary with other methodologies, ESA is a suitable method to create insight in processes oriented questions.

Reference

ARCADIS (November 2011). Milieueffectrapportage – wat, waneer en hoe? Minihandleiding milieueffectrapportages en –beoordeling.

Abbott, A. (1995). Sequence Analysis : New Methods for Old Ideas. *Annual Review of Sociology*, *21*(1995), 93–113.

Beattie, R. B. (1995). Everything You Already Know About Eia (But Don ' T Often Admit). *Urban Studies*, *9255*(95), 109–114.

Bell, D., Gray, T. & Haggett, C., 2005. The "Social Gap" in Wind Farm Siting Decisions: Explanations and Policy Responses. *Environmental Politics*, 14(4), pp.460–477. Available at: http://www.tandfonline.com/doi/abs/10.1080/09644010500175833 [Accessed October 14, 2014].

BMM, index @ www.mumm.ac.be. Available at: http://www.mumm.ac.be/NL/index.php [Accessed March 30, 2015].

BSH, (2008). Wind Farms. Bundesamt fur Seeschiffahrt und Hydrographie, Berlin.

Boons, F. a. a., Spekkink, W., & Jiao, W. (2014). A Process Perspective on Industrial Symbiosis. *Journal of Industrial Ecology*, *00*(0), n/a–n/a. doi:10.1111/jiec.12116

Breton, S.-P. & Moe, G., 2009. Status, plans and technologies for offshore wind turbines in Europe and North America. *Renewable Energy*, 34(3), pp.646–654. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0960148108002243 [Accessed November 24, 2014].

Cuppen, M., Broekhans, B., & Enserink, B. (2012). Public participation in EIA and attitude formation. *Impact Assessment and Project Appraisal*, *30*(February 2015), 63–74. doi:10.1080/14615517.2012.660348

Canter, L. (1977). *Environmental impact assessment*. Retrieved from ftp://www.energia.bme.hu/pub/hullgazd/Environmental Engineers' Handbook/Ch02.pdf

Devine-Wright, P. (2005). Beyond NIMBYism: towards an integrated framework for understanding public perceptions of wind energy. *Wind Energy*, *8*(2), 125–139. doi:10.1002/we.124

Devine-Wright, P. & Howes, Y., 2010. Disruption to place attachment and the protection of restorative environments: A wind energy case study. *Journal of Environmental Psychology*, 30(3), pp.271–280. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0272494410000174 [Accessed October 25, 2014].

Devine-Wright, P. (Ed.). (2014). *Renewable Energy and the Public: from NIMBY to Participation*. Ch 1 Symmetries, Expectations, Dynamics and Contexts: A framework for Understanding Public Engagement with Renewable Energy Projects, Routledge.

European Commission, 2001. Guidance on EIA. *Environment Themes*, 1, pp.1–29.

EC:85/337/EEC-EIA. EC directive 85/337/EEC -EIA, Communities 1–19 (2009). Retrieved from eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1985L0337:20090625:EN:PDF

Ellis, G., Barry, J., & Robinson, C. (2007). Many ways to say "no", different ways to say "yes": Applying Q-Methodology to understand public acceptance of wind farm proposals. *Journal of Environmental Planning and Management*, *50*(4), 517–551. doi:10.1080/09640560701402075

Firestone, J., & Kempton, W. (2007). Public opinion about large offshore wind power: Underlying factors. *Energy Policy*, *35*, 1584–1598. doi:10.1016/j.enpol.2006.04.010

Glucker, A. N., Driessen, P. P. J., Kolhoff, A., & Runhaar, H. a C. (2013). Public participation in environmental impact assessment: Why, who and how? *Environmental Impact Assessment Review*, *43*, 104–111. doi:10.1016/j.eiar.2013.06.003

Green, R. & Vasilakos, N., 2011. The economics of offshore wind. *Energy Policy*, 39(2), pp.496–502. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0301421510007615 [Accessed November 22, 2014].

Haggett, C. (2011). Understanding public responses to offshore wind power. *Energy Policy*, *39*(2), 503–510. doi:10.1016/j.enpol.2010.10.014

Hertin, J., Turnpenny, J., Jordan, A., Nilsson, M., Russel, D., & Nykvist, B. (2009). Rationalising the policy mess? Ex ante policy assessment and the utilisation of knowledge in the policy process. *Environment and Planning A*, *41*(5), 1185–1200. doi:10.1068/a40266

Ladenburg, J. (2008). Attitudes towards on-land and offshore wind power development in Denmark; choice of development strategy. *RenLadenburg, J. (2008). Attitudes towards on-Land and Offshore Wind Power Development in Denmark; Choice of Development Strategy. Renewable Energy, 33(1), 111–118. doi:10.1016/j.renene.2007.01.011ewable Energy*, *33*(1), 111–118. doi:10.1016/j.renene.2007.01.011

Ladenburg, J., 2009. Visual impact assessment of offshore wind farms and prior experience. *Applied Energy*, 86(3), pp.380–387. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0306261908001323 [Accessed November 16, 2014].

Langley, A. (1999). Strategies for theorizing from process data. Academy of Management Review, 24(4), 691-710

Leknes, E. (2001). The roles of EIA in the decision-making process. *Environmental Impact Assessment Review*, *21*, 309–334. doi:10.1016/S0195-9255(00)00081-0

Perry, C., 1998. Processes of a case study methodology for postgraduate research in marketing. *European Journal of Markering*, 32(9), pp.785–802.

PETERLIN, M., KROSS, B.C. & KONTIC, B., 2006. INFORMATION IN AN EIA PROCESS AND THE INFLUENCE THEREOF ON PUBLIC OPINION. *Journal of Environmental Assessment Policy and Management*, 08(02), pp.183–204. Available at: http://dx.doi.org/10.1142/S1464333206002426.

Pinho, P., McCallum, S. & Cruz, S.S., 2010. A critical appraisal of EIA screening practice in EU Member States. *Impact Assessment and Project Appraisal*, 28(February 2015), pp.91–107.

Portman, M., 2009. Involving the public in the impact assessment of offshore renewable energy facilities. *Marine Policy*, 33, pp.332–338.

Rijksoverheid. (2014). *Haalbaarheidsstudie Windenergie op Zee binnen de 12-mijlszone*. Den Haag. Retrieved from http://www.noordzeeloket.nl/images/Haalbaarheidsstudie Windenergie op Zee binnen de 12-mijlszone_3381.pdf

Runhaar, H. et al., 2013. Environmental assessment in The Netherlands: Effectively governing environmental protection? A discourse analysis. *Environmental Impact Assessment Review*, 39, pp.13–25. Available at: http://dx.doi.org/10.1016/j.eiar.2012.05.003.

Runhaar, H. (2009). Putting SEA in context: A discourse perspective on how SEA contributes to decision-making. *Environmental Impact Assessment Review*, *29*(3), 200–209. doi:10.1016/j.eiar.2008.09.003

Runhaar, H., Dieperink, C., & Driessen, P. (2006). Policy analysis for sustainable development: The toolbox for the environmental social scientist. *International Journal of Sustainability in Higher Education*, *7*(1), 34–56. doi:10.1108/14676370610639236

Sminia, H. (2009). Process research in strategy formation: Theory, methodology and relevance. *International Journal of Management Reviews*, *11*(1), 97–125. doi:10.1111/j.1468-2370.2008.00253.x

Vanderhaegen, M., & Muro, E. (2005). Contribution of a European spatial data infrastructure to the effectiveness of EIA and SEA studies. *Environmental Impact Assessment Review*, *25*, 123–142. doi:10.1016/j.eiar.2004.06.011

Ven, A. H., & Poole, M. S. (1990). Methods for Studying Innovation Development in the Minnesota Innovation Research Program. *Organization Science, 1*(3), 313-335.

Waterplan, N., Kust, H., & Noorden, T. (n.d.). Rijksstructuurvisie Windenergie op Zee.

Wolsink, M., 2006. Invalid theory impedes our understanding : a critique on the persistence of the language of NIMBY. , (2002), pp.85–91.

Wolsink, M., 2000. Wind power and the NIMBY-myth: Institutional capacity and the limited significance of public support. *Renewable Energy*, 21(1), pp.49–64. Available at: http://onlinelibrary.wiley.com/doi/10.1111/j.1475-5661.2006.00191.x/full [Accessed November 21, 2014].

Wolsink, M., 2007. Wind power implementation: The nature of public attitudes: Equity and fairness instead of “backyard motives.” *Renewable and Sustainable Energy Reviews*, 11(6), pp.1188–1207. Availabl

Zaken, M. V. A. N. E., En, L., & Offshore, T. (2012a). MER WINDPARKEN GEMINI.

Zaken, M. V. A. N. E., En, L., & Offshore, T. (2012b). Samenvatting mer windparken gemini.