

“Knowing which way the wind is blowing”

Cooperation and its effect on the realization of onshore wind farms in the Netherlands



Figure 1: front image (Lagerwey, 2017)

Cooperation and its effect on the realization of onshore wind farms in the Netherlands

A quantitative analysis on the relation between the presence of a cooperative and the chance of receiving a permit and the chance of realization of onshore wind farms

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Preface

Before you lies the master thesis “Knowing which way the wind is blowing”, the basis of which is desk research which resulted in a dataset on more than 350 cases of onshore wind farms in the Netherlands. This thesis has been written to fulfill the requirements to graduate for the masters program in planning at the Radboud University in Nijmegen. The research and writing process took place from March to September 2019.

The research question for this thesis has been formulated together with my supervisor, Huub Ploegmakers and although the process was not always easy, my supervisor was almost always available to answer my question. Therefore I would really like to thank my supervisor for his guidance and support during this process, without him I would not have been able to find my way thru the ‘jungle’ of statistics.

I would also like to give a special thanks to my research colleague Jaclijn Matijssen, with whom I conducted the data collection. We also worked closely in the data analysis and the overall process of our thesis writing. She offered me support and someone to spar with.

Last but not least I would like to thank my boyfriend René and my family for their everlasting support.

I hope you enjoy reading this research.

Wieke Veenhuizen

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Summary

As climate change is becoming more visible and apparent, an increasing number of people are realizing that something has to change in human society to try and limit the consequences of human behavior. Temperatures are rising and so are the sea levels. Freak storms, bush fires, droughts and heavy rains are becoming more frequent and causing more damage through flooding of areas and failed harvests. There is a resistance towards the whole idea of the energy transition as well as resistance against small parts of the energy transitions, such as the development of onshore wind farms. On the other hand, there are of course also people that are under the impression that not enough is being done.

Concrete measures the Dutch government is taking are for example that in July 2018 a first draft version of the '*klimaat akkoord*' was distributed. In this proposal many points on the subject of energy transition were mentioned but one that stood out was the goal of realizing more cooperation and support within the society before 2050. Cooperation and support are essential for the energy transition and therefore there is an ambition to make sure that at least 50 percent of the new renewable energy production onshore would be in the hands of the local environment (Nijpels, 2018). According to the government, cooperation should become an intricate part of the energy transition. It is anticipated that cooperation will make the energy transition easier by including the citizens, it can also make it more difficult by for example elongating the process by including all different opinions.

This research investigates whether the presence of a cooperative has an effect on the chance of receiving a permit and the chance of realization of onshore wind farms. Does cooperation increase the chance of receiving a permit and the chance for realization or does it elongate the process? The dataset includes 352 onshore wind farms in the Netherlands of which all sorts of data has been collected. This quantitative research covers the effect of cooperation, but it also includes several control variables such as locational factors, the number of turbines and if the project has been realized yet or not.

With the use of the cox regression analysis, the main question of this thesis could be answered. The conclusion is that presence of a cooperative does have an influence on the chance of receiving a permit but not on the chance for realization of a wind farm project. It seems to have a positive influence and causes for wind farms to receive a permit quicker and more easily. The realization chance is however not significantly influenced. Of course there are some critical comments to be made on the overall process. The dataset could have had even more variables and some variables could have been included differently, with for instance a different measuring scale.

Future research can either broaden the dataset with more variables or increase the amount of cases by also looking at other countries or even continents. Future research can also built upon the outcome of this research and look deeper into the relation between cooperation and the realization of wind farms. The other opportunity for further research lies within the qualitative research which can provide more answer into the relation.

1. Introduction

This chapter contains the introduction to this study. The chapter will start with paragraph 1.1, the introduction to the subject, and then in paragraph 1.2 the research aim can be found. In the third paragraph, the research questions are discussed. The whole research is built around these questions and they form the main line throughout this study. Lastly paragraph 1.4 discusses the societal and scientific relevance of this research.

1.1 Introduction

Over the last few years the effects of climate change have become more apparent to a lot of people across the globe. Temperatures are rising and so are the sea levels. Freak storms, bush fires, droughts and heavy rains are becoming more frequent and are causing more damage through the flooding of large areas and by spoiling harvests. People around the world are becoming more susceptible to the possibility that the climate is changing and will affect more and more people's daily lives. They are realizing that action needs to be taken before the effects of climate change are irreversible. For some people change through action is happening way too fast, others think it is happening way too slow and not enough is being done about the imminent climate change.

In the Netherlands there is an increasing amount of attention in daily news reports for climate adaptation but even more so for climate change mitigation. For example, the NOS coverage of the Belgian climate march on the 27th of January 2019, where over 70.000 people gathered in Brussels and marched towards the European Parliament building. The message they wanted to convey: "the government does not take the climate problem seriously" (NOS, January 27, 2019). Another example is Urgenda suing the Dutch government for not doing enough to protect the Dutch population from the consequences of climate change. According to Urgenda, the government should be limiting the amount of greenhouse gasses emitted by at least 25 percent relative to the year 1990. The emissions have however not decreased since then. Urgenda sued the Dutch government over this and won the case and as a result the judge ruled that the government must reduce the amount of emissions by at least 25 percent in the year 2020 (Urgenda, 2019).

Among people that protest, some say that most can be gained by addressing the big polluters such as large industrial companies. These industrial companies, however are often being relieved of their obligations towards the environment and the consumers and citizens are the ones that have to pay *the bill*. The external costs often must be paid by the users of products, and not by the polluter himself (Volkskrant, 2018). To many people, this does not seem fair.

There are complaints about not doing enough but there are also complaints of enforcing too much. As there can also be found wide resistance against the energy transition in the Netherlands. During the municipal elections in early 2019, for example, there was an enormous increase in people voting for the right-wing FvD (Forum voor Democratie). The FvD does not believe in climate change and does not see any point in investing money into this cause. Some people claim that the energy transition, that the Dutch government is pushing for, is creating an even bigger gap between the higher and lower educated people and the rich and poor. There are people who see no other way forward then going 'green', and others that are more invested in the question of who is going to pay for the energy transition (Cuperus, 2018). A part of this resistance towards the energy transition, is aimed at the development of onshore wind farms. It is this part that we will look at specifically in this study.

In the Netherlands, wind parks have faced strong local resistance (Oteman, Wiering & Helderman, 2014). The example of the wind farm planned of the N33 in Groningen is one case in which local residents came together to try and stop the realization of this wind farm. It seems that the amount of pressure the local government put on the realization of the farm caused a significant reduction in the support of the local residents for this project. Locals are now protesting with the use of Hitler posters,

piles of asbestos dumped in the middle of the street, and the occupation of city hall (NOS, January 24, 2019). The residents whom have grouped under the name 'tegenwind n33' feel ignored and do not feel heard by the government. This discussion has been going on for eight years already (Stichting Tegenwind N33, 2019).

The case of the wind farm near the N33 is a perfect example of the Not In My BackYard (NIMBY) concept. Sir Anthony Jay (2005) defines NIMBY as: 'any citizen, who tries to defend their home and their neighborhood from plans which would destroy the view, pollute the environment, overload the transport network, upset the ecosystem and knock £50,000 off the value of their house. When it comes to our own backyard, we are all nimby's, every nimby deserves respect for standing up to corporate and government giants' (Jay, 2005). Wolsink (2017) tells us that public attitudes towards wind power are fundamentally different from attitudes towards wind farms. There is a gap between the two that causes misunderstanding and negatively influences public support for renewables. When planners are not aware of this gap and too easily assume that support for renewables can be improved by information campaigns emphasising the environmental benefits this can lead to issues. What planners should potentially be focusing on to tackle the opposition to renewable energy schemes is a selfish 'not in my backyard' attitude as Wolsink (2007) describes. But is this a conclusion one can make so easily?

An example of concrete measures that the government is taking to achieve the energy and climate goals, is the first draft version of the climate bill that was distributed in July 2018. In this proposal many points on the subject of energy transition were mentioned but one that stood out was the goal of realizing more cooperation and support within the transition. According to the government, cooperation should become an intricate part of energy transition. Therefore, the ambition is to make sure that at least 50 percent of the new onshore renewable energy production would be in the hands of the local governments (Nijpels, 2018). As it is very possible cooperation will make the transition process easier by including the citizens, it can also make it more difficult. For example, taking all different opinions into consideration can significantly slow down the entire process.

In realizing wind farms in the Netherlands, the first hurdle to overcome is local politics. When a Dutch municipality does not take a proactive stance towards adjusting or adapting the local land use plan, in order to develop a wind farm, a wind power entrepreneur is already set back. This often happens and causes most projects to fail during the local political debate. They often do not make it to the actual permission procedures (Agterbosch, Glasbergen, and Vermeulen, 2007).

Only a limited amount of research has been conducted on the effects of cooperation on the chance of receiving a permit and the chance of the realization of wind farms, as it is an issue that only recently gained interest. To add to the knowledge on this topic, it is important to build upon theories and methods of earlier research that has been done on the topics of participation and cooperation, the energy transition, NIMBY and the realization of onshore windfarms. Does the presence of a cooperative have an effect on the development of wind farms, and what if so, what kind of effect is it? Does it slow the process down or speed it up? This research will attempt to figure out these relations between cooperation and the realization process of onshore wind farms in the Netherlands, by doing quantitative research.

1.2 Research objective

This research will focus on cooperation, participation, and wind co-operations in particular. It is very important to have a basic understanding of these concepts in the Netherlands and how they work. Who is likely to participate and how can cooperation be encouraged? How can you get people to want to be involved in a certain process? While these questions will not be answered in this research it is extremely important to know this information in order to find out the effects of cooperation on the realization of onshore wind projects. The goal of this research is:

'To find out if the energy transition can happen more quickly when a cooperative is present. In order to do this we will look at whether the presence of a cooperative increases the chance of receiving a permit and the chance of the project being realized.'

In the Netherlands opinions are very divided on what is the correct way to deal with climate change and its effects. But the government has reached one consensus on climate change mitigation. As mentioned previously, the climate bill states that at least 50 percent of the renewable energy production should be in the hands of local residents and companies. In order to make this happen, this statement creates the need for more information and knowledge on the topic of participation and cooperation. This research has focused on wind cooperation's and the effect they have on the realization of wind farms in the Netherlands. Other factors that have been included are location, local policy (changes) and the local support for a wind farm. After analyzing cooperation as a factor, the focus will shift to other factors influencing the realization of wind farm projects. Factors like availability of financing, the location and the support of the local environment. These factors will be conceptualized based on available literature.

1.3 Research question

To achieve the research goal described in paragraph 1.1, the main research question has been formulated as follows:

'To what extent does the presence of a cooperative influence the chance of receiving a permit and, the chance of realization of onshore wind farms in the Netherlands'

Because of the institutional need for more citizen cooperation in Dutch spatial planning, research should be done on this subject to make sure decisions made are thoroughly analyzed and not made in a rush. As there is a shift from a traditional top-down approach towards a more bottom-up oriented approach there is a need for more cooperation in all layers of society. What are the effects of this cooperation in the realization of onshore wind farms in particular? To narrow down the scope of this study, the following sub questions have been formulated.

'Does the presence of a cooperative have an effect on the chance of receiving a permit for a wind farm?'

The first sub question helps to answer the first part of the main question. By researching the relation between the presence of a cooperative and the chance of receiving permit, one can see if there is a relation and if this relation is positive or negative. The results from this can be used to base future research on.

'Does the presence of a cooperative have an effect on the chance of the realization of a wind farm?'

This second sub question answers the second part of the main question and gives, just as the first sub question, opportunity to do further research on the topic.

'What factors other than cooperation influence the chance of receiving a permit and realization of wind farms?'

This last sub question includes the necessary control variables. There are many factors that influence the realization of wind farms to various degrees. By clarifying each of these factors it will become more clear what part the presence of a wind co-operation plays in the whole process.

1.4 Relevance

1.4.1 Societal relevance

The societal relevance of this research lies in the fact that there is a change happening in the way we produce energy. Our energy supply is still largely dependent on fossil fuels, and these resources are becoming scarcer. This results in increasing prices, costs and a burden for societal and economic progress. The use of fossil fuels is not only a burden on our economy but also a burden on the environment (milieu central, 2019). The latter is becoming more important nowadays. By increasing the production of renewable energy, the Netherlands can become less dependent on fossil fuels and decrease the emissions of greenhouse gasses.

Secondly, citizens of the Netherlands are considered active in cooperation and they want to contribute to modern society by undertaking action themselves and organize initiatives as can be seen by the increase in the number of energy cooperatives (PBL, 2011 and HIER opgewekt, 2017a). This study will contribute to a better understanding of this participatory society and how it applies to energy co-operations.

Thirdly, relevance for society lies with the national government of the Netherlands. It has set goals concerning sustainability and in 2050 The Netherlands want to be almost energy neutral (Rijksoverheid, 2016). Energy cooperatives are contributing to the climate goals set-out by the Dutch government. Researching the potential of wind cooperatives in The Netherlands and their effects on the realization of wind farms will give new insights in how energy cooperatives can contribute to the energy transition in The Netherlands and therefore reaching set goals. Seyfang et al. (2013) expect that in the United Kingdom energy cooperatives will continue to grow and achieve their potential as key players in the transition towards renewable energy. This could also possibly apply to the Netherlands.

Lastly, the results of this research could make the realization of onshore wind parks become easier and faster in the future which is necessary to reach the set climate goals.

1.4.2 Scientific relevance

The concept of public cooperation in the context of wind projects has gained increased attention in academic literature. This literature primarily covers the influence of participation and cooperation on local acceptance (Langer et al., 2017 & Seyfang et al., 2013 & Aitken et al., 2016). The general conclusion that public cooperation promotes the acceptance of wind projects by local citizens can be drawn from this literature. This does not automatically mean that these conclusions automatically apply to realization and acceptance of onshore wind parks. Answering this question is the aim of this research.

As there is an increasing need for renewable energy, and an increasing need for local cooperation in this process, there is a need to expand knowledge on the topic, as there is a lack of knowledge at the moment. This research will add to the scientific literature on public cooperation and its effects on receiving a permit and the realization of wind farms by testing current literature and maybe adding new factors influencing the realization.

As it is advocated to stimulate community initiatives for their contribution to the energy transition (Nijpels, 2018), it is important to broaden the knowledge on cooperation and its effects. The knowledge on the effects of acceptance and support is already there, for instance the article by Hall, Ashworth and Devine-Wright (2013). By analyzing the effects of the presence of wind co-operations it will become clearer what the next step should be in making sure the Netherlands increases their renewable energy production and realize the climate goals set by the international climate bill.

2. Theory

This chapter discusses the theoretical framework of this research, based on relevant theories from literature. This theoretical framework will later be used as basis for the analysis (see Chapter 4) and conclusion of this research. Subjects discussed are cooperation, participation, the acceptance theory, innovation and grass root initiatives, NIMBYism and locational factors. The chapter will start by explaining the realization process of onshore wind farms, see paragraph 2.1. Paragraph 2.2 gives an in-depth analysis on the role of energy cooperatives in realization of wind farms is discussed. This paragraph is all about participation and cooperation. In paragraph 2.3, NIMBYism and the locational factors that can influence the realization process onshore wind farm are detailed while the connection between cooperation and the development speed of wind farms is discussed in paragraph 2.4. It also contains the operationalization scheme of the theoretical concepts.

2.1 The realization process of onshore wind farms

Realizing an onshore wind farm can be very time-consuming as there are many rules, laws and stakeholders to take into consideration. The Rijksdienst voor Ondernemend Nederland (RVO) has made a phasing scheme of the entire process from just an idea to a working wind farm (RVO, Sc.D.).

In phase one (1 – 3 years), a reconnaissance study is done. During this reconnaissance the initiator should make a structural vision, study the possible locations, required permits and categorize potential hazard. The outcome of this phase is known as a milieueffecten rapportage (MER) (RVO, Sc.D.).

In phase two (1 – 4 years) the MER is applied, and permits are obtained. What is needed to be able to get a permit and to what demands does a initiative have to comply to. This research takes up some time till the initiative is ready to apply for the needed permits. After applying for and obtaining the required permits, participation can be organized (RVO, Sc.D.).

During phase three (1 – 2 years) the wind farm is physically realized. As part of this effort, initiators need to sort out contracts, monitoring and realize the wind farm. After the wind farm has been built the exploitation can start. This includes the sale of electricity and maintenance, monitoring and regular safety checks. This exploitation phase can take 15 to 20 years, depending on the lifespan of the turbines (RVO, Sc.D.).

During each of the phases something or someone can turn the whole situation around. This could mean a minor setback, but it could just as well mean that the whole process has be started from the beginning. In extreme situations, it can result in the entire project getting cancelled. This, in turn, can result in financial loss and the government not achieving its goals.

2.2 Energy cooperatives and participation

The research performed by Seyfang et al. (2013) is about the position of local energy co-operations in the United Kingdom. They conclude that the cooperations should be regarded as key players in the energy transition process. This research could be applied to other but similar countries, such as the Netherlands. This, and the fact that the Dutch government has decided that it wants at least 50 percent participatory renewable energy production makes it very interesting to look at this link. In order to analyze the connection between energy cooperatives and the realization speed of wind farms it is important to first take a closer look at the certain effects of energy cooperatives are one the process of realization. Why are cooperatives seen as an important variable in the process of realization of wind farms?

2.2.1 Participation

The topic of participation is covered by many theories and classifications. One example of these classifications is the described by Aitken (2014) which summarizes three classification of participation (see Figure 2):

1. Raising awareness
2. consultation
3. empowerment

The first form of participation, raising awareness, is described as the dissemination of information. It represents a minimal form of community engagement. It is argued that a one-sided and unidirectional information provision to raise awareness, should not be considered public engagement or participation (Aitken et al. 2016).

The second form of public engagement, consultation, aims to gather insights into the views, attitudes and knowledge of the public (Aitken et al. 2016). The information that is collected by this consultation is subsequently used to inform decisions that have to be made. This way of public engagement can involve two-way flows of information between the public and professionals (Aitken et al. 2016).



Figure 2: Approaches to community engagement (Aitken et al. 2016).

The third form of public engagement discussed by Aitken (2014) is empowerment. Empowerment involves the devolution of power to participants and with that the creation of benefits for participants and the local public. Empowerment can be achieved in various ways:

1. through community-led forms of engagement where community members themselves design the process and determine its objectives, topics of relevance and scope or through partnership approaches.
2. through engagement approaches which bring together community members in ways which build relationships and social capital which will continue after the engagement process ends (Aitken et al. 2016).

This last form of public engagement is the one that is important and built up-upon in this research.

The most commonly used form of participation used within wind projects is a local wind cooperative. Putting the focus on local energy cooperatives as ‘agents of change’ (Hajer et al., 2015) and not on the nationwide cooperatives matches with the ideas of Goldthau (2014) and Wolsink (2012) of decentralized energy systems and with the polycentric governance theory of Ostrom (2010). In England Seyfang et al. (2013) think of local energy cooperatives as potential key players in the energy transition which is another reason that makes it even more interesting to take a look at local cooperatives and their influences in the Netherlands.

Wind cooperatives are typically open for all community members (and may be open for people outside the geographical community) to participate. Profits of the cooperative are usually flowing back into the community. These profits can include the production of energy or the gained financial profits but may also include increased employment rate or educational gains. Yildiz et al. (2015) explain cooperatives as social and economic enterprises who are striving for economic, social and cultural improvements for their members. Members of energy cooperatives join this movement for reasons such as: the wish to participate, support for renewable energy and the support for the decentralization of energy supply. Local energy cooperatives might also help to reduce the resistance against renewable energy facilities. Wolsink (2000) argues that resistance to wind energy is often eagerly being labeled as NIMBY-ism, but that this is not always necessarily the case. Open and participatory planning practices could overcome a significant part of the resistance (Wolsink, 2000). Huybrechts and Mertens (2014) state that local energy cooperatives are creating some positive externalities of having renewable energy sites (wind turbines for example) nearby.

As there are different amounts of involvement of the local public in a process there are also different forms in which the public can be involved in the process. According to the literature (Corcadden et al. 2012; Upham and Garcia Perez, 2015; Yildiz, 2014), financial participation has a high influence on the acceptance of wind energy. By providing the opportunity for an energy cooperative with regards the realization of a wind farm, one can provide an easy and accessible way for people to be financially involved in the process. As it is often impossible for one person alone to realize a wind farm, in this way people can be involved but not entirely responsible. In his article Walker (2014) distinguished two forms of financial participation and connects the term with justice. The first is based on the equity principle in which the outcomes are proportional to the inputs. This entails that the participation is in the form of financial shares bought by the local citizens, if one has more shares one is entitled to a larger share of the profits. The second form is based on equality and means that all persons that are involved get an equal share of the outcome. This second form entails a communal fund and according to Walker (2014) the latter causes for a higher acceptance rate than the former. But what is acceptance?

The acceptance theory has been widely discussed in literature. Wolsink (2013, p 3) describes social acceptance as “the degree to which a phenomenon (e.g. wind power implementation) is taken by relevant social actors, based on the degree how the phenomenon is (dis)liked by these actors”. In the article by Wustenhagen et al. (2007) the term acceptance is explained in a general context as well. The difference between the two is that in the article by Wustenhagen et al. (2007), the focus lies on the institution in which acceptance takes place and they distinguish three dimensions: socio-political acceptance, market acceptance and community acceptance. These three types of social acceptance are illustrated in figure 4 that is seen below. In this figure the term socio-political acceptance means the broad and general acceptance by the public, policy makers and key stakeholders. Market acceptance is described as “process of market adoption of an innovation”. The third form of acceptance, community acceptance refers to the acceptance of people being located near a specific site and renewable energy projects. The last one is the form of acceptance that will be discussed and used in this research as it best suits the subject at hand. Community acceptance is important when looking at the realization of onshore windfarms as it has a direct impact on the realization process. Onshore wind farms influence the direct surroundings, with their appearance and the sound they produce, and therefore have an influence on local citizens.



Figuur 3: The triangle of social acceptance of renewable energy innovation (Wüstenhagen, Wolsink & Bürer, 2007)

The research of Langer et al. (2017) shows that participation in the form of information, cooperation, consultation and financial participation have a positive effect on acceptance. Information was the preferred form of participation and according to the research done by Corscadden et al. (2012) a high level of consultation and early communication is preferred by communities. Such consultation will provide a forum for increased social acceptance and reduce the chance of conflicts. Other factors that influence the social acceptance that have been identified are visual impact, ownership, information and as mentioned before, participation (Jobert et al. 2007). These factors are very important when reaching local acceptance for a wind farm project.

Local acceptance is seen as a very important aspect in realizing goals on sustainability and greenhouse gas emission reductions, because when there is local resistance against a project, it can slow down or even stop the development (Wüstenhagen et al., 2007). Procedural and distributive justice are important factors determining acceptance (Langer et al. 2018). Financial participation is connected to distributive justice, because people can make a profit from their financial investments, which can lead to a more even distribution of costs and benefits of a wind project. Consultation and cooperation are connected to procedural justice, because people have the opportunity to actively participate during the planning and implementation of wind energy projects. This leads to perceived fairness of decision-making (Wüstenhagen et al., 2007; Langer et al., 2017). Furthermore, trust in the information and intentions of actors outside the community was found to be of importance (Wüstenhagen et al., 2007). Rogers, Simmons, Convery and Weatherall (2008) suggest that “community renewable energy projects are likely to gain public acceptance but are unlikely to become widespread without greater institutional support.”

2.2.2 Innovation, niches and grassroots initiatives

Seyfang et al. (2007) define grassroots innovations as “networks of activists and organizations generating bottom-up solutions for sustainable development; solutions that respond to the local situation and the interests and values of the communities involved. In contrast to mainstream business greening, grassroots initiatives operate in civil society arenas and involve committed activists experimenting with social innovations as well as using greener technologies.” Other than the role that cooperatives have in

the creation of more acceptance within the general public, they also have an influence on the innovative process and they have the possibility to create a niche within society. Many scientists have defined the term 'niche' such as the definition by Hoogma et al. (2002). They state: 'A niche can be defined as a discrete application domain (...) where actors are prepared to work with specific functionalities, accept such teething problems as higher costs, and are willing to invest in improvements of new technology and the development of new markets'. The goal of a niche is creating a relatively save space to create and innovate solutions to certain issues. A grassroot innovation is an example of such a innovative niche.

As one can see this definition includes citizen cooperation within the process of innovation. This cooperation can even be an essential part of the innovation processes that happen within a niche. Grassroots innovations, in contrast to a niche, exist within the social economy of community activities and social enterprise (Seyfang et al., 2007). The goals of grassroots are reaching a social need and ideology. Meeting social (and environmental) needs is the primary function (Seyfang et al., 2007). By including interested and knowledgeable citizens in the process of innovation, the possibilities for innovation grow. The way cooperation has an influence on further innovation is very important when looking at the usefulness of participation and cooperatives. In this research however this part will not be discussed any further because it has no influence on the realization speed of onshore wind farms.

As the focus of this research lies on the financial participation, mapping the different types of financial participation can help to get a clear view of the different types of financial participation that are used in the development of wind projects and their characteristics. In this typology the types of financial participation are defined based on two main characteristics, namely the degree of local ownership and whether a corporation or a cooperative develops it. Local ownership refers to ownership by citizens and local businesses. Based on these characteristics four different models of financial participation can be distinguished:

1. corporate ownership
2. direct local ownership
3. cooperative ownership
4. shared ownership

Within these models different types of financial participation can be applied. This model can be seen in Figure 4.

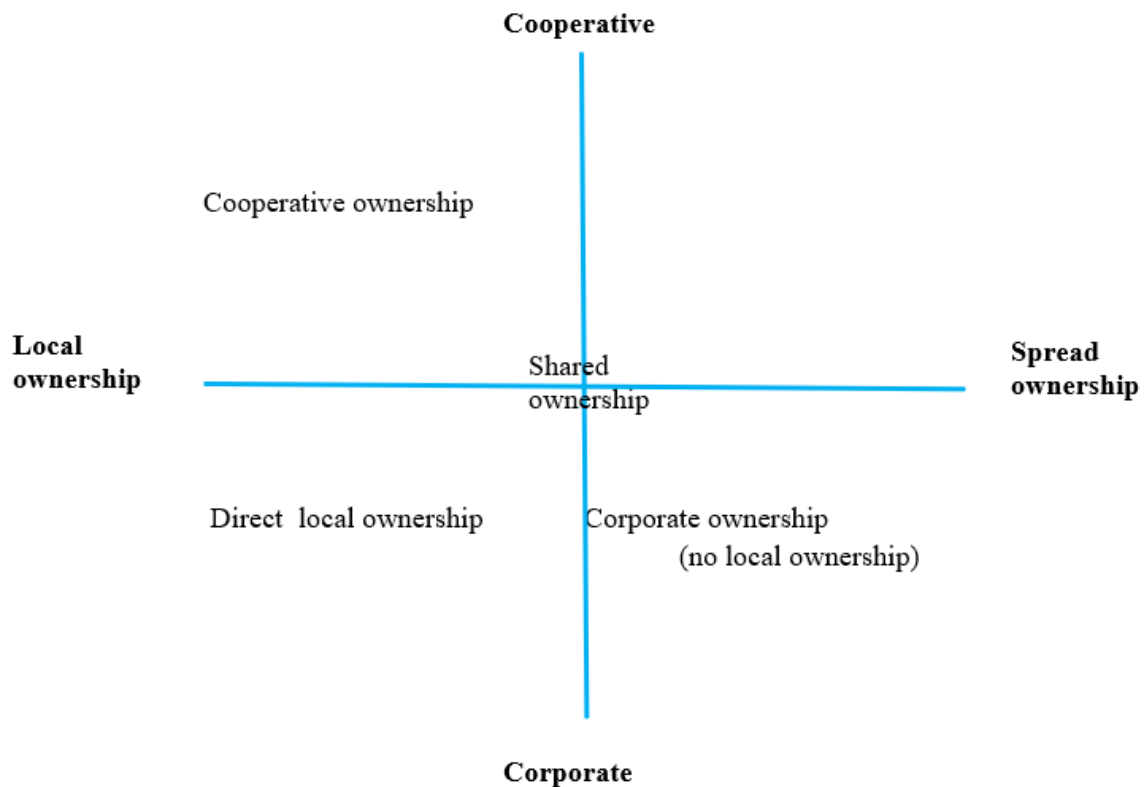


Figure 4: Typology of financial participation

In the first model, corporate ownership (right bottom corner), the wind project is developed and owned by a corporation. The corporation can choose not to apply any form of financial participation, or issue bonds, set up a local fund or wind fund, create a benefit scheme for local residents or give local residents discount on their energy bill. When a bond is issued the holder does not have ownership in the project. A part of the proceeds of a wind project can also be put into a fund, which can be put to use in favor of the surrounding area. Developers can also offer local residents within a certain range from the wind turbines a financial compensation, compensation could also be offered in the form of discount on the energy bill. In this model there is form of financial participation with local ownership. Local residents can get benefits from the wind project, but they do not have any power over the wind project.

In the second model, direct local ownership (left bottom corner), the wind project is also developed and owned by a corporation. In this case the corporation gives out shares, which give local residents and businesses the chance to participate in the project directly. Local residents and businesses can thus become shareholders and therefore co-owners of the wind project. Cooperatives can be actively involved in facilitating the issue of shares, but there is no cooperative ownership. The corporate types of financial participation can be applied in combination with the issue of shares.

In the third model, cooperative ownership (top left corner), the wind project is developed and owned by a cooperative. Citizens can participate in this cooperative, making it locally owned. The corporate types of financial participation can be applied in combination with the cooperative model too.

The fourth model, shared ownership (in the middle), is a combination of the previously mentioned models. In some cases the wind farm is for example owned by a cooperative for 50 percent and by a corporation for 50 percent.

2.3 Factors that influence the realization process of onshore wind farms

Langer et al. (2016 & 2017), have done much research into the subject of factors influencing the realization process of wind farms. Their research covers the factors influencing the process and the acceptance of wind farms. They have identified many factors that influence the process and have grouped these factors into five categories: perceived side effects, process-related variables, personal characteristics, technical and geographical issues, and socio-demographical data. The first category Langer (2016) mentions is about the perceived side effects of the wind turbines that are planned or being built. These variables are the '*visibility from the place of residence*' and '*fear of infrasound*'. These variables can only be measured by personally surveying or interviewing local residents. The second category is about process-related variables. These variables are all about the process and how the local residents are involved in this process. The third category is about the personal characteristics, which entail the experience with wind energy. This is also a category that can only be measured by collecting the personal data thru survey or interview. The fourth category, on technical and geographical issues, is about the locational factors that influence the realization process. The variables within this category are '*number of turbines in vicinity*', and '*distance to place of residence*'. The last category is about the socio-demographical information on the respondent.

Only category 2 and 4 are being used in this research as the other three categories include personal opinions and experiences, which can only be measured with the use of a survey or conducting a personal interview. As this is considered out of scope of this research, this data will remain unknown. The category 'process-related variables' includes the factor '*cooperation*'. The second category 'technical and geographical issues', includes the factors '*number of turbines in the vicinity*' and '*distance to the place of residence*'. In addition to these factors that are used by Langer et al. (2017), this research also includes the factors '*size*', '*intermunicipal*', '*political*', and '*Provinces*'. These factors have been added to create an addition to the locational factors.

The variable '*size*' could be interesting to look at because logic tells us that realizing a larger project will not only take more time during the building process, but can also have more opposition because it will cover a larger surface area. The variable '*intermunicipal*' will tell us if there is cooperation between multiple municipalities. When this is the case the project should in theory take longer because in that case even more actors will have to work together and figure out what all parties want. Market, state and civil society will have to come to an agreement. The variable '*political*', is interesting to take into account because it tells us if political preference of a municipality significantly influences the realization process or not. It can tell us how much power politics have within a municipality. The last extra variable '*provinces*' is added because it is interesting to see the differences per province. Each province has their own ideas and regulations on how to realize such big projects. By including this variable one can analyze these differences and use this difference to build on in further research.

A locational concept that is often used when talking about the realization of onshore wind farms is the concept of NIMBY. The acronym NIMBY is generally known to stand for 'Not-In-My-Back-Yard'. NIMBY describes the resistance to siting specific projects close to one's area of residence while exhibiting acceptance of similar projects elsewhere (Petrova, 2013). As wind energy is still recognized as a successful technology for meeting renewable energy targets and decreasing carbon dioxide emissions, the siting of wind turbines is a growing challenge that policy makers, facility planners, and wind developers face (Petrova, 2013).

Theoretically speaking, the concept of NIMBY represents a game situation or a social dilemma (Wolsink 2000). For psychologists (social dilemma theory) and economists (game theory) these concepts are important when analyzing the provision of public goods. They explain why in society some public goods are not provided, despite all people in that society want that public good to be produced. Instead of working together for the greater good, in this process the individual's personal costs and benefits are calculated and acted upon. Of course, with this way of thinking and rationalizing the eventual outcome is not going to be optimal since each individual's utility maximizes his or her decisions.

The NIMBY concept is often used when a community is facing unwelcome developments which include a wide range of land-use proposals such as low incoming housing, nuclear facilities, airport extensions, hazardous waste facilities and of course wind farms (Dear 1992). These communities do however often realize the importance of the development but do not want it to happen close to them.

2.4 Operationalization of theoretical concepts

In this research the relationship between cooperatives and the realization of wind farms takes a central place. Therefore it is very important to analyze this relation upfront to see if the literature suggests that there is a relationship and if so what this connection might look like. The concept of cooperation is intrinsically connected to the acceptance of a phenomena such as the realization of wind farms. According to the literature when there is cooperation the acceptance is higher and therefore the realization of a wind farm is more likely to happen and happen quickly. Cooperation is of importance because of its influence on the local citizens and involved stakeholders, as cooperation gives them the opportunity to be involved in the process and let their opinions be heard.

An important other factor influencing the realization process is the concept of NIMBY. People are will always be selfish and aim for their own self-interest. The most important variable connected to NIMBY is the location of a wind farm. Where will it be, close to a village or next to a highway. This is an extremely important factor for local citizens as it is their horizon that is going to change in the end. As the relation between cooperation and the realization of onshore wind farms is the relation this research is all about it is important to use one theory that focusses on this subject. The theory that will therefore be used in this thesis is the acceptance theory, which tells us that there should be a positive relation between the realization of onshore wind farms and the presence of cooperation during this realization process. The operationalization scheme in figure 5 shows us the expected relations between the different variables.

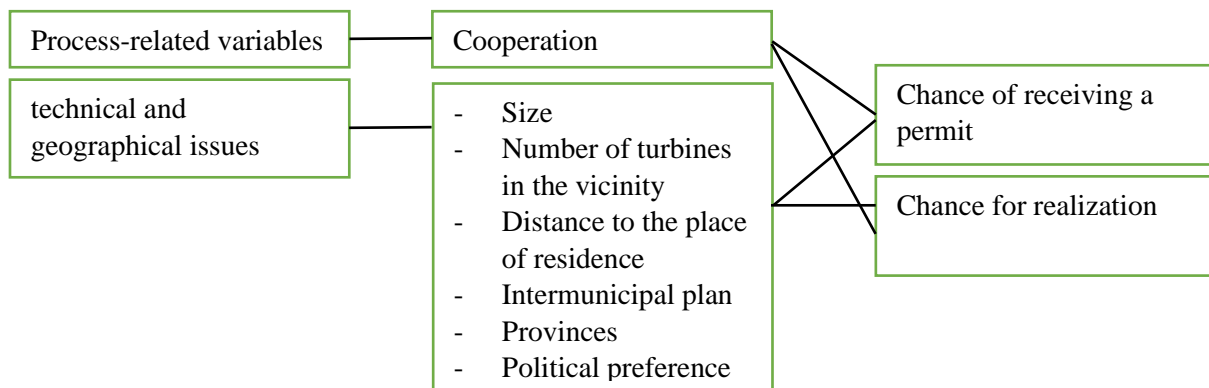


Figure 5: Conceptual model (Langer et al., 2017)

This conceptual model comes forward from the theoretical framework and includes factors that influence the realization of a wind farm project. By following these steps one can, with the help of spss, research how the factors influence the realization, positive or negative, and how much they influence the realization. For the analysis it is important to not only look at the effect of wind co-operations on the realization speed, it is also important to include different control variables to check what has the most influence and prevent a one-sided answer.

From the conceptual model and the theoretical chapter the operationalization scheme can be formed (see Table 1). In this scheme all important concepts and factors that came from the theory and will be used in the later stages of this research are shown and elaborated.

Concept	Dimension	Indicators
Cooperation	Financial cooperation	Corporate ownership
		Shared ownership
		Degree of local ownership
		Direct local cooperative ownership
Intermunicipal cooperation	Intermunicipality	Two or more municipalities working together
Physical and locational factors	Size	Maximum power of the projects in MW
	Proximity to housing	Wind turbines within 500 meters
	Proximity to highways	Wind turbines within 100 meters
	Proximity to industrial and business sites	Wind turbines within 100 meters
	Proximity to other earlier realized turbines	Wind turbines within 2 km / 5 km / 10 km / 15 km
Provinces	Province	Each of the twelve Dutch provinces
Political preference	The political preference of the local municipality	The political majority in the local municipality, either against or for the realization of onshore wind farms

Table 1: Operationalization scheme

3. Methodology

3.1 Research design

In this chapter the methodology of this research is explained. First, the research strategy is explained. After this the research methods, data collection and data analysis will be discussed. Finally, the research ethics are addressed. This research project is concerned with the analysis of local acceptance and support, wind co-operations and the realization of wind farms. It will partly be a comparative research between all the different wind farm plans that are in existence in the Netherlands. Where some plans are already completed and some are only in the planning stadium. Some projects are set up by a co-operation, others by the government or companies. The location can also differ greatly whereas some are in the middle of nowhere and others are next to a village or city. By comparing all these different aspects one can try and analyze what factors have an influence on the realization of wind farm projects, which of these factors are beneficial to the process and which of them are more of an obstacle.

To describe the choices that have been made the research Onion as created by Saunders et al. (2009) is used. It visualizes the steps of designing a research project and by following these steps a well-founded research design is created.

Saunders et al. (2009) start with the research philosophy, which can be either positivism, realism, interpretivism and pragmatism. The philosophical assumptions underlying any research have to be discussed as these assumptions shape the way the research will be conducted. These assumptions are based on philosophical arguments on the nature of reality (ontology) and what we can know about this reality (epistemology). Thus, the research philosophy defines what the researcher considers to be reality, how the researcher can identify what is real, and how the researcher positions her- or himself within the research (Farthing, 2016; Guba & Lincoln, 1994).

Positivism is a research paradigm that is very well known and well established in universities worldwide. 'This 'scientific' research paradigm strives to investigate, confirm and predict law-like patterns of behavior, and is commonly used in graduate research to test theories or hypotheses' (Taylor & Medina, 2011). This paradigm is particularly useful where very large sample sizes are involved. Generally, its focus is on the objectivity of the research process (Creswell, 2008). The positivist paradigm mostly involves quantitative methodology (Taylor & Medina, 2011).

In establishing the research paradigm ontology, epistemology and methodology have to be taken into account. Within the paradigm of positivism these can be summarized as follows:

According to Guba and Lincoln (1994), the *ontology*, realism suggests that there is an apprehendable reality that exists which is driven by immutable laws and mechanisms. The *epistemology* is dualist and objectivist. The researcher and the researched are assumed to be independent entities. Inquiries take place as through a one-way mirror where the researcher cannot have an influence on the researched. The *methodology* is experimental and manipulative. Questions and/or hypotheses are stated in propositional form and subjected to empirical test to verify them (Guba & Lincoln, 1994).

The Positivism paradigm is used in this research as it fits well with the chosen methods as it is a quantitative research. In this research the researcher conducts empirical research on the data collection which cannot be influenced by the researcher because the data is objectively collected from objective sources. In the analysis several hypotheses will be tested and if found to be true, accepted.

The next step in the research onion is the deductive and inductive research approach. This research is a deductive research. By using deductive methods, by using multiple statements or assumptions from existing theories and making several hypotheses from this it is possible to create new findings on the basis of research that has already been done and conclusions that have already been made.

The next two steps are the research strategy and methods. This project is based on a mono method strategy. The method that has been chosen is a quantitative methods approach and has been chosen because of some important reasons. First of all the use of a survey causes for generalizability of the outcomes and conclusions. By conducting a research with a large amount of data the outcomes can be generalized more and therefore the conclusions will be applicable to more than one situation.

Secondly the quantitative nature of this research makes it possible to be more objective in making conclusions on the topic. Whereas many subjective opinions are involved in this issue, it is also very much an issue of numbers and objective analysis. This objective data can complement or contradict the many subjective stories.

The final step which can be peeled off is the time horizon (Saunders et al., 2009). This research is a panel-study, this means it is a combination of cross sectional and longitudinal. The cases that are researched start at one point at time and are then being followed over time.

In conclusion, the quantitative methods have been chosen for this research because it gives an overall view on the topic. In order to give more insight into the phenomena one has to first figure out if there is a relation between cooperation and the chance of receiving a permit and the chance for realization of onshore wind farms and whether this relation is positive or negative. By using quantitative methods a general conclusion can be made about this relation and further research can build on this conclusion to further increase the knowledge on this topic.

3.2 Research material and data collection

The research strategy of this research is the use of secondary data, available in multiple data sources. By analyzing documents and plans for existing and non-existing wind farms the data of location, duration of the planning process and the presence of co-operations and participation is collected. The database has been formed from several documents from several experts.

The first set of data has come from the 'Blow list', this list followed the realization of wind farms during the years 2002 until 2007. By analyzing these documents, a well-grounded dataset on the wind farms during this period has been formed, including project names, location, starting year, year of receiving a permit, realization year and the whole duration. As this collection of data stopped after the year 2007 the next set of data comes from the expert bureau Bosch and van Rijn (BevR). BevR gave us the data of the years 2008 and 2011. The data for the years 2009 and 2010 are missing but we were able to recreate some logical steps in the realization process by looking at the phase the projects were in in 2008 and 2011. From 2012 until 2017 the dataset has been based on the lists made by the RvO. Further data was not yet available. Most of the datasets used, contained data on what province and municipality the projects was in, the year of initiative, the year of receiving a permit, the year of realization, the amount of MW the wind farm was going to produce and if there was a cooperative active in the process. For some of the projects this data was not available in these list but we were able to figure out most of it by doing more in-depth research in those projects.

In order to create more in-depth locational data we first used the locational data that was provided by BevR (windstats 2019). This data did not however include all the locational data of all the projects in our dataset. By researching the wind farms that we did not have locational data for, we collected more coordinates. By putting all these coordinates into the computer program ArcGis we created a map for locational data. By adding several different 'Layers' we were able to deduct more locational factors such as the variables '*Housing nearby*' (BAG 2019), '*road systems nearby*', '*railways nearby*', '*business parks nearby*', and '*amount of turbines nearby*'. We ended up with locational data for 396 of the 562 wind farms in our dataset. In order to create an accurate picture to base our conclusions on, it is very important to include all these control variables. It is important to analyze the locational aspects of a wind farm because the location can have a big effect on the realization process. As mentioned above the NIMBY concept is all about locational factors.

As said before the NIMBY factor is mainly influenced by the proximity of the, in this case wind farm, to someone's home. People do not want wind turbines next to their home because it negatively impacts their living circumstances. With the noise and shade they produces but also just by their sheer appearance. Most people do not find the look of a wind turbine very attractive and that influences their opinion about them. By including the proximity to buildings with a living function one can create an ever better picture of the NIMBY factor and its influence on the realization process. The proximity to industrial and business sites is also a factor that has to be taken into account as a counter towards the proximity to buildings with a living function. A lot of wind farms have been and are being developed in business and industrial areas. As these areas are often further away from housing it is a possibility that this locational factor also influences the realization process and this is the reason why this factor is important within this research. Highway locations are equally important in this research as industrial sites, and for the same reason. Highways are often located further from housing and a lot of wind farms are located next to or close by highways.

The collection of all this data took up a lot of time and it made us be creative in figuring out how to collect the data and how to use the data properly, in order to create a database that is reliable. In analyzing the dataset it is very important to only include cases of which most variable information is available. By selecting only cases that have enough information available we end up with in total 383 cases that are used in the data analysis of this research. The case selection process is further elaborated in paragraph 4.1 (descriptive analysis).

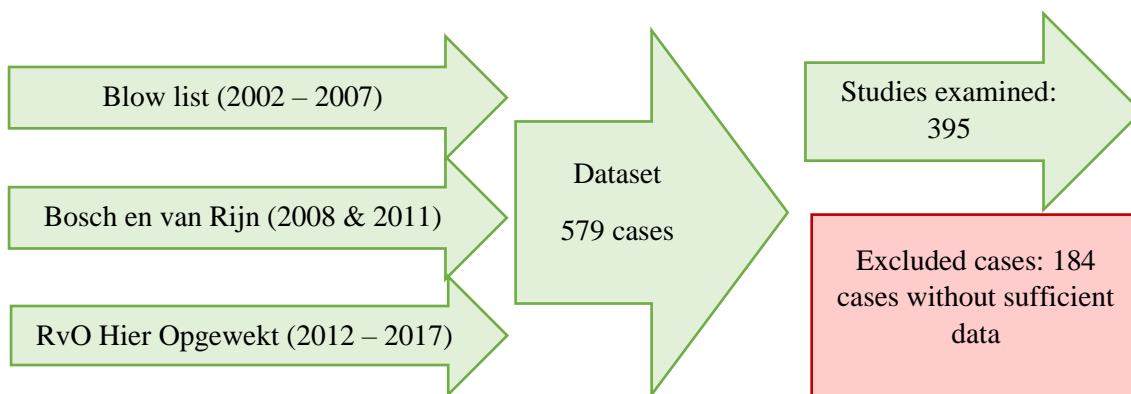


Figure 6: Case selection

3.3 Validity and reliability of the research

In this paragraph the validity and reliability of the research will be discussed. In order to conduct a valid and reliable thesis it is important to make sure to take certain things into account such as transparency, generalizability and repeatability.

3.3.1 Validity

The validity of a research refers to the extent to which the researcher measures the phenomena he or she intends to measure. Within the concept of validity a distinction can be made between internal validity and external validity. Internal validity refers to instruments of measurement being accurate and pointing out as good as possible what they are determined to point out. The internal validity of this research is determined by whether the findings actually represent the reality of what was measured. Since it is impossible to know this, researchers often look for other relevant evidence. The variables included in this research are based on previous research and theoretical frameworks, to ensure that the internal validity is increased (Saunders et al., 2009).

When looking at the external validity the ability to generalise the results of the research is important. In this research all planned and developed onshore wind projects in the Netherlands are included. By forming a database that covers the whole country the generalizability of this research is high on a

national level. This generalizability does not however apply to other countries, and in order to apply the results to other countries further research has to be done (Saunders et al., 2009).

3.3.2 Reliability

To conduct a reliable quantitative study on this topic it is extremely important to be transparent in all steps taken during the research process. This step by step transparency is shown in the methodology chapter of this research and makes all the steps taken, clear for the reader. By being transparent this research should be fairly repeatable for other conducting research on the topic. This research could be repeated by someone who was not involved in the first research and the same conclusions should come forward. By creating a research with high reliability it is easy to check if the researcher made the right decisions, and if not, how to change these steps.

As this data in this research has not been collected through a survey but rather through desk research. Because of this, the data is of an objective nature, rather than a subjective nature. Most of the data has come from expert bureaus or has been based on expert information. The reliability of the data cannot change when the research is done again, as events have simply happened how and when they have occurred. This makes for a very reliable data source. Because of the fact that the data is objective there is no input from the outside that has an effect on the collection.

3.4 Analysis methods

For analyzing the dataset collected thru desk research, the program SPSS has been used. For the descriptive analysis some analysis methods have been used. The methods used are predominantly:

- Frequency tables;
- Descriptive tables,
- Cross tabs.

With this it is possible to analyze on municipal, provincial and national level. Several different important variables have been checked to see their distribution. As the data has been collected thru desk research rather than with the use of surveys, there is no non-response in the dataset. There is however some missing data because this data was not locally available. Because of this missing data some cases could not be included in several of the analysis. This does not however mean that the research is no longer generalizable as still over 65 percent of the data is used.

For the statistical analysis of the collected data the analysis program SPSS will be used. In order to study the effects mentioned before several analysis will be done. The methods that will be used are:

- Kaplan Meyer analysis
- Cox regression analysis

3.4.1 Kaplan Meyer analysis

With the Kaplan Meyer survival analysis a relatively simple model can be created on the differences between two groups within a variable. The Kaplan Meyer test is a test of differences over time and also includes a defining moment within this time period. In the case of this research the time variable is the total amount of time between two moments, the independent variable is the cooperation and the defining moment is either 'receiving a permit' or 'realization'. With the Kaplan Meyer one can check if there is a significant difference between two groups and what this difference entails.

3.4.2 Cox regression analysis

With the survival rate analysis one can analyze data involving times to some event of interest. As said in the article on survival rate analysis by Christiana Kartsonaki (2016), the objectives of survival analysis include the analysis of patterns of event times, the comparison of distributions of survival times in different groups of individuals and examining whether and by how much some factors affect the risk of an event of interest.

In the case of this research the survival rate analysis will be used to determine the average time needed to achieve realization of a wind farm from the first time a plan is made until the moment the wind farm is completely realized. When using the survival rate analysis one has to choose between the Kaplan Meier analyze and the cox regression. When there is only one predictor that has to be researched that can only take a few possible values one can use the Kaplan Meier Analysis. Are there multiple factors that can influence the 'survival' than there is a need for a more elaborate model. In this case the cox regression is a model that is often used. With this analysis one can study multiple predictors at the same time. An advantage of the cox regression over the Kaplan Meier analysis is that not only the question 'is there an effect?' can be answered, also the question of 'how large is the effect of a certain predictor?' can be answered. The Cox model shows us the size of an effect using hazard ratios (HR), wherein an HR of 1 indicates that there is no difference. The hazard is the chance to get an event (in this case realization of a project), and a hazard ratio is comparable to a relative risk (Clinical Research Unit, 2018).

4. Data analysis

In this chapter the data analysis will be covered. In paragraph 4.1 the descriptive analysis will be discussed. First the data selection will be explained, and then several of the most important variables will be analyzed. In paragraph 4.2 the statistical analysis will be covered. This paragraph will start with the explanation on the two analysis methods that will be used, then the analysis will be performed.

4.1 Descriptive analysis

In order to make the data analysis complete it is important to first describe the data that has been collected. In the following paragraphs the different variables will be covered. Wind farms per province and municipality, the realization process and the locational factors such as the proximity to roads, housing and nature. By doing the descriptive analysis it is possible to look closer at the variables on which data has been collected and their usefulness in the rest of the research. It is also very useful in figuring out which cases can be included and which should not, either for not having sufficient information on them or them not being useful for the analysis or outcome.

4.1.1 Data selection

In order to have a dataset that is useful for this research it is important to make some choices regarding the selection of data used in the analysis, as there are some cases for which we do not have all the information that is needed, available. With this dataset and research it is very important to analyze the locational factors that can influence the realization process of a wind farm project. To do so we added the locational factors with the program ArcGIS. By putting in all the wind farms of which the location was available (either an exact location or a planned area). After this, other layers that were available (road systems, railroad systems, housing and business parks) were put into the map. These layers were crossed using several different buffers and buffer sizes to accomplish a great source of locational data. Unfortunately it was not possible to find the location of all 583 wind farms so some data is missing. In Table 1 you can see that of the 583 wind farm plans we were able to pinpoint 396. This is almost 70 percent, and with this data set we will do the locational data analyses. The missing farms will therefore be discarded in this section of the research and further analysis will be done with the remaining 396.

	Frequency	Percent
Valid	396	66,2
Missing	187	33,8
Total	583	100,0

Table 2: Frequency table of coordinates

4.1.2 Variable description

In this paragraph all frequency table outputs are put in to tables and diagrams to create a more clear image of the contents of the dataset. These outputs are based on the previously made selection of 396 onshore wind farms.

4.1.2.1 Wind farms per province and municipalities

The amount of wind farms in each province includes all wind plans and all of their expansions and upscaling's. The expansions and upscaling is viewed as a separate plan from the original wind farm. What is easily seen from this pie-chart is that some provinces have way more wind farms then others. Whereas Noord-Holland (39), Noord-Brabant (60) and Zuid-Holland (86) make up the top three, other provinces like Overijssel (12), Utrecht (13) and Drenthe (11) are falling behind (Figure 7).



Figure 7: Number of wind farms (black) and the number of cooperative wind farms (green) in each province measured in the year 2017 (PixaBay, 2019)

There are wind farms (projects) in 168 municipalities in the Netherlands, spread over 12 provinces. In 18 of these municipalities there are 5 or more wind farms / projects. In Figure 8 these 18 cities are displayed in alphabetical order. What can be easily seen is that there are two municipalities that are front runner. The municipalities of Goeree-Overflakkee with 16 projects and Rotterdam with 21 projects. Of all of the 396 wind farm projects that have been analyzed in this thesis, 11 of them have been or are being developed in a inter municipal way, in which case two or more municipalities are involved in the development process.

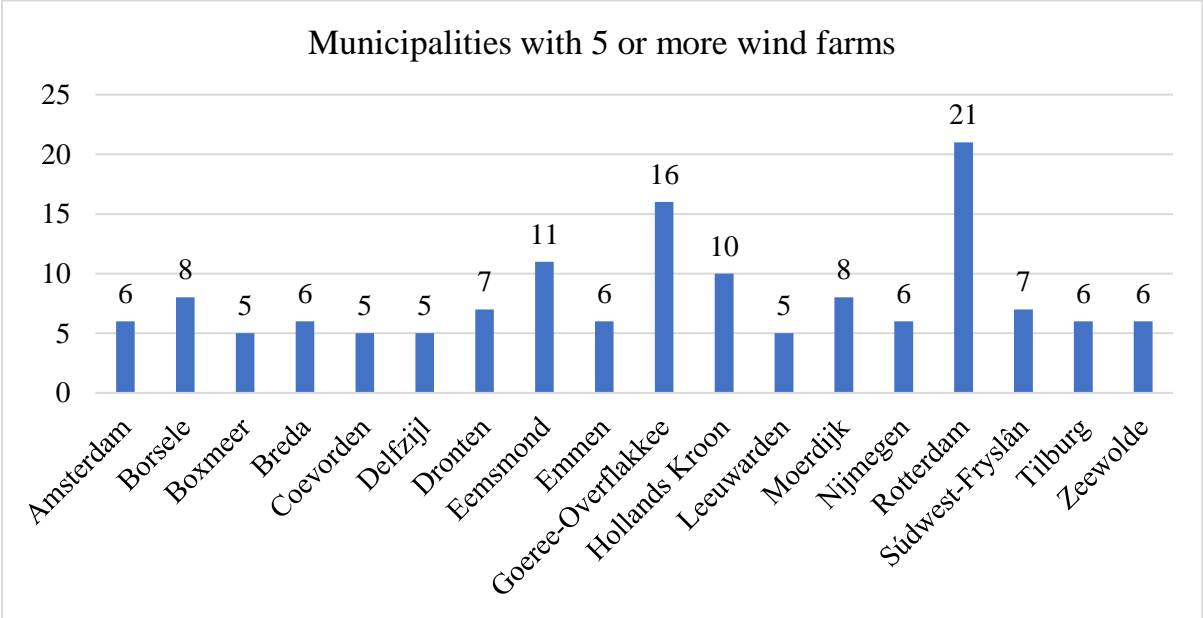


Figure 8: Municipalities with 5 or more wind farms/projects

4.1.2.2 Realization process of the wind farms

Of the wind farms that are included in the dataset almost 39 percent of them have been realized (Figure 10). This means that of the 396 projects 153 of them are open for business. The other 243 projects have either been cancelled or are still in other stages of the process, such as waiting for the permit to come through or waiting for the building process to start or finish. In figure 9 you can see that of the 396 projects over 50 percent have been granted a permit and can move on to the development of the wind farm.

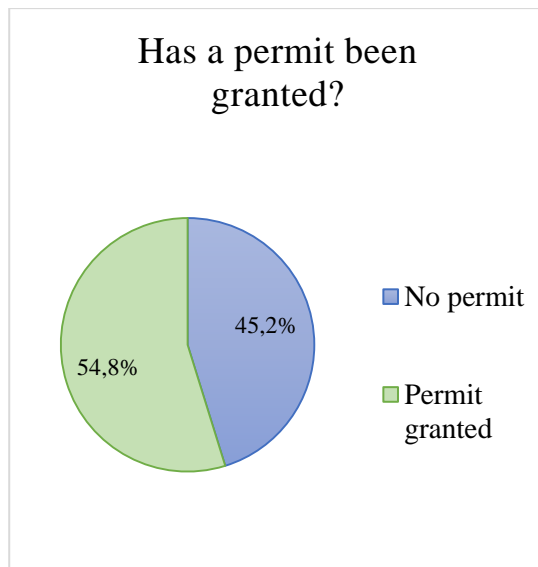


Figure 9: has a permit been granted or not?

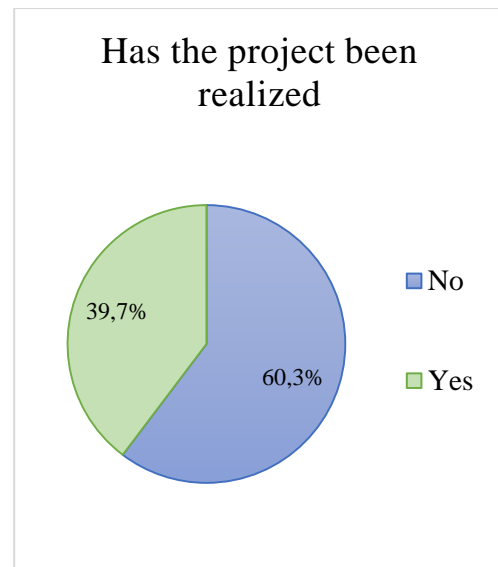


Figure 10: Has a permit been granted?

In figure 11 and 12 The figures show how long projects take to receive a permit, and how long projects take to be realized. The mean of the first phase (initiative until receiving a permit) is 6.65 years. This tells us that on average a project takes more than 6 years to receive a permit. The realization process overall (initiative until realization) has a mean of 9.63 years. This tells us that on average the whole project takes up to 9.5 years to realize.

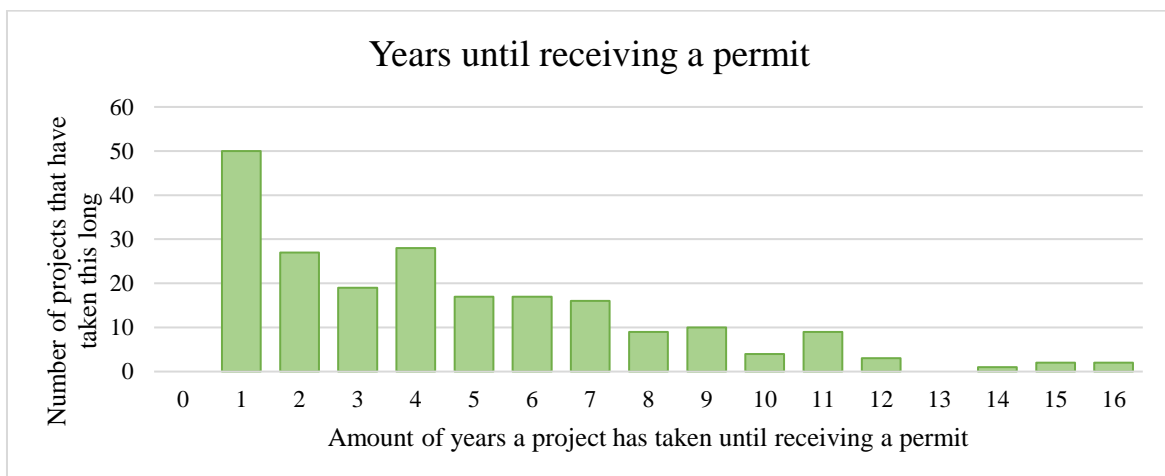


Figure 11: The amount of years until receiving a permit

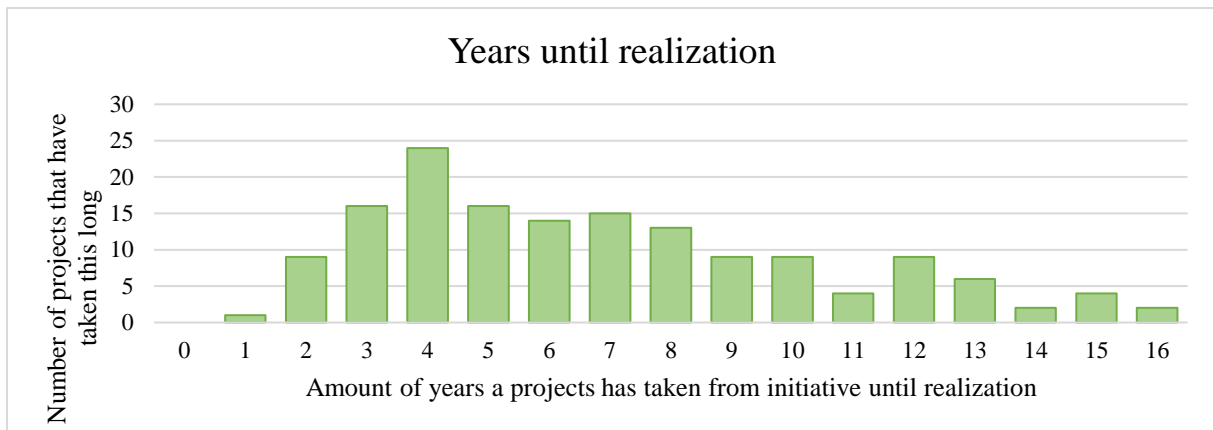


Figure 12: The amount of years until realization

4.1.2.3 Cooperation

It is extremely important to realize that the dataset is on the realization process of wind farms and not on the organization of the existing wind farm. A lot of the projects have not been set up with cooperation in mind. While the realization process has not been based on any form of cooperation, it is very well possible that thereafter the wind farm has become cooperative with the use of bonds or shares. The data in this dataset is based on the process from initiative to a realized wind farm, and the presence of a cooperative within the process. In figure 13 you can see that in 12 percent of the cases there is a form of cooperation present. This means that of the 396 projects there are 49 projects that involve or have involved some kind of cooperation during the realization process.

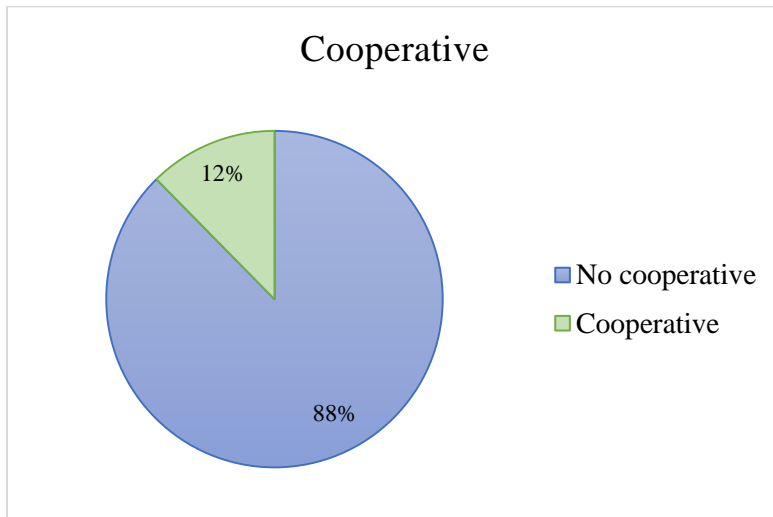


Figure 13: Cooperative or no cooperative active

4.1.2.4 Locational aspects

Housing

The variable housing was originally a variable with a ratio measuring scale. From this a dummy has been created to provide a better overview of the data in this variable. Finding the correct way of categorizing the data was impossible because most started with a category that went up to 500 but there are so little wind farms that have 500 or more houses nearby that this categorization would not show enough detail. Therefore the categorization seen in figure 14 has been used, in order to create a more detailed image of the data. From the frequency table of the locational factor 'housing' the following pie-chart can be formed (Figure 14). The chart shows us that in most of the 396 cases (over 50 percent) there are 10 houses or less within 500 meters of a wind farm site. This tells us that in most cases wind farms and projects are being developed in rural areas in which case it does not have a huge effect on a large group of citizens.

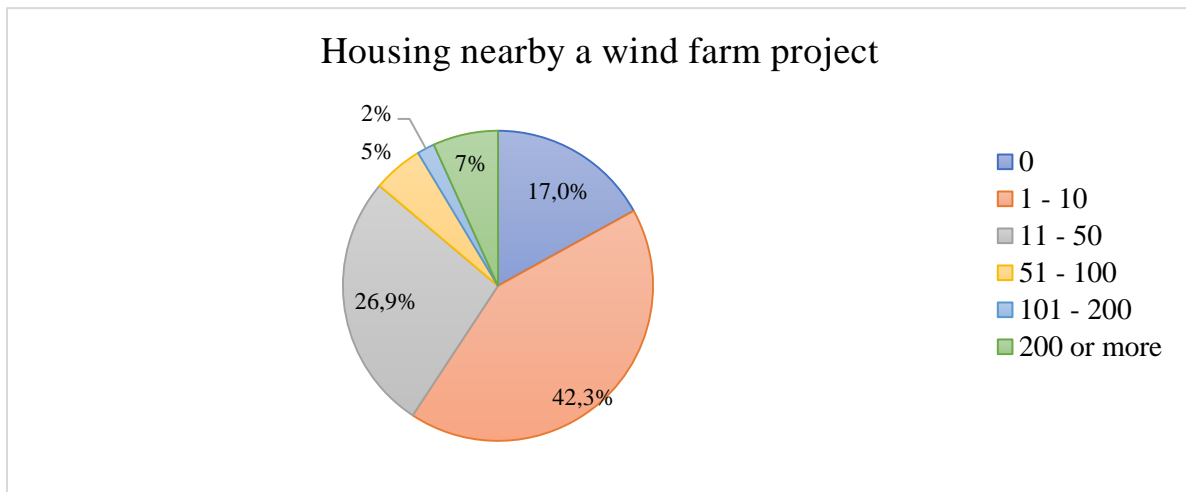


Figure 14: Amount of houses within 500 meters

Infrastructure

It is very interesting to see that when you analyze the proximity to national and provincial roads you can see clearly that most wind farms are not near a large road. From figure 17 and 16 it becomes clear that over 70 percent of the wind farms lie further than 100 meters from a large road or highway. The same can be said for the proximity to the railway (figure 15).

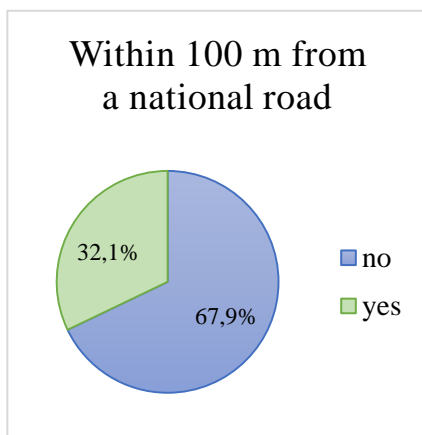


Figure 17: Proximity to a national road

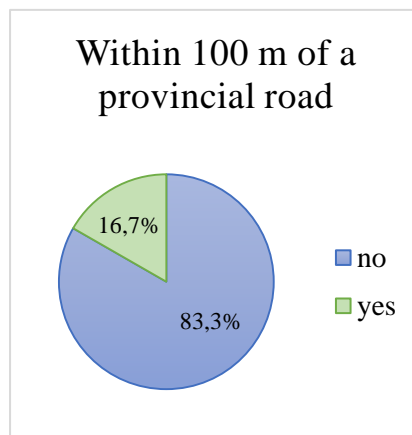


Figure 16: Proximity to a provincial road

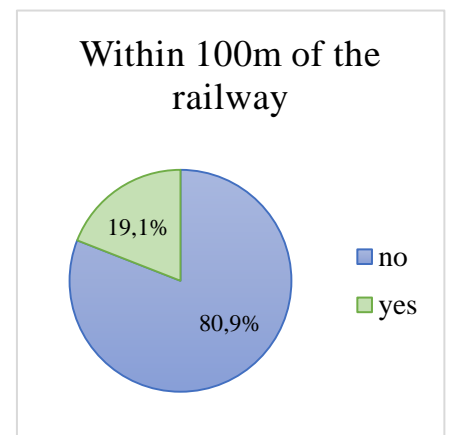


Figure 15: Proximity to a railway

Business parks

It is also interesting to look at the proximity of wind farms to business parks and industrial sites. One can derive from the frequency table that more than 37 percent of the wind farms and projects have been or are being realized within 100 meters from a business park (Figure 18). As business parks are often seen as a good location for wind turbines as they are less close to housing one would have expected more wind farms to be developed here. Instead more wind farms seem to be developed in rural areas as can be seen in Figure 19. Over 50 percent of the wind farms and projects are in an area with more than 150 hectares of visible land, this indicates that the wind farms are set in a very open landscape without many buildings obscuring the visibility.

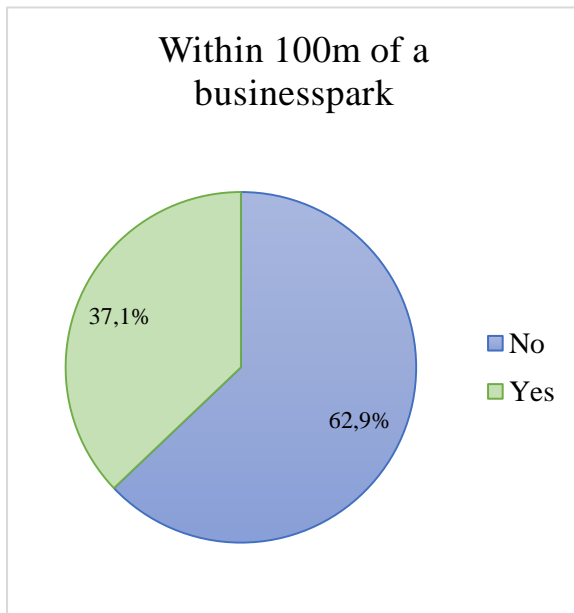


Figure 18: Proximity to a business park

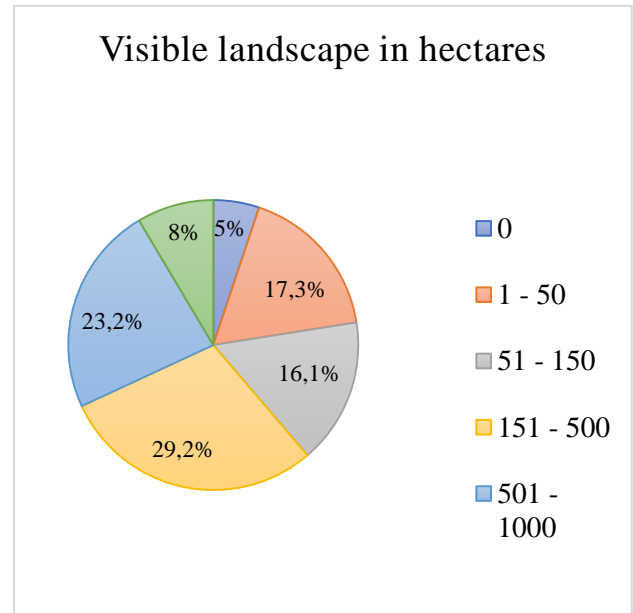


Figure 19: Openness of the landscape (visible hectares)

Openness of the landscape

In figure 21 you can see data for each of the provinces. On the y-axis the percentage of wind farms developed in a certain level of openness within the province. On the x-axis the province names. The green coloring indicates that the darker the color green, the less open the landscape is. This graph is based on the crosstabs of the variables 'Visible landscape in hectares' and 'Province name'.

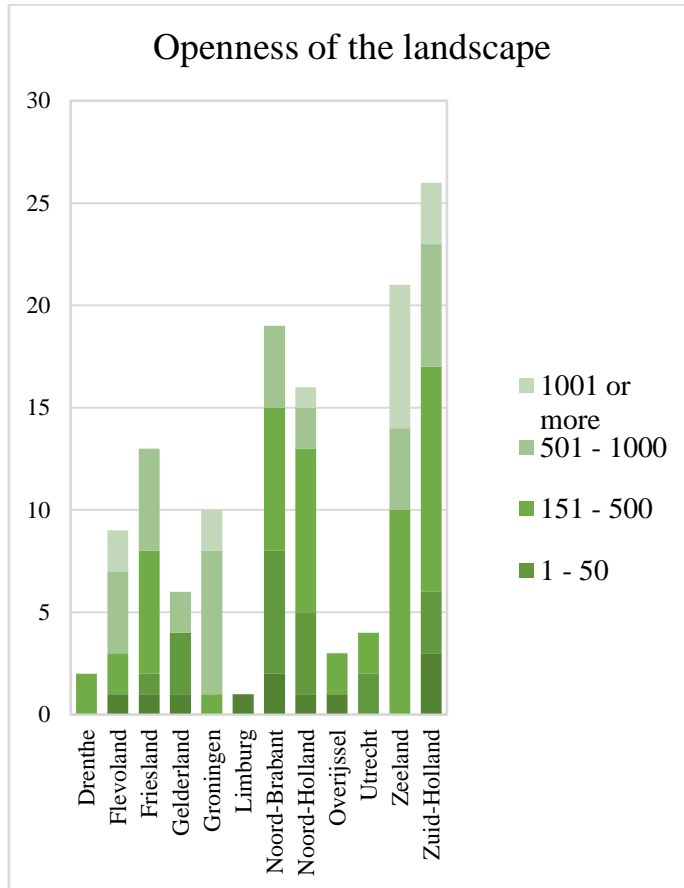


Figure 21: Wind farms and the openness of the landscape (province)

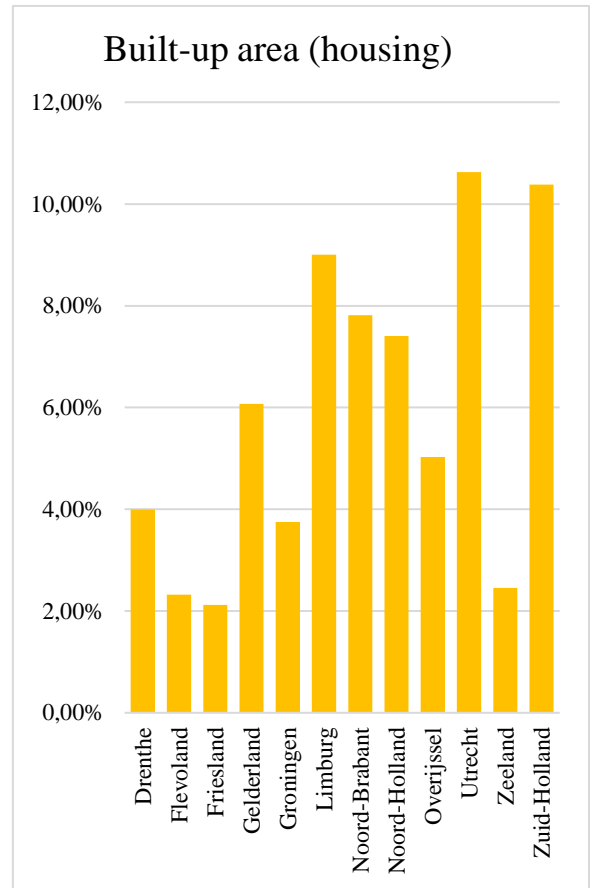


Figure 20: Built-up area with housing (Percentage of the entire province surface)

It is also interesting to see that there seems to be a connection between the percentage of built-up area and the amount of wind turbines in more open areas. In provinces like Friesland, Groningen, Zeeland and Flevoland most wind farms fall under the most open landscapes. At the same time in provinces, for instance Limburg, Utrecht, Zuid-Holland and Noord-Brabant, the wind farms are most often in a landscape that is less open. It has to be noted that this difference can also be due to the presence of trees or other natural barriers that can reduce the openness of the landscape. These factors have not been included.

4.2 statistical analysis

In paragraph 4.2 the statistical analysis will be done and analyzed. The paragraph consists of two parts, of which the first part will be on the analysis methods and the second will cover the analysis itself. All output tables that are of relevance can be found in the appendix or be traced back with the dataset and syntax, used during the analysis process.

4.2.1 Survival analysis

In survival analysis, subjects are usually followed over a specified time period and the focus is on the time at which the event of interest occurs. The most important reason for not using a typical regression analysis is that a linear regression analysis cannot effectively handle the censoring of observations. Some observations are called censored because the information about their survival time is incomplete. This dataset includes projects from 2002 onwards and some of them have not been finished yet. A project that has not yet experienced the 'event' during the research is said to be right censored. The survival time for this projects is considered to be at least as long as the duration of the study (Despa, 2019).

Unlike ordinary regression models, survival methods correctly incorporate information from both censored and uncensored observations in estimating important model parameters. The dependent variable in survival analysis is composed of two parts: one is the time to event and the other is the event status, which records if the event of interest occurred or not. One can then estimate two functions that are dependent on time, the survival and hazard functions. The hazard function will be used here (Despa, 2019).

A nonparametric estimator of the survival function, the Kaplan Meier method is widely used to estimate and graph survival probabilities as a function of time. It can be used to obtain univariate descriptive statistics for survival data, and compare the survival experience for two or more groups of subjects. The cox regression analysis allows testing for differences in survival times of two or more groups of interest, while allowing to adjust for covariates of interest (Despa, 2019).

4.2.1.1 Kaplan Meyer regression

First of all one has to test if the survival analysis is an option for these the variables you want to test, by testing if there is a significant difference between the two groups within the independent variable. Group 0: no cooperative and group 1: cooperative. This can easily be done by doing the log rank test. When the outcome of this test is significant the null hypothesis, there is no difference between the two groups, can be rejected. This is the case for the model used here so one can conclude that there are significant differences between the survival/hazard rates of the two groups.

In order to figure out what for effect the cooperative model has on the granting of the permit or the realization of a wind farm project you can do a Kaplan Meyer analyses. Whith this analysis one can find out if there is a significant relation between two variables and if so, if the relation is negative or positive. In this case we performed two analyses. The first tells us the effect of cooperation on the granting of the permit. Does the presence of a cooperative lead to a faster granting of the permit or not? By using the survival plot shown in Figure 22 one can easily see that the presence of a cooperative causes for a much shorter time period to receive a permit, then when there is no cooperative active.

The second graph, shown in Figure 23, shows the life table of the entire process from initiative to realization. This graph is in line with the first one, though the differences between cooperative and non-cooperative are smaller here. This is probably because of the fact that this last graph is more or less the combination of the first and second one. All three plots show us that the cooperative projects are more likely to receive permits and be realized sooner than the non-cooperative projects.

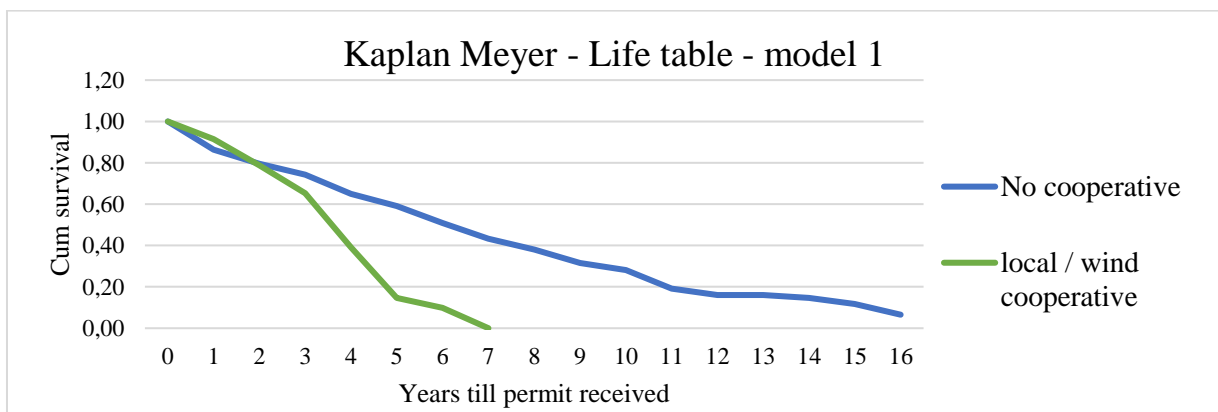


Figure 22: Kaplan Meyer - Life table, years till receiving a permit

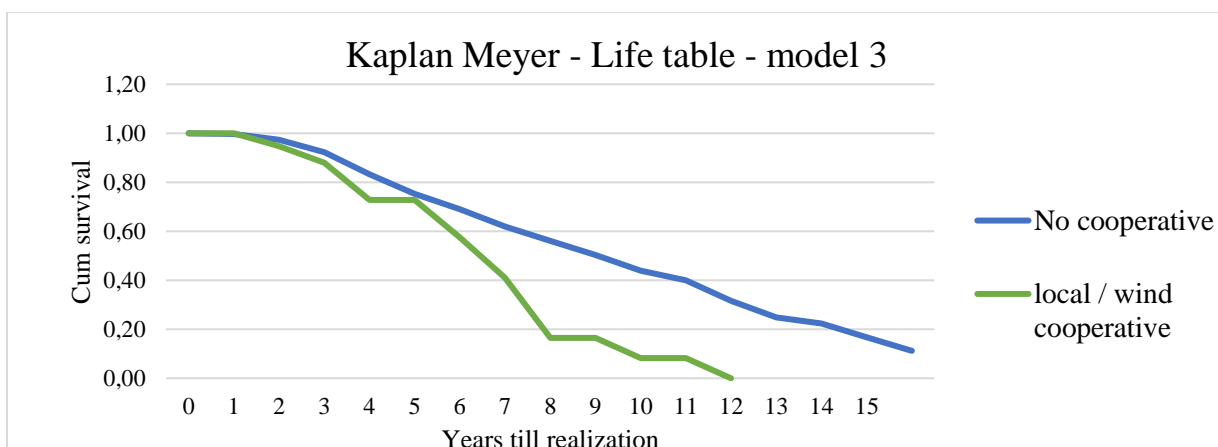


Figure 23: Kaplan Meyer - Life table, years till realization

As one can see this also is the case for the realization speed of a project. To be noted is that in the case of the realization speed the difference is a little bit smaller, therefor the most time is to gain in the period between initiative and permit. In the phase from permit to realization there is less time to gain.

4.2.1.2 Cox regression analysis

Whereas the Kaplan Meyer analysis only shows us the relation between two variables, the model can be made more elaborate with the cox regression. With this analysis one can look at many different variables that might influence the dependent variable and if this influence is positive or negative. By adding different variables the model can be made stronger and the explanatory power can increase. With the cox regression we have the total amount till the permit / realization. During this time there is a defining moment in which the project is either receiving a permit or not, or the project is realized or not. Several different variables can be added, the model will tell which of these variables have a significant influence on the defining event and whether this relation is positive or negative. In order to figure this out, one looks at the Sig and the Exp(B) shown in the output table. This value mentioned by Sig. tells us if the relation between the predictor variable and the event is significant and therefore interesting to look at. The value that is given for the Exp(B) is the coefficient and tells us that when the value is positive the risk of the hazard is greater for group B (value 1). When the value is lower than 1 the risk of the hazard is smaller for group B. What is very important to note is that these cox regression analyses are non-parametric. This means that it is assumed that the relations do not change over time and will stay the same.

In the case of this research, two cox regression models have been created. The first model has the receiving of the permit as the defining moment. This variable has the value 0 when the permit is not granted and 1 when it is, therefore a value of 1 means 'success'. The second model has 'Realization' as the defining event. When this variable has the value 0 there has been no realization, when the value is 1 the project has been realized.

In the output shown in tables 3 and 4, one can see that many variables have been added in order to create the best model with the most explanatory power. The variables that have been included, have been included for a reason. These variables will be discussed in the next paragraph in order to show their relevance in within the cox model.

The first variable that has been included is '*Cooperative*', and it has been included because the main question of this research is all about the effect of cooperatives on the realization of wind projects. This variable has been included in all models during this research in order to find out what effect this variable has.

The second variable is the '*Size*', this variable tells us the power of each wind projects in Megawatt. This variable is important because it tells us how big the projects is. If there is more power than there have to be more turbines. This size of a project can have a big influence on the realization speed of a project, not just because it takes longer to build but also because it might be more difficult to receive a permit.

The third variable is '*intermunicipal plan*', which indicates whether the project is being executed by one municipality or multiple municipalities working together.

The fourth variable is more a category in which multiple locational variables have been put. These location variables give an indication of the location in which the project is planned. Is the project planned in a more rural area or is it going to be realized in a business park location. Another locational factor is '*Number of turbines within 2/5/10/15 km*'. This variable tells us the amount of turbines within 2 km of the project and can tell us if wind projects are faster realized in areas where there are already turbines present or not. This variable also covers some variables that might have been overlooked in this research and is therefore an important control variable to add robustness to the overall model.

The fourth category includes all of the Dutch provinces. These variables are dummy variables that have a value of either 0 or 1, the value 0 means all other provinces and the value 1 means the province mentioned on the label. The outcomes of these variables are based upon one reference category, which in this case is the province of Zuid-Holland.

When looking at the cox model one has to first of all look at the significance of the model itself before looking at the influence of individual factors. The significance of the model can be derived from the p value. When this value is less than 0.001 the model has a significant improvement relative to the null model. At the bottom of table 1 and 2 the significance of all of the models is shown with the Significance value. What can be seen is that all models are significant but some have a bigger explanatory power than others, as more variables have been added. Each table has one model that has the most explanatory power and will therefore be used to base the conclusion on.

In table 3, seven output tables have been put next to each other. Each model has more variables added in order to figure out what model is best to use. The seventh model has the most explanatory power. Table 4 also shows seven models of which the seventh model has the most explanatory power. In both cases the seventh model will be used to answer the sub questions and main question.

Table 3 shows the model in which the receiving of a permit is the defining event. The time variable that has been used is the amount of time from initiative until receiving the permit. When looking at model seven, the most significant model, one can draw some interesting conclusions when looking at the variables that have a significant relation with the chance of receiving a permit.

First of all, the main variable in this research, '*Cooperative*' shows that when a significance level of $p < 0,05$ is used, the relation between '*Cooperative*' and the chance of receiving a permit increases with 77,4 percent each year. This outcome means that the presence of a cooperative has a positive relation with the chance of receiving a permit, when there is a cooperative the chance increases.

Another variable that shows a significant and positive relation with the chance of receiving a permit is the variable '*Turbines within 10 km*'. This tells us that when the number of turbines within 10 km of the new project increases, the chance of receiving a permit increases as well. The chance of receiving a permit increases with 1 percent each year. This relation is in line with the research that has been done by Huybrechts and Mertens (2014).

Next to these positive relations there are also two variables in the model that have a significant relation with the chance of receiving a permit but their relation is negative. The variable '*Size*' which tells us the size of the project, and the variable '*Inter municipal plan*', have a significant and negative relation with the chance of receiving a permit. When the size increases with 1 MW, the chance of receiving a permit decreases with 1,3 percent each year. For the variable '*Inter municipal plan*' the negative relation means that when the project is an inter municipal plan, the chance of receiving a permit decreases with 47 percent each year.

The last variables that are interesting to look at are the provinces. In this model all provinces are compared to the province of Zuid-Holland and in some provinces the chance of receiving a permit is significantly bigger than in this province. The provinces of Groningen and Zeeland both show a significant and positive relation with the chance of receiving a permit. In both cases the chance of receiving a permit is almost three times higher than in the province of Zuid-Holland each year.

Cox regression analysis – time until receiving permit

		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Cooperative	Exp(B)	2,090	1,747	1,709	1,712	1,803	1,810	1,774
	Sig.	0,000**	0,013*	0,019*	0,019*	0,010**	0,010**	0,013*
Size	Exp(B)	0,988	0,989	0,986	0,986	0,988	0,988	0,987
	Sig.	0,000**	0,000**	0,000**	0,000**	0,000**	0,000**	0,000**
Province of Drenthe	Exp(B)	1,598	1,297	1,245	1,229	1,206	1,261	1,206
	Sig.	0,255	0,556	0,622	0,643	0,674	0,602	0,674
Province of Flevoland	Exp(B)	3,598	2,618	2,080	1,633	1,108	1,232	1,102
	Sig.	0,000**	0,003**	0,046*	0,203	0,807	0,606	0,817
Province of Friesland	Exp(B)	2,110	1,937	1,776	1,740	1,589	1,578	1,583
	Sig.	0,008**	0,026*	0,054	0,063	0,123	0,129	0,126
Province of Gelderland	Exp(B)	0,950	0,870	1,067	1,108	1,107	1,104	1,054
	Sig.	0,857	0,640	0,834	0,739	0,742	0,747	0,868
Province of Groningen	Exp(B)	4,232	3,168	2,891	2,905	2,990	3,235	2,782
	Sig.	0,000**	0,000**	0,000**	0,000**	0,000**	0,000**	0,001**
Province of Limburg	Exp(B)	0,370	0,396	0,449	0,467	0,493	0,519	0,495
	Sig.	0,057	0,123	0,185	0,207	0,241	0,279	0,245
Province of Noord Brabant	Exp(B)	0,953	0,952	1,014	1,013	1,033	1,079	1,034
	Sig.	0,845	0,847	0,958	0,959	0,900	0,766	0,897
Province of Noord Holland	Exp(B)	2,082	1,901	1,574	1,522	1,352	1,306	1,343
	Sig.	0,002*	0,012*	0,078	0,103	0,253	0,320	0,264
Province of Overijssel	Exp(B)	1,212	1,491	1,636	1,691	1,780	1,853	1,757
	Sig.	0,618	0,308	0,211	0,182	0,144	0,118	0,154
Province of Utrecht	Exp(B)	0,768	1,096	1,109	1,161	1,218	1,257	1,196
	Sig.	0,576	0,849	0,829	0,755	0,682	0,635	0,710
Province of Zeeland	Exp(B)	3,374	2,939	3,027	2,933	2,957	3,193	2,974
	Sig.	0,000**	0,000**	0,000**	0,000**	0,000**	0,000**	0,000**
Province of Zuid Holland	Exp(B)	-	-	-	-	-	-	-
	Sig.	-	-	-	-	-	-	-
Inter municipal plan	Exp(B)			0,511	0,527	0,535	0,536	0,530
	Sig.			0,010**	0,014*	0,017*	0,017*	0,015*
Housing nearby	Exp(B)			1,000	1,000	1,000	1,000	1,000
	Sig.			0,528	0,486	0,598	0,558	0,593
Proximity to main roads	Exp(B)			0,852	0,861	0,895	0,899	0,901
	Sig.			0,215	0,246	0,382	0,403	0,412
Proximity to business park	Exp(B)			1,105	1,082	1,149	1,210	1,128
	Sig.			0,508	0,602	0,347	0,195	0,422
Turbines within 2 km	Exp(B)			1,015				
	Sig.			0,000**				
Turbines within 5 km	Exp(B)				1,011			
	Sig.				0,000**			
Turbines within 10 km	Exp(B)					1,009		1,010

	Sig.					0,000**		0,000**
Turbines within 15 km	Exp(B)						1,006	
	Sig.						0,000**	
Political preference	Exp(B)							1,267
	Sig.							0,482
Chi-square		99,006	63,183	89,385	94,171	96,190	94,098	96,668
df		13	13	18	18	18	18	19
Sig.		0,000**	0,000**	0,000**	0,000**	0,000**	0,000**	0,000**
Number of cases		583	396	396	396	396	396	396

Table 3: Cox regression analysis - initiative until receiving permit (* $p \leq 0,05$ ** $p \leq 0,01$)

In table 4 the second cox regression analysis can be viewed. This is the cox regression about the chance of realization with a time span from the initiative until the realization of the project. This table also contains seven models of which the seventh model is the most significant and has the most explanatory power. This seventh model will be used in the analysis.

In this model the variable ‘*Cooperative*’ is not significant and does therefore not have a significant relation with the chance of realization. The fact that this variable is not significant in this second table is logical because once the permit has been granted, a cooperative is no longer the main actor in the process. Once the permit is received all plans have already been made and only the building process is yet to be done. This building process is minimally influenced by the cooperative.

The variable ‘*Turbines within 10 km*’ does still show a significant positive relation with the chance of realization, and therefore the chance of realization increases with 1 percent each year when the amount of wind turbines nearby increases. A logical explanation for this might be the presence of good infrastructure or knowledge on the subject. As turbines have been realized before, the local community and involved actors already have some experience.

Another variable that shows a significantly positive relation is the variable ‘*Political preference*’. This variable was not significant during the permit process but is significant over the whole time period from initiative until realization. It tells us that when there is positive attitude towards realizing onshore wind farms, within the majority of the local council, the chance for realization increases with each passing year.

The variables ‘*Size*’ and ‘*Inter municipal plan*’, again show a significant and negative relation with the chance of realization. This seems logical as when the size of a project increases the level of difficulty and needed recourses also increases, this slows down the realization process and decreases the chance of realization with 2,5 percent each year for an increase of 1 MW in power. The fact that a project is inter municipal makes it more difficult because two or more parties have to agree on everything. The discussions and meetings will take up a lot of time in the whole process and the realization process will become more slow. The chance of realization will decrease with 47 percent each year when the project is inter municipal.

The variables ‘*Provinces*’, again show differences between different provinces. This time only in the province of Zeeland the chance of realization is significantly bigger than in the province of Zuid-Holland. The chance of realization is 3,5 times bigger each year than it is in the province of Zuid-Holland.

Cox regression analysis – time until realization

		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Cooperative	Exp(B)	1,743	1,392	1,326	1,303	1,335	1,308	1,243
	Sig.	0,042*	0,251	0,345	0,376	0,335	0,369	0,469
Size	Exp(B)	0,975	0,973	0,974	0,975	0,976	0,975	0,975
	Sig.	0,000**	0,000**	0,000**	0,000**	0,000**	0,000**	0,000**
Province of Drenthe	Exp(B)	1,123	0,921	0,732	0,713	0,695	0,724	0,709
	Sig.	0,875	0,911	0,673	0,649	0,624	0,664	0,643
Province of Flevoland	Exp(B)	4,481	3,672	2,668	1,928	1,345	1,435	1,350
	Sig.	0,000**	0,000**	0,015*	0,130	0,544	0,447	0,540
Province of Friesland	Exp(B)	2,788	2,487	2,060	1,993	1,749	1,699	1,744
	Sig.	0,002**	0,008**	0,035*	0,045*	0,108	0,130	0,110
Province of Gelderland	Exp(B)	0,985	0,831	0,958	0,995	0,994	1,000	0,844
	Sig.	0,968	0,632	0,916	0,990	0,987	1,000	0,684
Province of Groningen	Exp(B)	6,264	4,275	2,972	2,889	3,076	3,388	2,022
	Sig.	0,000**	0,000**	0,007**	0,007**	0,004**	0,002**	0,122

Province of Limburg	Exp(B)	0,626	0,592	0,598	0,629	0,656	0,686	0,662
	Sig.	0,443	0,477	0,487	0,532	0,570	0,612	0,577
Province of Noord Brabant	Exp(B)	1,382	1,252	1,186	1,177	1,187	1,230	1,190
	Sig.	0,258	0,440	0,564	0,581	0,561	0,485	0,556
Province of Noord Holland	Exp(B)	2,437	2,106	1,672	1,617	1,490	1,448	1,449
	Sig.	0,003**	0,014*	0,092	0,116	0,197	0,236	0,231
Province of Overijssel	Exp(B)	1,172	1,189	1,162	1,205	1,223	1,227	1,140
	Sig.	0,769	0,749	0,782	0,731	0,711	0,706	0,810
Province of Utrecht	Exp(B)	1,281	1,430	1,298	1,348	1,383	1,431	1,333
	Sig.	0,613	0,465	0,598	0,546	0,513	0,470	0,562
Province of Zeeland	Exp(B)	4,458	3,926	3,581	3,422	3,498	3,818	3,592
	Sig.	0,000**	0,000**	0,000**	0,000**	0,000**	0,000**	0,000**
Province of Zuid Holland	Exp(B)	-	-	-	-	-	-	-
	Sig.	-	-	-	-	-	-	-
Inter municipal plan	Exp(B)			0,512	0,528	0,537	0,539	0,530
	Sig.			0,029*	0,038*	0,043*	0,044*	0,039*
Housing nearby	Exp(B)			0,999	0,999	0,999	0,999	0,999
	Sig.			0,196	0,176	0,161	0,152	0,151
Proximity to main roads	Exp(B)			0,824	0,845	0,875	0,879	0,891
	Sig.			0,215	0,280	0,397	0,413	0,471
Proximity to business park	Exp(B)			1,176	1,133	1,200	1,254	1,111
	Sig.			0,363	0,482	0,295	0,194	0,554
Turbines within 2 km	Exp(B)			1,014				
	Sig.			0,033*				
Turbines within 5 km	Exp(B)				1,013			
	Sig.				0,002**			
Turbines within 10 km	Exp(B)					1,010		1,010
	Sig.					0,001**		0,001**
Turbines within 15 km	Exp(B)						1,007	
	Sig.						0,001**	
Political preference	Exp(B)							2,790
	Sig.							0,015*
Chi-square		90,618	74,161	90,987	95,221	97,497	97,439	102,751
df		13	13	18	18	18	18	19
Sig.		0,000**	0,000**	0,000**	0,000**	0,000**	0,000**	0,000**
Number of cases		583	396	396	396	396	396	396

Table 4: Cox regression analysis - initiative until realization (* $p \leq 0,05$ ** $p \leq 0,01$)

5. Conclusions and recommendations

The first paragraph will cover the conclusions that are drawn from the analysis of the dataset. In order to give detailed conclusions, the sub questions, formulated in chapter 1 will be used as the main line in this chapter. By answering the sub questions, it is possible to give an answer to the main question of this research. The second paragraph lists detailed recommendations for further and future research on the topic of wind farm realization and the involvement of cooperatives.

5.1 Conclusions

In this document a quantitative analysis of factors in various models was carried out in order to give an answer to the main question which states as follows:

'To what extent does the presence of cooperation influence the chance of receiving a permit or the realization of onshore wind farms in the Netherlands'

In order to give an answer to this main question several sub questions have been formulated. These sub questions will guide this thesis and form the main line in this conclusion chapter. In order to answer the sub questions a large dataset of 583 wind farm projects has been created, and with 396 of these cases the analysis has been done. The analysis that have been done are a Kaplan Meyer analysis and the Cox regression analysis. The first analysis tells us if there is a relation between the variables *'cooperative'* and the chance of either receiving a permit or realization. The second analysis tells us how this relation works and if other factors also have a significant influence.

The first sub question of this thesis is: *'Does the presence of cooperation have an effect on the chance of receiving a permit for a wind farm?'*

In order to answer the first sub question, a Kaplan Meyer analysis and a cox regression analysis have been done on the period from initiative until receiving a permit. A Kaplan Meyer analysis has been used to create a broader view of the effect of cooperation on the chance of receiving a permit for wind farms. This analysis has shown that there is a relation between the two variables, and the presence of a cooperative increases the chance of receiving a permit.

In order to determine what variables have a significant positive or negative influence on this process, a cox regression analysis on our dataset has been performed. From this analysis we can conclude that the variable *'cooperative'* has a positive effect on the chance of receiving a permit.

Other variables that have a significant effect on the realization, according to the model, are the size of the project, whether it is an intermunicipal plan, whether other turbines have already been realized nearby, the period the project was started, and in what province the project is being planned. Whereas the variables *'cooperative'*, and *'Turbines within 10 km'* cause for a greater chance of realization, other variables like the *'size'* and *'intermunicipal plan'* have a negative effect and therefore the speed of realization or receiving a permit is slower. As for the variable *'Provinces'* there are some provinces in which the chance for receiving a permit is bigger than others. In the province of Groningen and Zeeland the process seems to be significantly easier (almost three times quicker) than in the province of Zuid-Holland (reference category).

To answer the first sub question, the variable *'cooperative'* has an effect on the chance of receiving a permit. This relation between the two is positive and therefore when there is a cooperative active within a project, the chance of receiving a permit increases. This chance increases with 77,4 percent each year a project is running.

As there are two parts formulated in the main question there have to be at least two sub questions to answer it. In order to answer the second sub question: *'Does the presence of cooperation have an effect on the chance of the realization of a wind farm?'*, another Kaplan Meyer and Cox regression analysis have been carried out.

The Kaplan Meyer analysis is done on the whole process, from initiative until realization, and tells us again that when there is a cooperative active the chance of realization increases. The realization happens faster than when there is no cooperative active.

When looking at the cox regression analysis on the whole period it is interesting to see that the variable *'cooperative'* is no longer significant. Meanwhile the other variables that had a significant influence in the first analysis, *'size'*, *'Number of turbines nearby'*, *'Intermunicipal plan'* and *'provinces'* are still significant. Another variable that is significant in this analysis is the variable *'Political preference'*.

We conclude that the presence of *'cooperation'* only has an influence on whether a project receives a permit or not. The actual realization and build process are not influenced significantly by it. This conclusion is in line with the conclusions that Corscadden et al. (2012) made in their research that said that a high level of consultation and early communication is preferred by communities. The other variables do influence both phases which seems to be in line with the theory and logic. The realization can be made more difficult by *'size'* because it requires more effort and paperwork to be arranged.

To answer the second sub question, the presence of a cooperative during the whole process does not significantly influence the chance of realization. The time to realization is however shorter when looking at the Kaplan Meyer analysis, when we combine this with the earlier result that *'cooperative'* does significantly influence the chance of receiving a permit tells us that during the whole process most time can be gained in the first phase, from initiative until receiving the permit by including a cooperative.

To answer the last sub question that was formulated, *'What factors other than cooperation influence the chance of receiving a permit and realization of wind farms?'*, the factors that influence the realization of onshore wind farms were found to be:

- *'Cooperative'*
- *'Size'*
- *'Number of turbines nearby'*
- *'Province'*
- *'Intermunicipal plan'*
- *'Political preference'*

These variables all show a significant relation with the chance of receiving a permit and the chance of realization of onshore wind farms. In the case of receiving a permit the variables *'Cooperative'*, *'Number of turbines nearby'*, and *'Political preference'* positively influence the chance and the variables *'Size'*, and *'intermunicipal plan'*, have a negative influence on the chance.

In the case of the chance for receiving a permit the variable *'Number of turbines nearby'* positively influences the chance for receiving a permit, and the variables *'Size'*, and *'intermunicipal plan'*, negatively influence the chance for receiving a permit. When the size of the project increases or there is an intermunicipal plan, the chance for receiving a permit decreases each year.

When looking at the chance of realization of a wind farm the variables *'Number of turbines nearby'*, and *'Political preference'* positively influence the chance for realization, and the variables *'Size'*, and *'intermunicipal plan'*, negatively influence the chance for realization.

It can therefore be concluded that most is to gain during the first phase of the realization process. Currently the first phase takes up a lot of time and is the primary cause for a slow process. Including a

cooperative model seems to make the first phase faster and could therefore make the whole process faster and wind farms easier to realize.

All of the above analysis enables us to answer the main research question: *'To what extent does the presence of a cooperative influence the chance of receiving a permit and the chance of realization of onshore wind farms in the Netherlands'*.

The presence of a cooperative does have a positive influence on the chance of receiving a permit but does not significantly influence the chance of the realization of a wind farm project. It has a positive influence and causes for wind farms to be realized quicker and more easily. Most time can be gained in the early stages of the process between initiative and receiving the permit. Introducing a cooperative into the realization process from the start can therefore be recommended in the future, based on this research.

5.2 Recommendations

Cooperation is becoming increasingly important, and therefore it should become an increasingly important topic on the scientific research agenda. By using qualitative methods instead of the quantitative methods used in this thesis, a researcher can attempt to broaden the knowledge on cooperation and its effects on the realization process. There are many reasons for cooperation to have a positive influence on the realization, of which some are yet to be understood in full detail. Further research will allow us to answer questions like: at what moment in the process should cooperation start to have a maximal positive influence, and which forms of cooperation have the biggest influence on the whole process? Why does the presence of a cooperative have the influence it has?

Another recommendation we would like to make is to add even more variables into the equation. Variables that are mentioned in other research, such as the research by Langer et al. (2017). Variables that cover the more personal side of the issue. These personal variables can only be included by surveying or interviewing local residents, residents that live close to a wind farm. By including these variables one can analyze not only the effects of the presence of a cooperative on the realization process, but also the effect of the presence of a cooperative on the local acceptance of residents. Does the acceptance increase or does it have no influence on this aspect.

We also recommend performing more in-depth research on the differences between provinces. As concluded in this study there are certain differences that cause for the realization process to be either easier or harder in some provinces. Where do these differences come from and how can provinces learn from each other? Future research between different provinces can help for the overall process to become easier and perhaps even more successful. It is foreseen that this requires a qualitative, in-depth study to investigate the differences in policies, municipal and/or provincial agendas and local politics.

Our final recommendation includes a more global view on the topic. By broadening our view in qualitative and quantitative ways there is much more to learn about the diverse ways in which cooperation works and can be used. For instance, analyzing data from different countries or even different continents could get us a clearer picture on the effects of cooperation on the realization of wind farms. In doing so and combining it with qualitative research, a researcher can compare these different places, dynamics, policies and plans and look at the similarities and differences between them. What can we learn from each other, and how can we optimize this process of not only the realization of wind farms but also the realization of other renewable energy sources on a global scale?

6. Critical reflection

In this last chapter the critical reflection on the research will be done. It is always important to include such a chapter to figure out what issues came forward during the process and which thing could have been done differently. It is a critical reflection on the limits of the research the results and the recommendations.

Of course there are limitations to the research that has been done. Limitations in time and sources are the main issue in the case of this research. As this is a master thesis it was my intent to start in March and finish the research by August. This is a very short time span to form a large and useful data base to base my research of, form a theoretical framework and the analysis. This time issue has caused for a limitation in the data collection and a limitation in variables that have been included in the research. A variable in particular that I would have wanted to include was the opposition against certain wind farms in the Netherlands. This is a variable that has been mentioned in the introduction and it could in my view, have added a lot of depth and could also have large explanatory power. Unfortunately it was not possible for me to collect data on this variable. This is a variable that, as has been said before in the recommendation paragraph, could be very important.

So time has had a considerable effect on the research but also the availability of resources. A lot of resources were available due to the fact that my data collection partner had an internship from which she could get a lot of data. Some data however was more difficult to retrieve and has therefore been left out. This is again the case with the opposition variable. This variable is more difficult to measure and retrieve. For some of the variables the data was simply not available, which has caused for some missing's. These missing's are mainly caused by the fact that for some projects, no coordinates were available. As many of the variables used in the analysis are based on these coordinates, these cases where did not include sufficient information to be used in the analysis.

Whereas some data was difficult to collect, other data should have been used more wisely. In this case I am talking about the locational factors. These factors were added with the use of the program ArcGIS which took up a lot of time during the data collection. These variables were only viewed as binary variables, within 100 meters or not, this makes them not only less useful but also not complete. Maybe a lot of wind farms were not within 100 meters but within 101 meters. This automatically leaves them out of any conclusion which is not very scientific. Therefore these variables should have been of an interval measuring scale to ensure that all cases are reflected upon more precisely. Giving them an interval measuring scale is possible but there was simply not enough time left to do this.

Not only is it important to reflect on the research process and its limitations. The analysis, results, and recommendation should also be reflected upon. These two aspects of the research are a result of the process, and therefore also suffer the same limitations as mentioned above, time and sources. The descriptive analysis are made up of frequency, descriptive and correlation tables. These gave a good overview of the dataset and the variables it contains. The statistical analysis are completely formed by the survival analysis, which were difficult to do. In my opinion this is a very good analysis to use in this thesis, and it gave a good picture of the relations between the dependent and independent variables. First of all the Kaplan Meyer analysis gave the initial answer to the main question, but this answer had to be checked with the use of control variables. The Kaplan Meyer shows that the relation is there, and we could look in to this relation. The Cox regression gives the opportunity to look at this relation in connection with the control variables. I think the analysis give a full image of the dataset and the outcomes give a well-grounded answer to the main question.

To conclude, I think that the overall thesis has a good foundation, still there are multiple ways to further improve the data and analysis, or built further upon this research. I think that the whole process from idea to a finished product went well, even though there were some bumps in the road during the data collection. This thesis provides the opportunity to further investigate cooperation and the relation it has to the realization of wind farms and increase the knowledge on the subject.

7. References

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Appendices

Appendix 1. Frequency tables

Coordinates

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	396	67,9	100,0	100,0
Missing	System	187	32,1		
Total		583	100,0		

Amount of years until realization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	,3	,7	,7
	2	9	2,3	5,9	6,5
	3	16	4,0	10,5	17,0
	4	22	5,6	14,4	31,4
	5	14	3,5	9,2	40,5
	6	17	4,3	11,1	51,6
	7	14	3,5	9,2	60,8
	8	14	3,5	9,2	69,9
	9	9	2,3	5,9	75,8
	10	10	2,5	6,5	82,4
	11	4	1,0	2,6	85,0
	12	9	2,3	5,9	90,8
	13	6	1,5	3,9	94,8
	14	2	,5	1,3	96,1
	15	4	1,0	2,6	98,7
	16	2	,5	1,3	100,0
	Total		153	38,6	100,0
Missing	System	243	61,4		
Total		396	100,0		

Province

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Drenthe	13	3,3	3,3	3,3
	Flevoland	23	5,8	5,8	9,1
	Friesland	33	8,3	8,3	17,4
	Gelderland	42	10,6	10,6	28,0
	Groningen	25	6,3	6,3	34,3
	Limburg	16	4,0	4,0	38,4
	Noord-Brabant	61	15,4	15,4	53,8
	Noord-Holland	39	9,8	9,8	63,6
	Overijssel	12	3,0	3,0	66,7
	Utrecht	13	3,3	3,3	69,9
	Zeeland	32	8,1	8,1	78,0
	Zuid-Holland	87	22,0	22,0	100,0
	Total	396	100,0	100,0	

Project realized

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	243	61,4	61,4	61,4
	Yes	153	38,6	38,6	100,0
	Total	396	100,0	100,0	

Inter municipal plan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	350	88,4	88,4	88,4
	1	46	11,6	11,6	100,0
	Total	396	100,0	100,0	

Within 100 m from a national road

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	268	67,7	67,7	67,7
	yes	128	32,3	32,3	100,0
	Total	396	100,0	100,0	

Within 100 m of a provincial road

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	327	82,6	82,6	82,6
	yes	69	17,4	17,4	100,0
	Total	396	100,0	100,0	

Within 100m of the railway

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	318	80,3	80,3	80,3
	yes	78	19,7	19,7	100,0
	Total	396	100,0	100,0	

Housing nearby categories

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	69	17,4	17,4	17,4
	1 - 10	164	41,4	41,4	58,8
	11 - 50	106	26,8	26,8	85,6
	51 - 10	20	5,1	5,1	90,7
	101 - 200	8	2,0	2,0	92,7
	200 or more	29	7,3	7,3	100,0
	Total	396	100,0	100,0	

Openness of the landscape

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	11	2,8	7,3	7,3
	1 - 50	19	4,8	12,7	20,0
	51 - 150	20	5,1	13,3	33,3
	151 - 500	51	12,9	34,0	67,3
	501 - 1000	34	8,6	22,7	90,0
	1001 or more	15	3,8	10,0	100,0
	Total	150	37,9	100,0	
	Missing	System	246	62,1	
Total		396	100,0		

Cooperation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No cooperative	347	87,6	87,6	87,6
	cooperative	49	12,4	12,4	100,0
	Total	396	100,0	100,0	

Permit received or not

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No permit	182	46,0	46,0	46,0
	Permit granted	214	54,0	54,0	100,0
	Total	396	100,0	100,0	

Time till realization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	35	8,8	8,8	8,8
	2	40	10,1	10,1	18,9
	3	67	16,9	16,9	35,9
	4	70	17,7	17,7	53,5
	5	26	6,6	6,6	60,1
	6	23	5,8	5,8	65,9
	7	19	4,8	4,8	70,7
	8	22	5,6	5,6	76,3
	9	19	4,8	4,8	81,1
	10	28	7,1	7,1	88,1
	11	7	1,8	1,8	89,9
	12	11	2,8	2,8	92,7
	13	8	2,0	2,0	94,7
	14	3	,8	,8	95,5
	15	8	2,0	2,0	97,5
	16	10	2,5	2,5	100,0
Total	396	100,0	100,0		

Time till permit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	73	18,4	18,4	18,4
	2	50	12,6	12,6	31,1
	3	63	15,9	15,9	47,0
	4	66	16,7	16,7	63,6
	5	22	5,6	5,6	69,2
	6	24	6,1	6,1	75,3
	7	20	5,1	5,1	80,3
	8	17	4,3	4,3	84,6
	9	17	4,3	4,3	88,9
	10	16	4,0	4,0	92,9
	11	9	2,3	2,3	95,2
	12	4	1,0	1,0	96,2
	13	2	,5	,5	96,7
	14	2	,5	,5	97,2
	15	4	1,0	1,0	98,2
	16	7	1,8	1,8	100,0
Total	396	100,0	100,0		

Appendix 2. Descriptive tables

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Time till realization	153	1	16	1068	6,98	3,581
Valid N (listwise)	153					

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Time till realization	396	1	16	2259	5,70	3,871
Time till permit	396	1	16	1872	4,65	3,513
Time from permit to realization	396	0	14	417	1,05	1,733
Valid N (listwise)	396					

Appendix 3. Crosstabs

Province * Openness of the landscape Crosstabulation

Count

		Openness of the landscape						Total
		0	1 - 50	51 - 150	151 - 500	501 - 1000	1001 or more	
Province	Drenthe	0	0	0	2	0	0	2
	Flevoland	1	0	1	2	4	2	10
	Friesland	1	1	1	6	5	0	14
	Gelderland	1	3	3	0	2	0	9
	Groningen	0	0	0	1	7	2	10
	Limburg	1	0	1	0	0	0	2
	Noord-Brabant	2	6	2	7	4	0	21
	Noord-Holland	1	4	4	8	2	1	20
	Overijssel	1	0	1	2	0	0	4
	Utrecht	0	2	1	2	0	0	5
	Zeeland	0	0	4	10	4	7	25
	Zuid-Holland	3	3	2	11	6	3	28
Total	11	19	20	51	34	15	150	

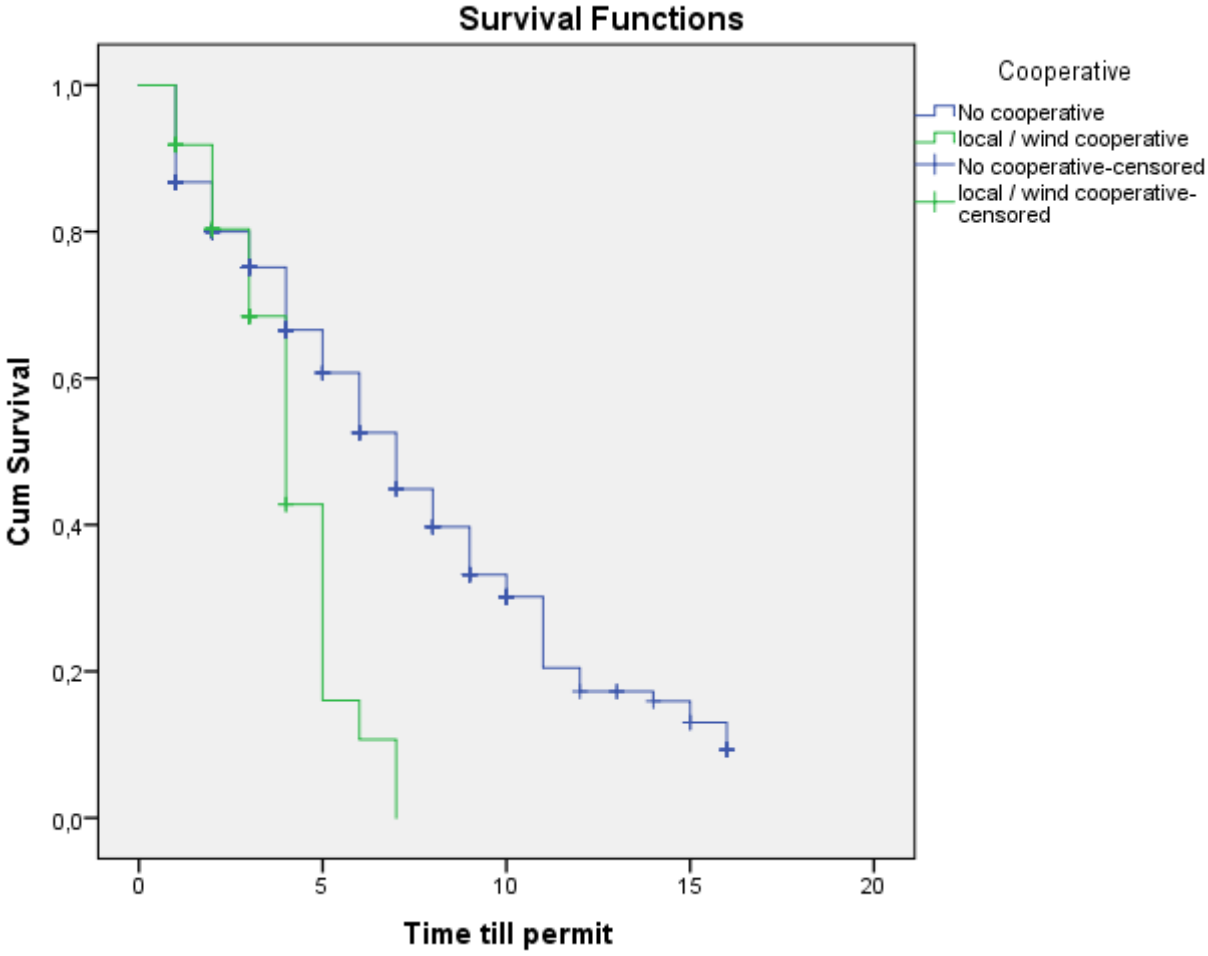
Appendix 4. Kaplan Meyer

Time till permit

Overall Comparisons

	Chi-Square	df	Sig.
Log Rank (Mantel-Cox)	11,393	1	,001

Test of equality of survival distributions for the different levels of Cooperative.

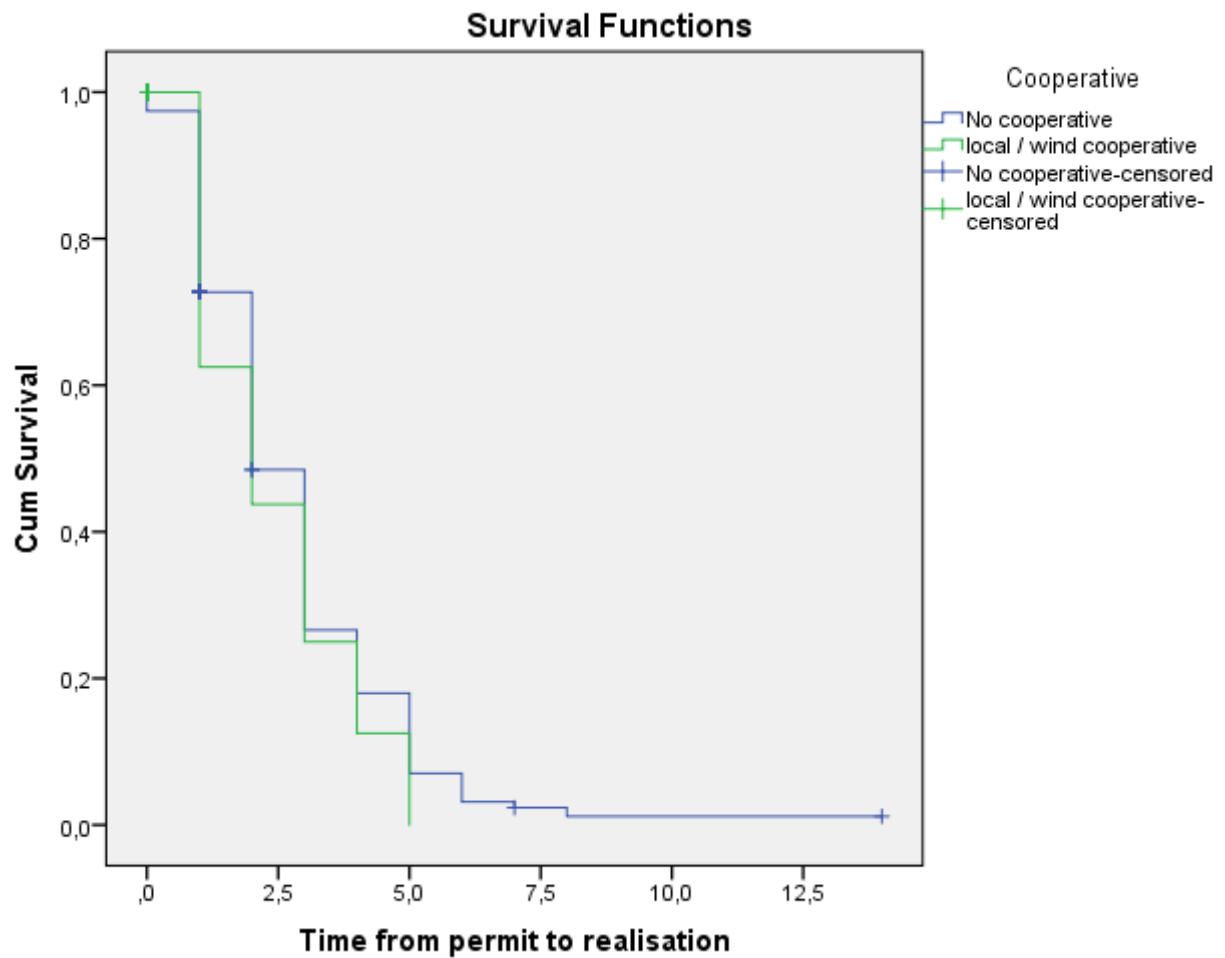


Time between permit and realization

Overall Comparisons

	Chi-Square	df	Sig.
Log Rank (Mantel-Cox)	,273	1	,601

Test of equality of survival distributions for the different levels of Cooperative.

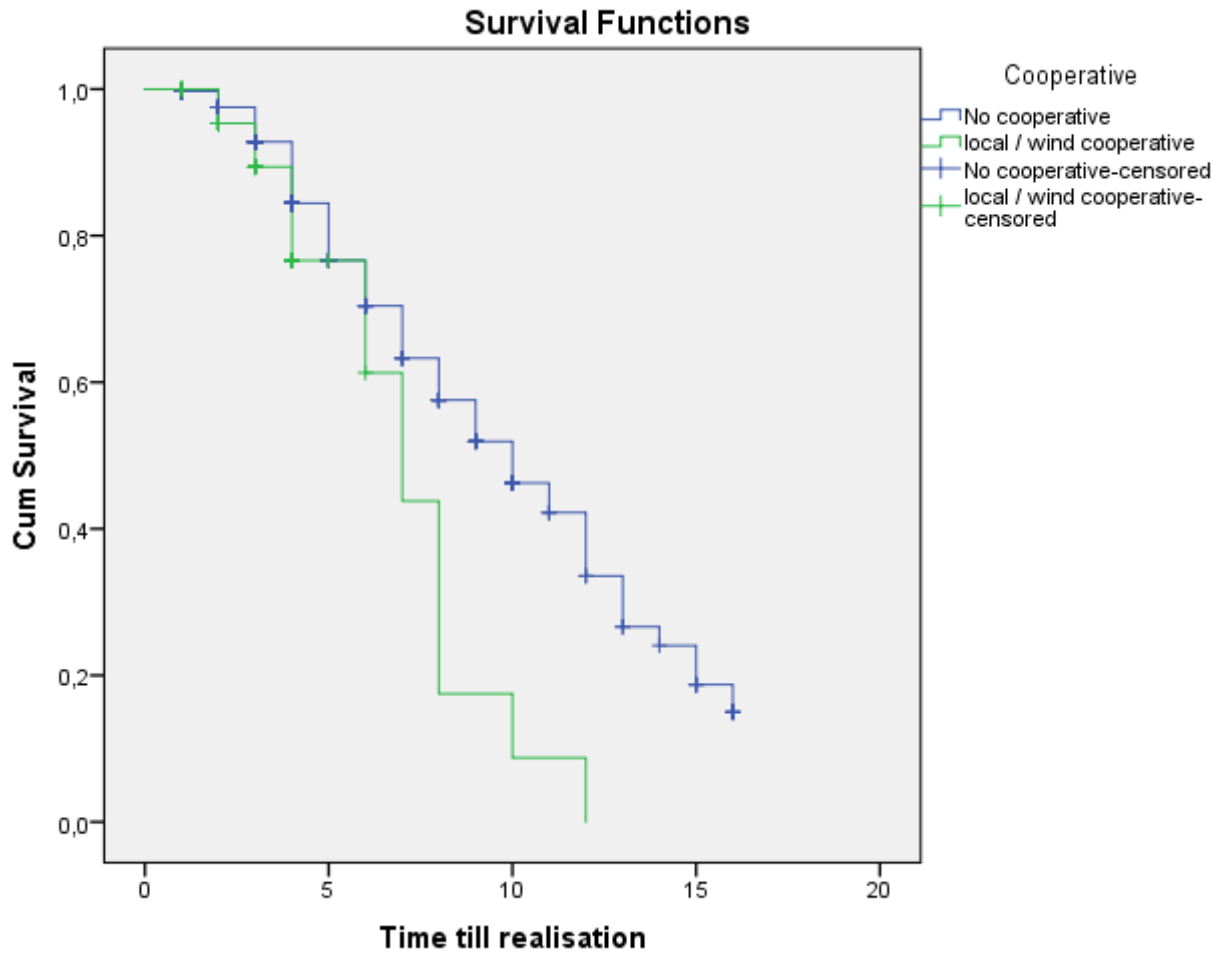


From initiative to realization

Overall Comparisons

	Chi-Square	df	Sig.
Log Rank (Mantel-Cox)	7,192	1	,007

Test of equality of survival distributions for the different levels of Cooperative.



Appendix 5. Cox regression

Cox regressive analysis consisting of 7 models, covering the time between initiative and receiving permit

Model 1: Total dataset including 583 cases

Model 2: Dataset without the cases that have locational data missing

Model 3: Dataset without the cases that have locational data missing, locational factors, and turbines within 2 km included

Model 4: Dataset without the cases that have locational data missing, locational factors, and turbines within 5 km included

Model 5: Dataset without the cases that have locational data missing, locational factors, and turbines within 10 km included

Model 6: Dataset without the cases that have locational data missing, locational factors, and turbines within 15 km included

Model 7: Dataset without the cases that have locational data missing, locational factors, turbines within 10 km*, and political preference included

* the 10 km mark has been chosen on the basis that that model is strongest

		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
cooperation	Exp(B)	2,090	1,747	1,709	1,712	1,803	1,810	1,774
	Sig.	0,000*	0,013*	0,019*	0,019*	0,010*	0,010*	0,013*
Max power (MW)	Exp(B)	0,988	0,989	0,986	0,986	0,988	0,988	0,987
	Sig.	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*
Province of Drenthe	Exp(B)	1,598	1,297	1,245	1,229	1,206	1,261	1,206
	Sig.	0,255	0,556	0,622	0,643	0,674	0,602	0,674
Province of Flevoland	Exp(B)	3,598	2,618	2,080	1,633	1,108	1,232	1,102
	Sig.	0,000*	0,003*	0,046*	0,203	0,807	0,606	0,817
Province of Friesland	Exp(B)	2,110	1,937	1,776	1,740	1,589	1,578	1,583
	Sig.	0,008*	0,026*	0,054	0,063	0,123	0,129	0,126
Province of Gelderland	Exp(B)	0,950	0,870	1,067	1,108	1,107	1,104	1,054
	Sig.	0,857	0,640	0,834	0,739	0,742	0,747	0,868
Province of Groningen	Exp(B)	4,232	3,168	2,891	2,905	2,990	3,235	2,782
	Sig.	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*	0,001*
Province of Limburg	Exp(B)	0,370	0,396	0,449	0,467	0,493	0,519	0,495
	Sig.	0,057	0,123	0,185	0,207	0,241	0,279	0,245
Province of Noord Brabant	Exp(B)	0,953	0,952	1,014	1,013	1,033	1,079	1,034

	Sig.	0,845	0,847	0,958	0,959	0,900	0,766	0,897
Province of Noord Holland	Exp(B)	2,082	1,901	1,574	1,522	1,352	1,306	1,343
	Sig.	0,002*	0,012*	0,078	0,103	0,253	0,320	0,264
Province of Overijssel	Exp(B)	1,212	1,491	1,636	1,691	1,780	1,853	1,757
	Sig.	0,618	0,308	0,211	0,182	0,144	0,118	0,154
Province of Utrecht	Exp(B)	0,768	1,096	1,109	1,161	1,218	1,257	1,196
	Sig.	0,576	0,849	0,829	0,755	0,682	0,635	0,710
Province of Zeeland	Exp(B)	3,374	2,939	3,027	2,933	2,957	3,193	2,974
	Sig.	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*
Province of Zuid Holland	Exp(B)	-	-	-	-	-	-	-
	Sig.			-	-	-	-	-
Inter municipal plan	Exp(B)			0,511	0,527	0,535	0,536	
	Sig.			0,010*	0,014*	0,017*	0,017*	
Housing nearby	Exp(B)			1,000	1,000	1,000	1,000	
	Sig.			0,528	0,486	0,598	0,558	
Proximity to main roads	Exp(B)			0,852	0,861	0,895	0,899	
	Sig.			0,215	0,246	0,382	0,403	
Proximity to business park	Exp(B)			1,105	1,082	1,149	1,210	
	Sig.			0,508	0,602	0,347	0,195	
Turbines within 2 km	Exp(B)			1,015				
	Sig.			0,000*				
Turbines within 5 km	Exp(B)				1,011			
	Sig.				0,000*			
Turbines within 10 km	Exp(B)					1,009		1,010
	Sig.					0,000*		0,000*
Turbines within 15 km	Exp(B)						1,006	
	Sig.						0,000*	
Political preference	Exp(B)							1,267
	Sig.							0,482
Chi-square		99,006	63,183	89,385	94,171	96,190	94,098	96,668
df		13	13	18	18	18	18	19
Sig.		0,000*	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*
Number of cases		583	396	396	396	396	396	396

Cox regressive analysis consisting of 7 models, covering the time between initiative and realization

Model 1: Total dataset including 583 cases

Model 2: Dataset without the cases that have locational data missing

Model 3: Dataset without the cases that have locational data missing, locational factors, and turbines within 2 km included

Model 4: Dataset without the cases that have locational data missing, locational factors, and turbines within 5 km included

Model 5: Dataset without the cases that have locational data missing, locational factors, and turbines within 10 km included

Model 6: Dataset without the cases that have locational data missing, locational factors, and turbines within 15 km included

Model 7: Dataset without the cases that have locational data missing, locational factors, turbines within 10 km*, and political preference included

*the 10 km mark has been chosen on the basis that that model is strongest

		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Cooperation	Exp(B)	1,743	1,392	1,326	1,303	1,335	1,308	1,243
	Sig.	0,042*	0,251	0,345	0,376	0,335	0,369	0,469
Max power (MW)	Exp(B)	0,975	0,973	0,974	0,975	0,976	0,975	0,975
	Sig.	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*
Province of Drenthe	Exp(B)	1,123	0,921	0,732	0,713	0,695	0,724	0,709
	Sig.	0,875	0,911	0,673	0,649	0,624	0,664	0,643
Province of Flevoland	Exp(B)	4,481	3,672	2,668	1,928	1,345	1,435	1,350
	Sig.	0,000*	0,000*	0,015*	0,130	0,544	0,447	0,540
Province of Friesland	Exp(B)	2,788	2,487	2,060	1,993	1,749	1,699	1,744
	Sig.	0,002*	0,008*	0,035*	0,045*	0,108	0,130	0,110
Province of Gelderland	Exp(B)	0,985	0,831	0,958	0,995	0,994	1,000	0,844
	Sig.	0,968	0,632	0,916	0,990	0,987	1,000	0,684
Province of Groningen	Exp(B)	6,264	4,275	2,972	2,889	3,076	3,388	2,022
	Sig.	0,000*	0,000*	0,007*	0,007*	0,004*	0,002*	0,122
Province of Limburg	Exp(B)	0,626	0,592	0,598	0,629	0,656	0,686	0,662
	Sig.	0,443	0,477	0,487	0,532	0,570	0,612	0,577
Province of Noord Brabant	Exp(B)	1,382	1,252	1,186	1,177	1,187	1,230	1,190
	Sig.	0,258	0,440	0,564	0,581	0,561	0,485	0,556
Province of Noord Holland	Exp(B)	2,437	2,106	1,672	1,617	1,490	1,448	1,449
	Sig.	0,003*	0,014*	0,092	0,116	0,197	0,236	0,231

Province of Overijssel	Exp(B)	1,172	1,189	1,162	1,205	1,223	1,227	1,140
	Sig.	0,769	0,749	0,782	0,731	0,711	0,706	0,810
Province of Utrecht	Exp(B)	1,281	1,430	1,298	1,348	1,383	1,431	1,333
	Sig.	0,613	0,465	0,598	0,546	0,513	0,470	0,562
Province of Zeeland	Exp(B)	4,458	3,926	3,581	3,422	3,498	3,818	3,592
	Sig.	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*
Province of Zuid Holland	Exp(B)	-	-	-	-	-	-	-
	Sig.	-	-	-	-	-	-	-
Inter municipal plan	Exp(B)			0,512	0,528	0,537	0,539	0,530
	Sig.			0,029*	0,038*	0,043*	0,044*	0,039*
Housing nearby	Exp(B)			0,999	0,999	0,999	0,999	0,999
	Sig.			0,196	0,176	0,161	0,152	0,151
Proximity to main roads	Exp(B)			0,824	0,845	0,875	0,879	0,891
	Sig.			0,215	0,280	0,397	0,413	0,471
Proximity to business park	Exp(B)			1,176	1,133	1,200	1,254	1,111
	Sig.			0,363	0,482	0,295	0,194	0,554
Turbines within 2 km	Exp(B)			1,014				
	Sig.			0,033*				
Turbines within 5 km	Exp(B)				1,013			
	Sig.				0,002*			
Turbines within 10 km	Exp(B)					1,010		1,010
	Sig.					0,001*		0,001*
Turbines within 15 km	Exp(B)						1,007	
	Sig.						0,001*	
Political preference	Exp(B)							2,790
	Sig.							0,015*
Chi-square		90,618	74,161	90,987	95,221	97,497	97,439	102,751
df		13	13	18	18	18	18	19
Sig.		0,000*	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*
Number of cases		583	396	396	396	396	396	396