Technical University of Denmark

MSc Thesis

MANAGEMENT OF UNCERTAINTY AND AMBIGUITY IN WIND POWER PROJECTS

Jaime Palomo De Sotto

July 2014

DTU Management Engineering
Department of Management Engineering

MSc Thesis

Management Of Uncertainty And Ambiguity In Wind Power Projects

Author: Jaime Palomo De Sotto

Supervisors: Kristian Borch and Christian Langhoff Thuesen
DTU Management Engineering, Technical university of Denmark

Collaboration: Hans Chr Sørensen – SPOK Consult ApS

July 2014

DTU Management Engineering
Technical University of Denmark

Produktionstorvet
Building 424
2800 Kongens Lyngby
Denmark
Phone: (+45) 45 25 48 00
Fax: (+45) 45 93 34 35
Email: receptionen@man.dtu.dk

www.man.dtu.dk

ABSTRACT

Promoters of wind power have recognized the essential importance of expanding the understanding of planning and community acceptance in order to increase the development of the wind power industry and to mitigate against local resistance.

Building on actor network theory, innovation design and project management, this master thesis has sought to analyze, from a socio-technical perspective, the deployment of wind power and the related local controversies of community acceptance, from the point of view of the project developer. The analysis has focused on the management of uncertainty and ambiguity concepts, since they are seen as a necessary condition for effective management of these controversies. A clear differentiation between both concepts has been made when defining them: uncertainty, "lack of information", and ambiguity "lack of understanding/lack of clarity".

To demonstrate this framework, it has been applied to the cases of the Prøvestenen and Kalvebod Syd wind farms within the Copenhagen municipality. Results show the need of a strategic movement in wind power project management by the adoption of collaborative approaches between developers and the local community by combining value management with project management. Wind farm developers may be more successful if they engage local communities as partners in the planning and developing processes, additionally, a collaborative approach helps to ensure low levels of uncertainty and ambiguity. From a conceptual point of view, this collaborative approach can be seen as the sweet spot between actor network theory, project management and innovation design. This does not guarantee project success, but increases the probabilities of getting higher rates of community acceptance and thus potentially higher wind power penetration within Danish communities.

Key Words: *Wind Power, Project Management, Community Acceptance, Uncertainty, Ambiguity, and Decision-Making*.

PREFACE

The present master thesis, *Management of uncertainty and ambiguity in wind power projects*, has been conducted by Jaime Palomo De Sotto, under the supervision of Kristian Borch and Christian Langhoff Thuesen, both from the department of management engineering at DTU-Technical University of Denmark. In addition to the collaboration of Hans Chr Sørensen from SPOK Consult ApS, and coordination of Susana Ortiz Marcos from ICAI-School of Engineering at Universidad Pontificia Comillas.

This master thesis has covered 30 ECTS (5 months) and it has been done as part of a double degree program, between the MSc Management Engineering at DTU-Technical University of Denmark (Lyngby, Denmark), and the Industrial Engineering degree at ICAI-School of Engineering at Universidad Pontificia Comillas (Madrid, Spain). The main topic of this work is how wind power project developers should deliver value and engage local stakeholders by designing and managing appropriate frames for community acceptance when planning and developing wind farms.

I would like to thank for their guidance, advise and support to my supervisors, Kristian Borch and Christian Langhoff Thuesen. Besides to Hans Chr Sørensen due to this thesis has greatly benefited from his valuable inputs and expertise.

I am also grateful to DTU-Technical University of Denmark and the department of Management Engineering, and to ICAI-School of Engineering at Universidad Pontificia Comillas for the knowledge and values I have learned from them.

Heartfelt thanks to my parents, Santiago and Elena, and to my brother, Jorge, for their unconditional trust and support. Without them this would have not be possible.

Additionally, I would like to thank for their continuous interest and support to my group of friends Pupilos Celestiales, to all my mates from Tåsingegade Kollegiet, as well as to my thesis group, Jaime Sánchez Saralegui and Tinna Björk Sigmundsdóttir.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF DEFINITIONS

"Socio-technical System" – An approach that recognizes the interaction of social aspects, people and society, and technical aspects, organization structure and processes	(1)
"Stakeholders" – Those individual or groups who can affect or are affected by the organization [1]"	(3)
"Community acceptance" – the identification and understanding of the dimensions underlying social controversy at the local level [2]	(4)
"Project management" – The application of knowledge, skills and techniques to execute projects effectively and efficiently. It's a strategic competency for organizations, enabling them to tie project results to business goals and thus, better compete in their markets [3]	(5)
"Uncertainty" – Lack of Information	(6)
"Ambiguity" – Lack of understanding / Lack of clarity	(7)
"Framing" – A process through which actors come together to establish a common world and achieve a collective scenario of a desired outcome [4]	(8)
"Overflows" – The repercussions that follow when actors do not "conform to expectations, adopt conflicting positions and develop their own interpretations of the project" and in effect ensure that new frames are enacted [4]	(9)
"Planning phase in wind power projects" – Idea phase and scoping of the project, first contacts with local stakeholders *"Development phase in wind power projects" – Preparation of a plan proposal and environmental impact assessment report of the project*	(10)

CHAPTER 1: INTRODUCTION

Sustainable energy supply is in the spotlight. Numerous ambitious targets have been set up for the investment on renewable energies. Specifically important in this context is wind power as one of the most mature and fastest-growing renewable energy technologies [5][6]. In addition to technological concerns, the implementation of wind power systems carries a strong socio-economic component. The way it is implemented is a unique process of the re-creation of the technology, and it cannot thus be separated from the local dynamics of wind farm building [4]. Despite promoter of wind power have become increasingly concerned with stakeholder management and participation, there is still a high number of failed wind power projects [4][7][8]. Wind project developers and authorities have encountered what was named "local resistance", this means that formal procedures for engaging local stakeholders might be insufficient. While research to a large extent can describe general controversies behind lack of local acceptance in socio-technical systems such as wind power, many project managers still cannot explain differences from project to project due to contextual differences. Therefore, it has become more relevant the idea that opposition could occur from communities confronted by the planning and development process itself rather than by the proposed wind farm [4][9][7][8][10].

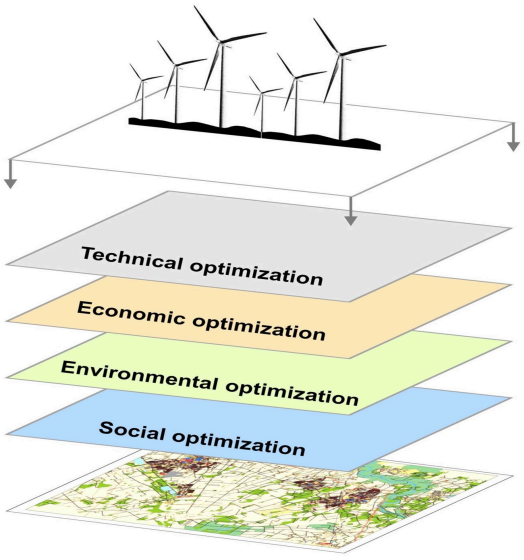


Figure 1 Dimensions of a wind farm

Wind power systems are expected to contribute significantly to the Denmark's target of obtaining 100% of its energy from renewables by 2050, and local acceptance is an important but uncertain element in meeting this ambitious target.

Denmark has strong competences within wind energy technology and economy, however there is a lack of in-depth knowledge on what shapes local acceptance and how project planning, public decision-making and policy measures may reduce conflicts [11][12].

2013 was an excellent year for the expansion of wind power in Denmark [13], wind-power production almost reached 30% of domestic electricity supply and wind turbines produced 9466 GWh electricity [13][14]. However, the current political situation does not longer ensure support for wind power planning. As a result the Danish Wind Industry Association [14][15] expects a flat growth or even more, a suspension of the municipalities' plans for the deployment of wind farms in the following years.

1.1 WIND2050 PROJECT

"The project Wind2050 may revolutionize citizen involvement in renewable energy [12]*"*

Under this perspective Wind2050 project, launched in January 2014 and funded by The Danish Council for Strategic Research, seeks to draw on international experience to understand the dynamics of local acceptance of offshore and onshore wind power projects in a Danish context. The project aims to examine both the factors that influence local acceptance and the influence of governance, project development and deployment of wind power. Moreover, the objective is to address local acceptance from a multidisciplinary perspective, focusing on the institutional and regulatory context as well as technical and social aspects in project development, in order to gain new scientific insights in sustainable development of socio-technical systems under strong influence of uncertainty factors such as acceptance. Besides to provide recommendations and decision support for future deployment of wind power and other renewable energy sources [11][12]. Wind2050 project is the source of inspiration and motivation for this master thesis.

1.2 LEARNING OBJECTIVES

- Define and describe social acceptance concept and its dimensions.
- Define and describe uncertainty and ambiguity concepts and their dimensions.
- Describe main key points of the wind power industry in Denmark.
- Identify, describe and evaluate the factors of community acceptance that add uncertainty and ambiguity, creating controversy to wind power projects.
- Identify, describe and evaluate community participation in decision-making processes, and management of uncertainty and ambiguity when planning and developing a wind power projects.
- Assess the link between community participation in decision-making processes and uncertainty and ambiguity when planning and developing wind power projects.

CHAPTER 2: PROBLEM STATEMENT

2.1 "MIND THE GAP"

Social acceptance towards wind power is basically different from local acceptance. This 'gap' causes sometimes that wind power project planners and developers can easily assume support for this renewable energy and usually overestimated the impact of local acceptance on success or failure of wind power implementation [16]. D. Bell et al. [17] distinguish between two kinds of gap that might be confused; the 'social gap' – between the high general support for wind energy expressed in opinion surveys and the low success rate achieved in planning applications for wind power developments – and the 'individual gap', which exists when an individual person has a positive attitude to wind power in general but actively opposes a particular wind power project, local resistance. Local resistance concept that goes beyond the simplistic and outdated NIMBY (No-In-My-Backyard) phenomenon [7][16].

2.2 U-SHAPE DEVELOPMENT OF ACCEPTANCE

Social acceptance and the level of opposition are key factors in successfully planning and development for a wind farm. Therefore, it is essential to understand how this evolves along with the project.

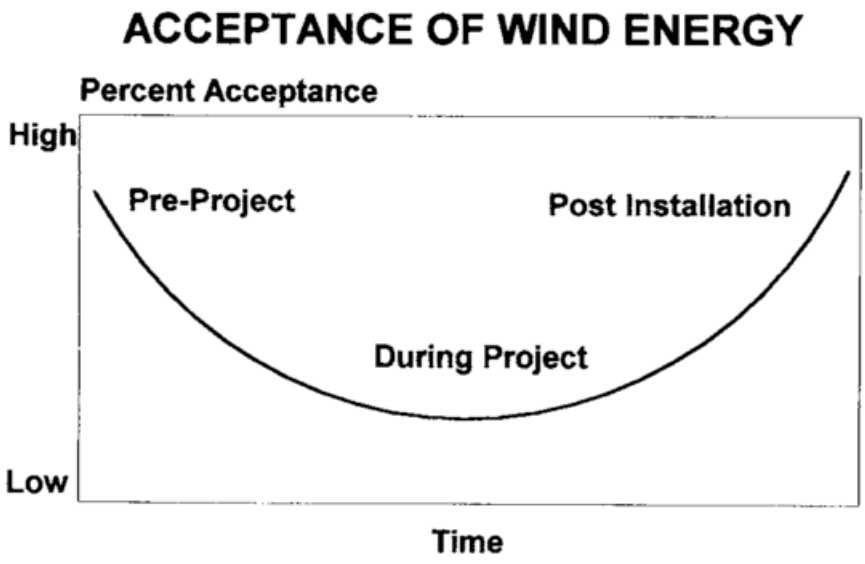


Figure 2 Acceptance pattern of wind energy [18][16][19][20]

In this way Wolsink [16] and Gipe [20] identified a U-shaped development pattern of acceptance to wind power projects, comparing level of acceptance in the different phases of project planning. They noticed that although there is high level of acceptance towards wind power in all the three phases, it reaches a minimum when concrete schemes are announced and publicly discussed. Furthermore some literature shows that the nature of local support and opposition changes through the course of the project, with changes in the players involved, as well as in the positions and arguments used [4].

2.3 THE LIMITED SCOPE OF PROJECT MANAGEMENT

"The success of wind power depends on how well the wind industry learns to include the public in decisions, both for the opportunities this allows for broader dissemination of information about wind power and for the suggestions the public can contribute to the discussion of their concerns and how to accommodate them – Pasqualetti [16][19]*"*

A common critical perception of project management practice is its technocratic approach, which does not encompass all the stages of the project. Consequently subjects as value management and program management are emergent tendencies separately from traditional project management concepts, becoming more relevant for project managers [21][22][23].

Wolsink [7][24] stated that social acceptance and attitudes are highly influenced by organization of the planning process. He criticized that a 'Decide-Announce-Defend' and top-down approaches often used by planners and developers, minimizes opportunities for stakeholders to influence and to participate in wind farm projects causing needless opposition. Therefore, opposition could occur from communities affronted by the planning and development process itself rather than by the proposed wind farm [9]. He [16][25] suggested that the best way to facilitate the development of appropriate wind farms is through collaborative approaches, based on a process that allows direct interaction with the local community and project developer through participation and communication. It means, to include participation methods are part of the planning process, a social engineering to produce acceptance and channel social dynamics.

In any organizational context the introduction of a wide range of stakeholders brings different performance objectives, different priorities and different perceptions of objectives. In addition to the large and complex dimension and investments, makes that wind power projects are often a subject of disagreement and controversies [4]. This divergence of values and expectations, as well as the frames implemented are the nature of sources of uncertainty and ambiguity for the project. Understanding that uncertainty leads to the acquisition of objective information and the answering of specific questions, while ambiguity leads to sense making, the exchange of views and the definition of situations/problems [10][23]. Assessing these uncertainty and ambiguity associated to them and the interactions between them, is fundamental to effective management of the project. A failure when clarifying stakeholder expectations and priorities at an early stage can cause major difficulties later in the project [10].

2.4 RESEARCH QUESTIONS

Wind power project management seems to be lacking in attending to all these uncertainty and ambiguity, and it is still unclear why projects fail or succeed [4]. Thereby, especially in the planning stage, developers should look forward to the deliver value and engage stakeholders, developing appropriate frames, participation processes and responses for key sources of uncertainty and ambiguity that can reduce or eliminate potential later problems at relatively low cost. Wind farm developers may be more successful if they involved local communities as partners in the planning and developing processes.

Hence, the overall objective of this thesis has been to recognize and understand, in a Danish context and from a socio-technical perspective, the key stakeholders of wind power projects and the main factors that drive community acceptance. As well as, good project management practices, participation methods and frames related to these projects. Identifying and providing some insights to support wind farm developers in order to set the most appropriate strategies to increase community acceptance and project value. Evaluating possibilities of benefit sharing and community involvement, to select the most appropriate level of community participation in the planning and developing phases.

Especial attention has been given to analyze and understand the link between project frame, decision-making process, and community expectations. A lack of alignment of them has been considered a potential source of controversies. These controversies have been viewed as an encounter between different people and interests, but also viewed as an encounter between a new technology and a new site, as well as their associated socio-technical network [4]. So the main focus has been to assess whether the controversies of these factors are caused due to uncertainty or ambiguity, and how the project developer should manage it.

For the former two research questions have been formulated:

Research Question 1: "Local Community of wind power projects: Who is involved, what interests and expectations are implicated and how these interest are negotiated?"

The motivation of this research question has come from the aim of defining and understanding local community in wind power projects. Who is involved, what interest and expectations are implicated, and how these ones are negotiated. Providing a framework and some insights for developers in order to empower the knowledge about local community, engaging the right stakeholders in the right moment of the process.

Research Question 2: "How should the project developer manage community participation and uncertainty & ambiguity during when planning and development of wind power projects?"

This second research question has been formulated in order to recognize some good project management practices and guidelines in relation to wind power projects. Therefore, developers can identify and understand the sources of uncertainty and ambiguity, how to deal with them. As well as to set appropriate boundaries and levels of community participation while planning and developing a wind power project.

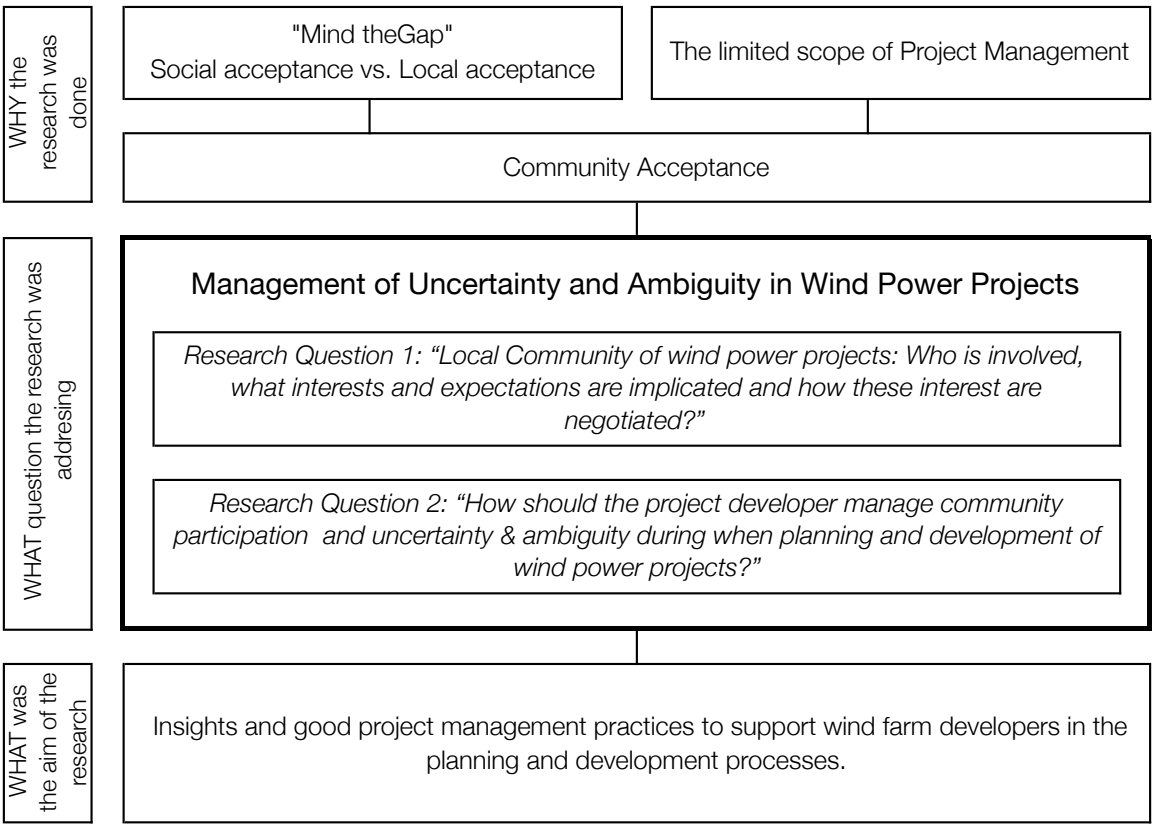


Figure 3 Problem statement summary

CHAPTER 3: STATE-OF-THE-ART

The State-Of-The-Art chapter has been intended to make a description of the foundations for this research. In addition to gain a background of perspectives, frameworks, theories and models, which have enriched the understanding of the topic of this thesis, as well as the description, analysis and discussion of the case studies.

This chapter is presented into two sections according to both research questions formulated. The first one addresses the research question related to local community of wind power projects, more focused on descriptive features. While the second part embraces the research question formulated in relation of project management, more focused on normative characteristics.

▪ STATE-OF-THE-ART – LOCAL COMMUNITY

Research Question 1: "Local Community of wind power projects: Who is involved, what interests and expectations are implicated and how these interest are negotiated?"

The figure below represents the different approaches used for this State-of-the-Art related to local community, and their hierarchy. Actor Network Theory has worked as the root for the research and as a base for the understanding the relationships between actors in wind power projects. While innovation design and value framework have been the lens through wind power socio-technical system has looked at community acceptance as one of the dimensions of social acceptance.

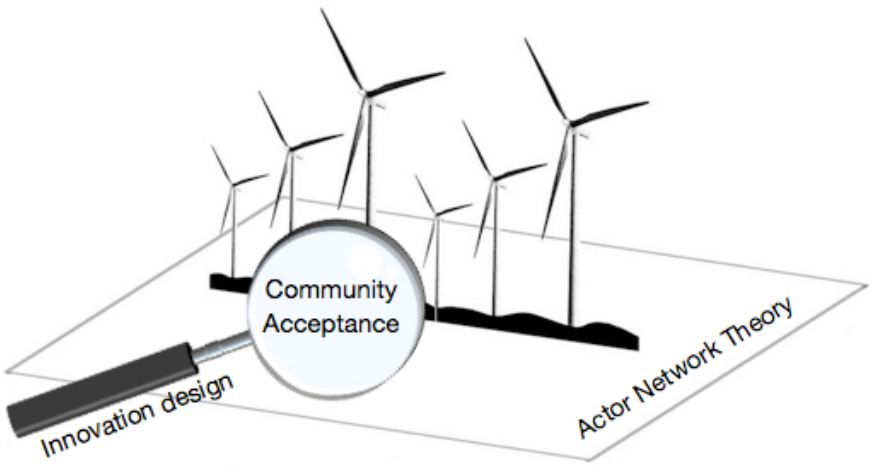


Figure 4 State-of-the-art of local community

3.1 ACTOR NETWORK THEORY (ANT)

Actor-network theory (ANT), pioneered by B. Latour, M. Callon and J. Law [26][27][28], is an approach to understand the shaping of socio-technical systems (STS) through the shaping of network relations among stakeholders, technology and context.

> *"STS – An approach that recognizes the interaction of social aspects, people and society, and technical aspects, organization structure and processes"*

ANT is a model for exploring and interpreting the relationships in a network, mapping simultaneously relations between things and concepts. Based on the notions of actor and network to understand how important components (actors) of a socio-technical system are tied together (networked) and produce action/dynamism (translation) [29]. An actor network is thus the act of linking together both technical and non-technical elements with all of their influencing factors. ANT differs from other sociotechnical approaches because it sets a principle of symmetry where both human and non-human are treated equally [26][27][28].

ANT is best known and criticized because it assigns capacity to nonhumans to act or participate in networks. But it has also been questioned for its amorality, because ANT assumes all actors are equal within the network, so power imbalances can not be made, as well as, because ANT might lead to useless descriptions and fails to provide explanations for social processes [30][31]. Anyway, the relevance of ANT is the link between the technicalities of processes and the social dynamics: actors disagree and negotiate on technical features as well as their social consequences, what addresses the kind of hybrid problems faced nowadays where the human and the technical, interact constantly [4],

Drawing on this theory, social and technical dimensions can be addressed together to wind power project management and the question of participation. Setting up a wind farm can be defined as an engineering problem where the technological feature of engineering merges with the social aspect of engineering. A wind power project touches on both the technology of the wind turbines, the economics of wind farming and the environmental issues, as well as the legal regulations, the social-dynamics of the people involved in the project management and the acceptance of local actors. Furthermore this process involves re-using of existing elements of planning, methods, skills and equipment. To do so, project planners adapt and interpret these standard tools for wind power facility planning and combine them so as to make them fit local specificities, by a process of constant negotiation, compromises, arguments and conflicts during the implementation of their plan. Participation, however, is a very ambiguous concept and depends very much in practice on the method and process of its implementation [4][11].

3.2 Innovation Design

The term value is used very often, but has different meanings in different contexts and for different actors. Innovation design looks for the ways to create meaningful innovations. Becoming clear at an early stage that it can only be achieved by adding shared value for organizations, users and society what requires collaboration between different players [32].

Wind power can be seen as a renewable energy innovation. It is important of not only understanding the creation of technology, but also its diffusion and interaction with all the actors of the socio-technical system. This means, it is essential to deeply understand the added value for every stakeholder or value network, formed by complex and dynamic process of negotiation of interests and positions bound together in a collective whole. But value certainly does not mean the same to everyone in every context, so for a better understanding of value, it is important to distinguish the level and perspective at which it is perceived and what value means at these different levels and perspectives [32].

3.2.1 Value Framework

Value Framework [32] integrates the different views on value into one overall. This framework combines the value concepts from economics, psychology, sociology and ecology, and explains them at the four levels of value: user, organization, ecosystem and society. The figure below shows the four levels as concentric circles, each higher level encompassing the lower ones. In the bottom half of the picture the foundation is laid for value creation. For each of the levels and each of the perspectives, the overarching value concept is given. An innovation is considered meaningful if it addresses the four levels from all four perspectives; in other words, when a positive check is made for all the items stated in the framework.

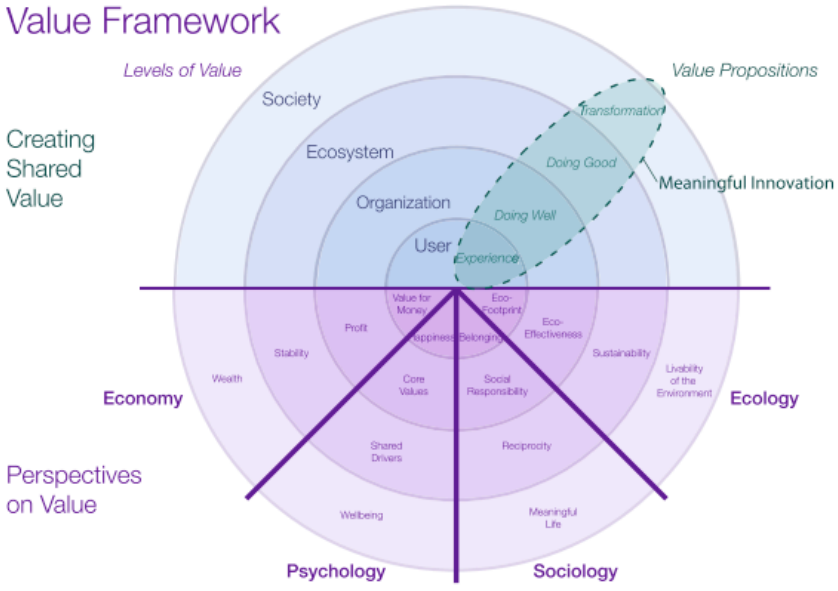


Figure 5 Value framework [32]

This framework provides insights, which can be used to enrich the wind power innovation development by improving those aspects that are insufficiently addressed. Especially for the process of community acceptance and local controversies due to the inherent uncertainty and ambiguity about local community needs and behavior, requires from an iterative process to be applied in order to understand it by proposing innovations and improving them where needed.

3.3 SOCIAL ACCEPTANCE

One important component of innovation design is the way in which new technology projects interact with their context. Social acceptance is not just an issue of accepting or rejecting a specific technology. It also refers to the way in which the technology is introduced in a new context. Project framework conditions, policy, economic, social, cultural and infrastructural aspects have thus an important influence over social acceptance. Therefore social acceptance works as a powerful facilitator of renewable energies [33].

Figure 6 The triangle of social acceptance in renewable energy innovation [33]

According to R. Wüstenhagen et al. [33] and IEA Wind [34] definitions for social acceptance of renewable energy focusing in wind energy, social acceptance can be defined as societal consensus on the planning, construction, and operation of wind power projects. Three interdependent dimensions can be defined for it: socio-political acceptance, community acceptance and market acceptance. The general level of socio-political acceptance concerns the acceptance of both technologies and policies by institutional and general stakeholders. These key stakeholders become decisive when adopting policies and the institutionalization of frameworks that effectively foster and enhance market and community acceptance. Community acceptance refers to the local level of the project, including potentially affected people, local authorities and local

stakeholders. Three main factors influence community acceptance, distributional justice (Distribution of costs and benefits), procedural design (Design of decision-making process) and trust (Community relationship with actors from outside). Finally Market acceptance refers to those actors related to the wind power industry. But it also can be interpreted as the process of market adoption of an innovation. It should be noticed that there is a important link with market and socio-political acceptance, because these firms are influential stakeholders in the development of energy policies [33].

3.3.1 STAKEHOLDERS IN WIND POWER PROJECTS

> *"Stakeholders: those individual or groups who can affect or are affected by the organization – R. Freeman and D. Reed* [1]*"*

Identifying all stakeholders relevant to the project is the first and most important but difficult stage towards stakeholder management [25]. Following the three dimensional criteria for social acceptance of R. Wüstenhagen et al. [33] and the guidelines developed by IEA Wind [35], an overview of the main stakeholders in wind power projects has been made. It is included in the figure below. The list just highlights commonly encountered groups, since stakeholder groups differ depending on the country, the region, and local communities.

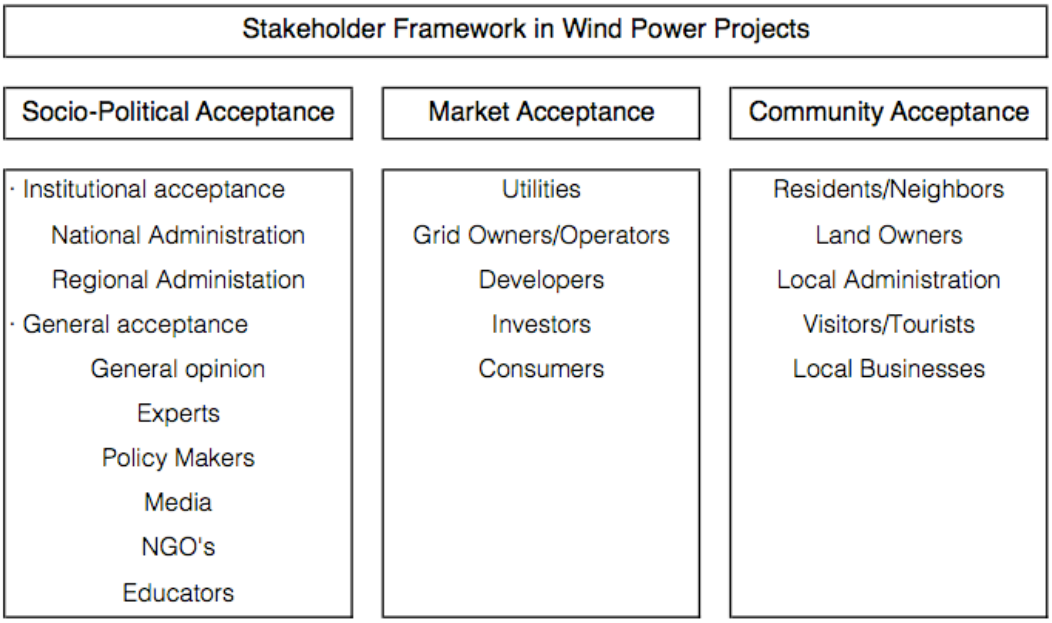


Figure 7 Stakeholder framework in wind power projects

3.3.2 COMMUNITY ACCEPTANCE

> *"Community acceptance: the identification and understanding of the dimensions underlying social controversy at the local level – Wind Energy: The Facts, EWEA* [2]*"*

Community acceptance has become attached to the local level of wind power projects, so setting its boundaries, its openness and identifying who belongs to this local community is essential for good project management practices.

G. Walker, P. Devine-Wright [36] identified two key dimensions that underlie the views of policy makers, administrators, activists, project participants and local residents, as well as it is a useful way of representing the core issues and diversity of meanings of community in relation to renewable energies. First dimension, "process", concerned with who a project is developed and run by, and who is involved and has influence. Second, "outcome", concerned with how the outcomes of a project are spatially and socially distributed, who the project is for and how the benefits are shared.

Considering this dual dimension framework and the definitions explained before. Community acceptance or Local acceptance, both terms have been considered to apply to the same concept in this thesis, referring it to the local stakeholders/local community and its neighbor surroundings and stakeholders affected by the wind farm especially by the size, visual, and noise related impacts.

3.3.3 FACTORS OF COMMUNITY ACCEPTANCE

Most of the literature agrees that local acceptance of wind power projects is strongly dependent on information and participation of the local community in the planning process from the outset. So it is as important to understand who belongs to this community acceptance, as to figure out what are their drivers.

A. Jobert et al. [37] showed how local acceptance is influenced by both planning rules and local factors. Their hypothesis stated that two categories of factors are decisive for the successful development of wind energy: institutional conditions, such as economic incentives and regulations; and site-specific conditions, such as the local economy, the local geography, local actors, and the actual on-site planning processes. They identified, after a look at different framework conditions, eight factors divided into four relating to the site (Geography and visual impact, former use and perception of the territory, ownership of the territory, and local economy) and four relating to project management (Local integration of developers, information and participation, creation of a network of support, and ownership/financial participation of the park).

K. Borch [11] also identified six themes of controversy that are important for local acceptance of wind power projects: (1) The aesthetic appreciation of the particular landscape, (2) The emotional attachment that people have to the place, (3) Fears of impacts on the local environment and economy, (4) The ownership of a development, and locals relationships with developers, (5) The decision making processes, trust in decision-makers, and opportunities for the locals, and (6) Sustainability (wind power is dependent on subsidies).

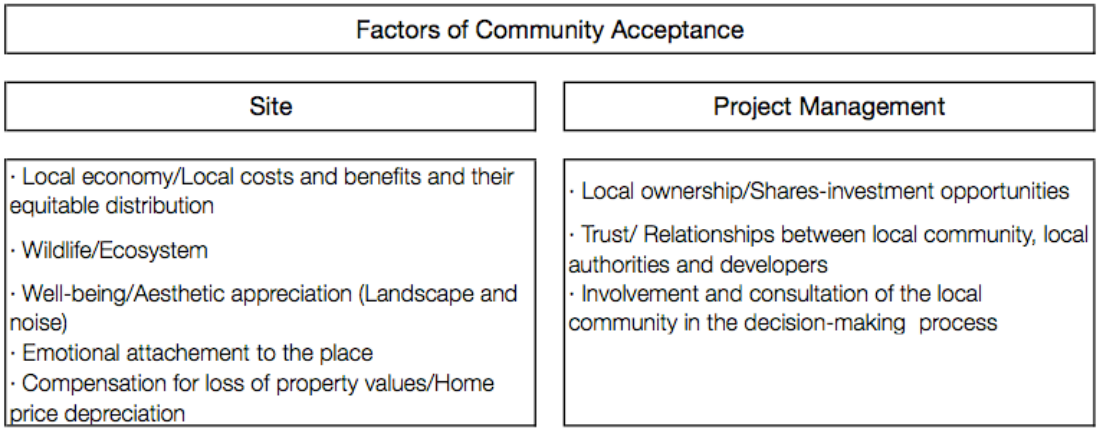


Figure 8 Factors of community acceptance

Based on both authors mentioned before, eight factors of controversy for community acceptance have been selected for the research of this thesis. These factors, shown on the figure above, have additionally been classified into site and project management categories following A. Jobert et al. [37] criteria.

- STATE-OF-THE-ART – PROJECT MANAGEMENT

Research Question 2: "How should the project developer manage community participation and uncertainty & ambiguity during when planning and development of wind power projects?"

3.4 PROJECT MANAGEMENT

Traditional project management practices mainly focus on technocratic and performance aspects, with a clear temporary feature; projects have a defined beginning and end in time. While all of these approaches encompass the idea of uncertainty, project managers still do not to understand why different approaches exist, which one to choose, and when. As a result, project failures are numerous in practice.

The reality is that project management engineering lives in an ambiguous and complex world, so it becomes essential the need for iteration, an approach of a whole life cycle of the projects, and the integration of communication, expectations and value issues to project management. Since they play an essential role, on the individual and organizational, in leading to differences, misunderstandings, and conflicts [3][38] [39].

"A projects is a temporary group activity designed to produce a unique product, service or result – Project Management Institute (PMI) [3]*"*

"Project management is the application of knowledge, skills and techniques to execute projects effectively and efficiently. It's a strategic competency for organizations, enabling them to tie project results to business goals and thus, better compete in their markets – Project Management Institute (PMI) [3]*"*

There are several theoretical contributions and definitions for uncertainty and ambiguity concepts depending on the nature on the research question addressed. The adopted uncertainty and ambiguity definitions for this thesis have been supported by the description made and argued by M. Thiry [22] [23] and S. Schrader, W. M. Riggs, and R. P. Smith [40]. It should be noticed that a clear differentiation between uncertainty and ambiguity has been embraced and defined for those concepts, as well as uncertainty and ambiguity have been expressed in terms of information adequacy.

3.4.1 Definition of Uncertainty

Uncertainty – "Lack of Information"

M. Thiry stated [22][23] that uncertainty is often linked to the lack of information and the difficulty predicting a cause-effect relationship. Uncertainty leads to the acquisition of objective information and the answering of specific questions organization. Planning and cost management are key elements of uncertainty reduction, as well as risk management. S. Schrader, W. M. Riggs, and R. P. Smith [40] defined uncertainty as a characteristic of situations where the set of possible future outcomes is identified, but where the related probability distributions are unknown, or at best known subjectively. Consequently, uncertainty reduction requires information gathering and integration, as well as a translation and transfer of information. Moreover in connection to the four dimensions of conflicts on project management level, uncertainty leads towards the instrumental dimension and dimension of interest, finding solutions and negotiating with available resources and procedures [39].

3.4.2 Definition of Ambiguity

Ambiguity – "Lack of understanding / Lack of clarity"

M. Thiry proposed [22][23] that ambiguity means the existence of multiple and conflicting interpretations, linked to confusion and lack of understanding. Ambiguity is characterized by a number of possible solutions and stakeholders without a clear path. Ambiguity leads to sense making, the exchange of views and the definition of situations/problems. Benefits, stakeholders, and communications are softer issues, linked with the reduction of ambiguity. In the same way as S. Schrader, W. M. Riggs, and R. P. Smith [40] defined ambiguity as lack of clarity, the existence of multiple and conflicting interpretations, regarding the set and the relationships of potentially variables relevant to problem solving. Ambiguity reduction requires in addition a translation and transfer of frameworks. Thus, ambiguity reduction is inherently less structured and less predictable than uncertainty reduction. According to the four dimensions of conflict on

project management level, ambiguity is linked to value dimensions and personal dimensions. Therefore dialogue, mutual understanding and collaboration become essential to reduce ambiguity.

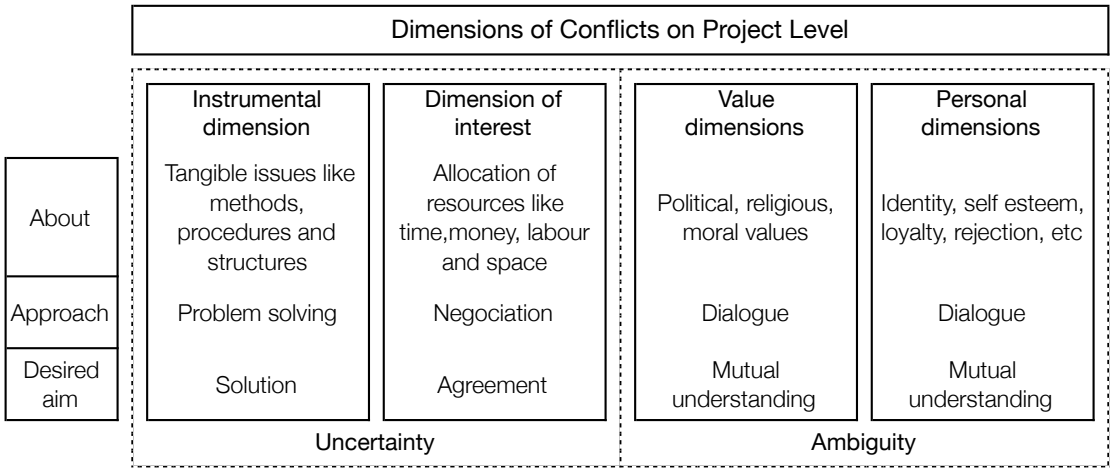


Figure 9 Dimensions of conflicts on project level [39]

3.4.3 Framing and Overflows

E. Jolivet and E. Heiskanen [4] explored the used of the Actor network theory (ANT) to analyze the social dynamics of local implementation of wind power. They developed a framework, which provides a socio-technical approach that helps to track the chain of micro-decisions that intertwine the material aspects of the technology, the site where it is implemented, the participation process, and the social relations in which they are embedded. These concepts, which address the singularity and the materiality of projects, can enrich the understanding of the complexities of participation processes and their influence on local controversies, and perception regarding project management of wind farms.

In order to understand what occurs in negotiating the introduction of a new technology in a local community, E. Jolivet and E. Heiskanen [4] draw the notions of “framing” and “overflows”. The main feature of these concepts is that framing and overflows can be conceived as a participation process based on analyzing power relations and controversies.

> *“Framing” - A process through which actors come together to establish a common world and achieve a collective scenario of a desired outcome* [4]

> *“Overflows” - The repercussions that follow when actors do not “conform to expectations, adopt conflicting positions and develop their own interpretations of the project” and in effect ensure that new frames are enacted* [4]

Framing sets the boundaries of a collective space for the project, establishing who participates, to which extent, and how the project is adapted to the local context. Overflows might arise when other stakeholders do not conform to expectations and set

their own scenarios of the project, obliging developers to adapt frames and change their plans. It represents the instability inherent to such project, which might break up at any moment.

Framing is costly because overflows happen all the time, but it is at the same time incomplete. Framing cannot just be achieved by following certain courses of action, it needs to generate some externalities. A wholly hermetic frame without overflows would not make feasible to add value locally to the project. The concept of overflows thus reveals the dynamic and networked nature of local resistance. It is the needed link with the project and the surrounding environment, and it represents the result of when uncertainty and ambiguity processes come up to the project.

3.4.4 Framing under Uncertainty and Ambiguity

S. Schrader, W. M. Riggs, and R. P. Smith [40] recognized the importance of problem solving for the management of technology and innovation. They proposed a framework based on the assumption that problem's uncertainty and ambiguity levels for framing the problem solving process are set by problem solvers. So problems are not determined by inherent levels of uncertainty and ambiguity.

They made a clear differentiation between uncertainty and ambiguity, since they understood that the two concepts relate to different problem framing processes, requiring different kinds of organizational support. They also argued that the choice of specific levels of uncertainty and ambiguity depends on context characteristics such as prior problem-solving experiences, organizational context, and available resources. Thereby the fit between context and the choice of levels of uncertainty and ambiguity has consequences for both the problem solving efficiency and outcome [40].

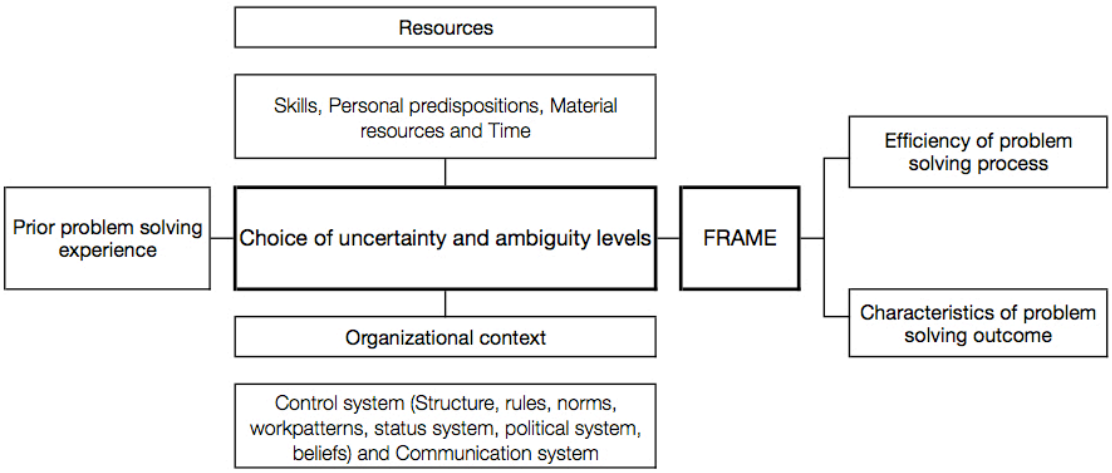


Figure 10 Contingency and efficiency perspective on the choice of uncertainty and ambiguity levels [40]

Using the proposed framework, S. Schrader, W. M. Riggs, and R. P. Smith developed the uncertainty and ambiguity matrix illustrated below. The main elements of this model are the identification of key variables for the framing process, as well as their value and potential relationships. Uncertainty reduction relates to the determination of the value of variables, while ambiguity reduction makes reference to the determination of the

variables and their relationships. So problem solvers can frame the problem as one of uncertainty reduction or as one of ambiguity reduction. This difference in framing has relevant consequences for the kind of information sought, for the communication channels, and for the resources needed. The figure below shows the possible uncertainty and ambiguity combinations. It should be noticed that the combination of low uncertainty and level 2 ambiguity does not exist, since S. Schrader, W. M. Riggs, and R. P. Smith argued that it is not possible to have certainty about the variable values without knowing which variables are or might be relevant [40].

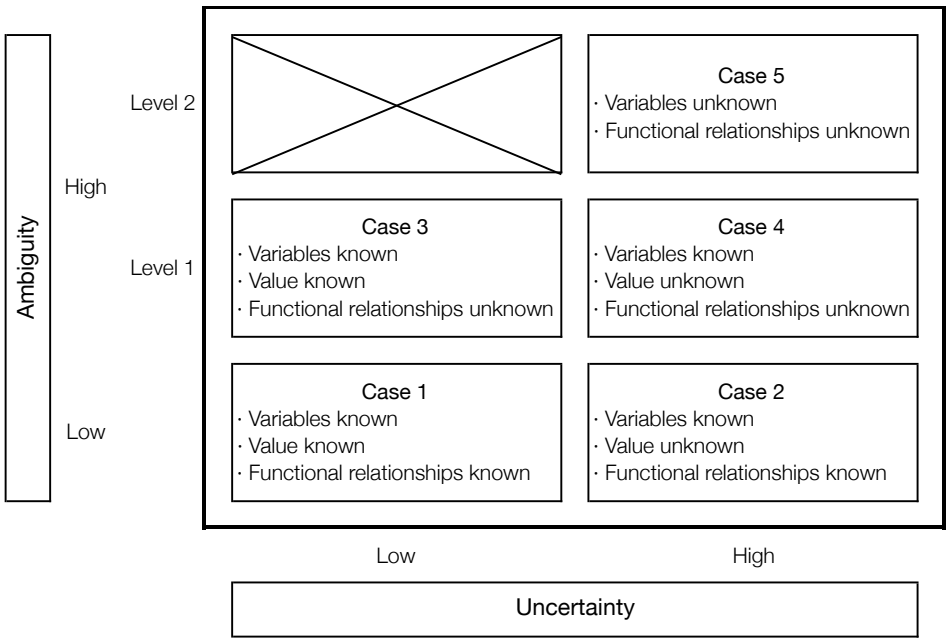


Figure 11 Uncertainty and Ambiguity Matrix I [40]

This framework thus suggests that problem solvers are inclined to frame ambiguity and uncertainty based on their problem understanding. As well as that the likelihood of success of different framing choices can be predicted, using the notion that the choice needs to fit resources and organizational context, structuring their decision-making environment [40].

3.4.5 Project Management under Uncertainty and Ambiguity

M. Thiry [22][23][41] proposed a re-definition and re-dimension of the project management space, analyzing the relationships between value management and project management. He stated that value management can be combined with project management to form an integrated learning-performance program management model, which requires integration across strategic levels, controlled flexibility, team-based structures and an organizational learning perspective. He highlighted as well that knowledge management and learning, both organizational and individual, are major contributors to uncertainty and ambiguity management. So when a project is finished, the lessons learned should be linked to whether the project was delivered on the agreed performance and the benefits of value management realized. Therefore M. Thiry

pointed out that this framework is a better approach to project management in ambiguous environments, in order to achieve strategic benefits and stakeholders' satisfaction at delivery.

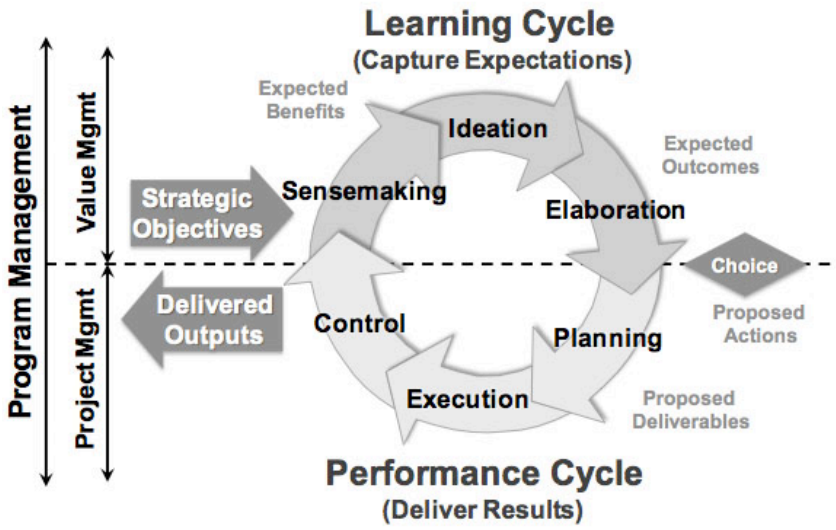


Figure 12 Learning-performance program management model [22][23]

In relation to this framework, M. Thiry [22][23][41] developed a simple matrix, which links the level of uncertainty and ambiguity of a project to the levels of project management. Therefore his learning-performance program management model embraces both project management and value management, stating that organizations are most productive when they can reduce uncertainty and ambiguity levels.

M. Thiry [22][23][41] related project and sustaining competitive advantage to low levels of ambiguity, while program and maintaining competitive advantage to high levels o ambiguity.

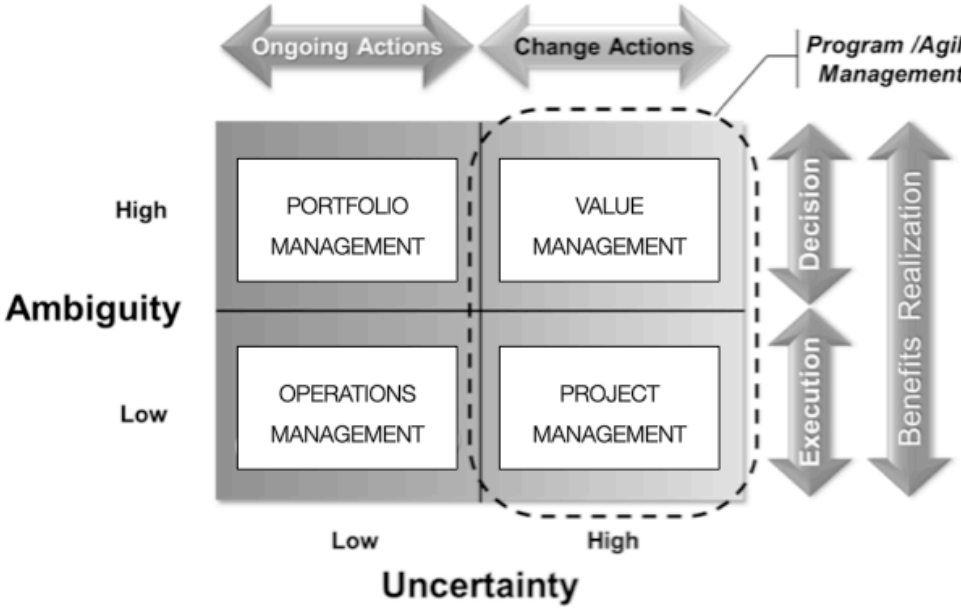


Figure 13 Uncertainty and ambiguity matrix II [22][23][41]

- Operations Management (Low uncertainty/low ambiguity): this level is defined by route work, best managed by good administration and operations management. It increases short-term advantage.
- Portfolio Management (Low uncertainty/high ambiguity): this level refers to an area of the business that is best managed using portfolio management and power-based methods of control. It maintains comparative value
- Project Management (High uncertainty/low ambiguity): this level is where project management is in its element, the big decisions have already been made and what is needed is a performance-based method to ensure their implementation. It improves performance and creates short-term value. Project management in this case is related to a tactical level of project management.
- Value Management (High uncertainty/high ambiguity): this level is defined by unsettling work, for which learning-based methods and value management are the key. It maximizes long-term value. Value management in this case is related to a strategic level of project management.

Thereby in this context project management is about controlled changes, consistency and reliability. It involves uncertainty reduction, what is achieved by breakdown structures, planning and risk analysis. Whereas ambiguity reduction leads value realization through identification and negotiation of needs and expectations.

To sum up, S. Schrader, W. M. Riggs, and R. P. Smith [40] and M. Thiry [22][23][41] models to manage uncertainty and ambiguity in project management have been embraced in order to provide a broader and richer approach for the case analysis of wind power projects and the associated local controversies. Using a cardboard box as a metaphor, S. Schrader, W. M. Riggs, and R. P. Smith model represents the content of the box, looking at the inside the box, identifying what element are inside it and how these ones are interconnected. This framework has facilitated the understanding of the relationships between the different socio-technical actors and controversies of the project, in relation to the frame established for it by the project manager. While M. Thiry model represents the box as a unit, looking at and assessing the outer of the box. It helps to characterize the box and identify where is located, evaluating what level of project management is corresponded to the project due to its frame. It also helps to establish a relation between project management and organizational levels (Strategic, tactical and operational) what can be useful in relation to decision-making issues. One critique that should be noticed is that S. Schrader, W. M. Riggs, and R. P. Smith model is just limited to the traditional approach of project management, while M. Thiry framework is more evolved, aligned with the goal of a whole life cycle of the projects. For this reason a combination of both of them has been considered the most appropriate approach.

3.5 STAKEHOLDER MANAGEMENT

Stakeholder management and power in decision-making are two key elements when addressing project management. Stakeholders have different levels of interest, different motivations and different levels of power and interest. Assessing each stakeholder's importance, power and influence in the decision-making process and the level of participation, balancing how value is shared among them, will affect project frame and success [25].

3.5.1 POWER IN DECISION-MAKING

In this context of power and participation of stakeholders, R. Mitchell, B. Agile, and D. Wood proposed a simple matrix in relation to the power that each stakeholder hold and the extent to which it is likely to show interest in supporting or opposing a particular project, mapping and facilitating the identification of those stakeholders who are potential blockers or facilitators [36]. In this way, the main stakeholders in wind power project listed before have been mapped and positioned in this matrix power vs. level of interest, when developing a specific wind power project from the project developer point of view.

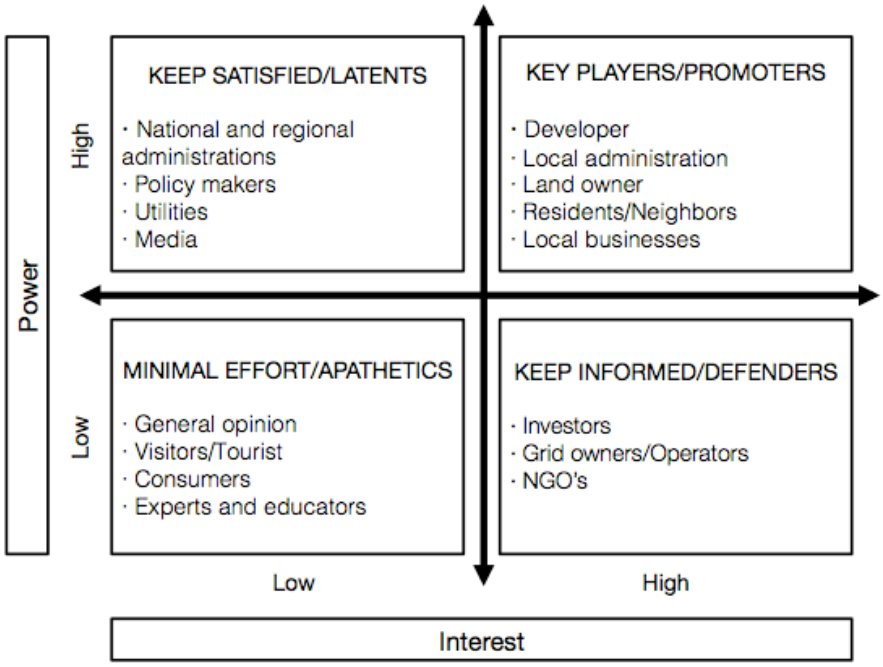


Figure 14 Power-Interest matrix of stakeholder in wind power projects

3.5.2 PARTICIPATION IN DECISION-MAKING

"There is a critical difference between going through the empty ritual of participation and having the real power needed to affect the outcome of the process – A ladder of citizen participation (1969), S. Arnstein [42]*"*

Stakeholders and participation in decision-making have become increasingly relevant for promoters of wind power projects, however, it is challenging. Participation is part of conflict assessment, so when assessing a controversial or complex situation decision-making issues should be addressed. Participation is a very ambiguous concept and depends very much on the method and process of its implementation. It is important to clarify public's role, because stakeholders will be dissatisfied with the outcome of the project, regardless of how much public participation activity may have occurred, if their expectations are not covered. So to identify the appropriate level of public participation, based on the project, the stakeholders, and the decisions to be made, is critical to the design and success of the project. Nevertheless, a project may include multiple levels of public participation, both at different stages of the process and because different stakeholders will choose to engage at different levels, thus a single project can be operating at different levels of public participation [4][43].

The advantages of public participation may include [44]: an essential improvement of planning decisions and balancing of different aspects, increased awareness of public concerns, an increased understanding of possible cooperation between opposing parties, elimination of misinformation and believed threats, future confidence and acceptance. As well as it can be defined three mayor different forms of public participation [44]: Information-Through information about ongoing development, Planning participation-Through involvement in the decision making process, and Financial participation-Through financial involvement in the project. Therefore the confidence of the public can be achieved, through an open and dynamic dialogue. A efficient tool not only to achieve a successful outcome of a project but also to empower confidence in wind energy developments, and even more important in wind power developers.

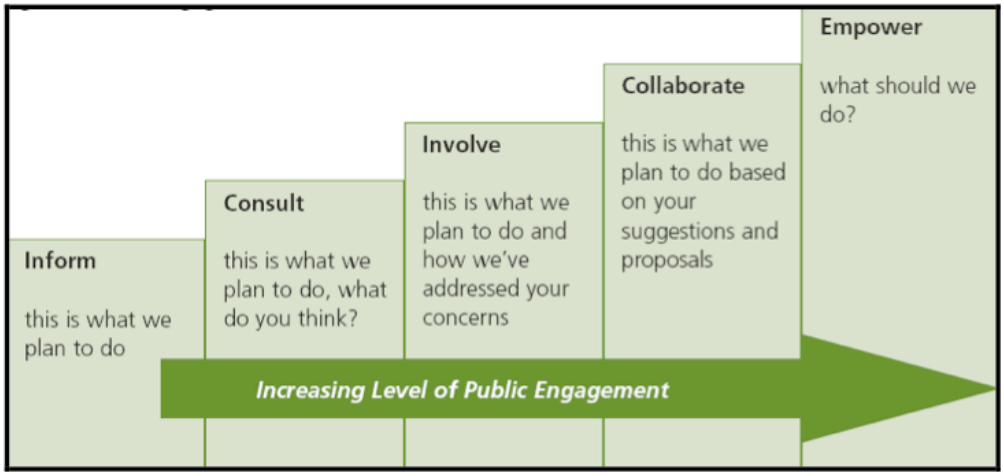


Figure 15 Levels of public engagement [45]

The International Association of Public participation (IAP2) [43][45] designed a Public Participation Spectrum in order to facilitate the understanding of shared decision authority and to assist in establishing the appropriate level of public participation in projects regarding their expectations. The Spectrum is based on the principle that the level of public participation is directly linked to the level of potential public influence on

the decision or action being considered. The Spectrum consists of five levels of participation (Inform, Consult, Involve, Collaborate and Empower) and shows that differing levels of participation depend on the goals, time frames, resources, and levels of concern about the decision to be made. The two ends of the spectrum relate to the extreme levels of potential public influence, from no opportunity to influence, Inform, to total influence over the outcome, Empower. These two levels of public participation work to frame the spectrum but actually it is in the middle three levels where most meaningful public participation occurs: consult, involve, and collaborate. Moving through the spectrum from the left to right, there is a corresponding increase in expectation for public participation and impact, tasks begin to differ and the strength of relationships increases, but no part of the spectrum is harder or more preferable than another. Indeed, the need for different skills and trust in relationships can make all parts of the spectrum both challenging and rewarding [43][45]. A detailed explanation of the spectrum is shown in the figure below.

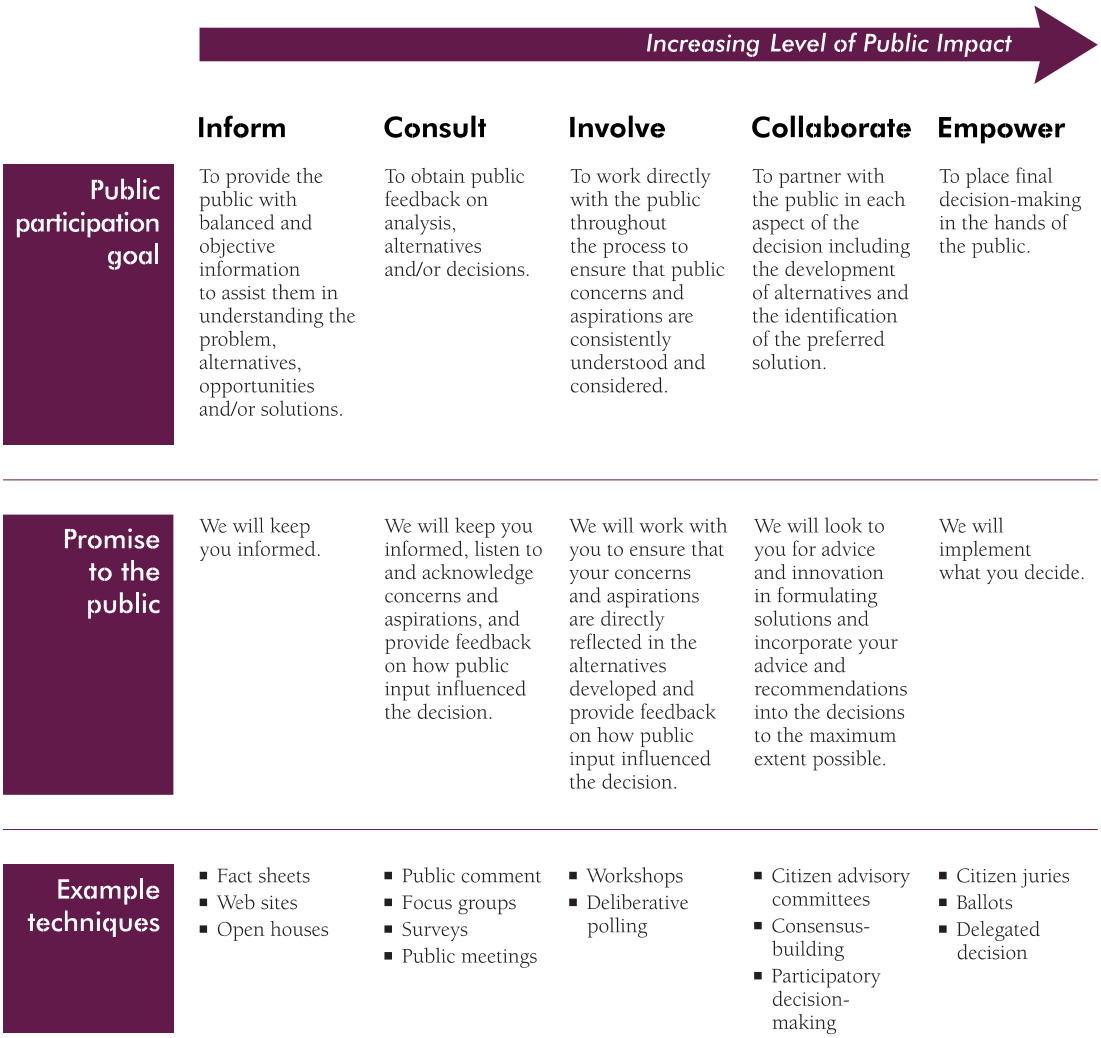


Figure 16 Spectrum of public participation [45]

CHAPTER 4: RESEARCH METHODOLOGY

4.1 CASE STUDY APPROACH

A case study research approach of individual wind energy projects has been conducted for this thesis in order to address the research questions. Case study research excels at understanding of a complex phenomenon, by a detailed contextual analysis of a limited number of events or conditions and their relationships. Enabling to extend experience or add strength to what is already known through previous research [46].

Case study approach has been considered appropriate for several reasons. Most of the study variables are predominantly qualitative and subjective in nature. Thereby it has been especially important to clearly define the variables, to be as consistent as possible in the interpretation of the data and to take a conservative approach when drawing conclusions. This has brought the need for the exploration of the variables within the whole context, and preservation of it, since it may have contained important information for the study. Two case studies have been employed to add reliability through repetition as well as to make comparisons focusing on similarities and differences. Besides conclusions have been made more defensible if two case studies were used [46].

4.1.1 APPROACH TO COMMUNITY ACCEPTANCE

A. Jobert et al. [37] identified two general approaches to the issue of social acceptance: (1) One orientated towards public opinion (global and local), working with opinion polls or discussion groups to identify the motivations and attitudes of the public. (2) The other one centered on how a project is constructed to understand why it is accepted or rejected, focusing either on public policy or on actors' behavior during the implementation.

Complementarily to the case study approach, the second approach proposed by A. Jobert et al. [37] has been adopted for the formulated research questions, focusing on local acceptance and project management factors. It has been considered to enrich the research due to it is a locally bound approach so leads to an interest in the specific stakes of the location for a project, and makes an interest in the specific context for a project, as well as it involves the identification of main elements of the public-policy framework in which the project is developed.

4.1.2 Case Selection Criteria

Two-selected wind power projects in Copenhagen municipality (Denmark), Prøvestenen and Kalvebod Syd, have been chosen as case studies for this thesis.

The selection of these two case studies has followed some criteria under the guidance of Hans Sorensen - SPOK. It has been searched for case studies with various levels of community participation during the planning process, various levels of success in obtaining planning permission, similar size wind energy projects, and projects under the same regulations. Besides, it must have been feasible to collect data on the cases.

4.2 Data Collection

The data for the case studies has been collected through semi-structured interviews with the developer company and a variety of stakeholders involved in each project, seeking to obtain the broadest perspective. This interview format has been chosen in order to both to promote focused questioning, and to allow some flexibility, adapting to the interviewees' circumstances and encouraging them to tell their point of view.

A complementary survey has been conducted to every stakeholder interviewed, in order to collect in a more structured way the information provided. It has helped as well to corroborate the consistency of that information by asking for the same issues in a different approach. Planning documents of support for each case have been also used to obtain and verify information such as the specific project location and technical aspects. In addition to some resources found on the web like media coverage, letters of support and opposition and a range of complementary documents [47][48][49][50].

Interview questions and survey have been formatted according to the methodology developed by J. McLaren Loring [51]. This methodology analyzes case studies from a socio-technical perspective based on actor network theory. J. McLaren Loring set four research variables involved in wind energy project planning: community participation, network stability, public acceptance and planning success. Its goal is to better understand how the local community is involved in the planning of new wind energy projects, and the stability of the networks of individuals and organizations of those projects. This is related to the public's acceptance of the project and the outcome of the planning process. For each variable a number of indicators, which can be rated in four levels (High, Medium, Low, and Very Low), are defined in order to be more a readily characteristic attributes of the variables. Taking the indicators together allows a more aggregated categorization of the cases and the subsequent identification of trends in the data [51].

4.2.1 INTERVIEW QUESTIONS

The formulated interview questions have aimed to obtain information about the four variables established by J. McLaren Loring's research methodology presented before. It should be noticed that some of the methodology's aspects have been simplified and adapted.

"What do you understand by local community in relation to wind power projects? Who belongs to it?"

"What factors in relation to local acceptance do you consider most important when developing wind power projects?"

At the beginning of each interview two extra questions have been asked to each interviewee, the ones are shown above. Both questions have sought to understand the interviewee's general opinion about community acceptance based on his/her experience and knowledge of wind power projects.

An interview question related to each of the four analysis variables has been formulated as well.

- Network:

Based on J. McLaren Loring [51], network variable seeks to identify key involved actors of the project, and the relationships among them, and between actors and wind energy technology. It means the recognition of the main stakeholders, relationships and multiplicity of them, as well as, amount and way of exchanged information among them.

"Who were the main stakeholders in this project? Was there any previously established network among them?"

For the former, the made question has been intended to recognize who have been the main stakeholders in each project and possible previous and/or developed connections among them, facilitating the identification of trust processes relevant for community acceptance.

- Community acceptance:

Community acceptance variable aims to understand the source and evolution of local community support and opposition attitudes through the development of the project, as it is stated in J. McLaren Loring [51]. As well as the chances of the local community to expressed its expectations. Important aspects to get a fully perspective of this variable are media coverage, letters of objection or support and public hearing meetings.

"Which were the attitudes of the local community towards the project? How did they evolve during the process?"

Therefore, this elaborated question has been intended to get information about the procedural design of the project, understanding it as a fair decision making process giving all relevant stakeholders an opportunity to participate.

- Community Participation:

Based on J. McLaren Loring [51], community participation variable deals with how local community is consulted and engaged with the project. Important issues for this variables are: ownership, compensations, impact of community decisions, involvement measures, as well as, arrangements with local community after project construction.

"When and how was the local community informed about the project? What were the arrangements to the project made with them?"

In this way, this question has aimed to get a picture of the distributional justice design of the project, understanding it as how costs and benefits were shared.

- Project Success:

Project success variable seeks to get information about project management issues, like planning consent, planning conditions placed and reasonable adjustment to times and budget expected (J. McLaren Loring [51]).

"Did you follow any guidelines/standards when developing this wind farm? Opportunities of modifying wind farms' development according to the experience from this project?"

The formulated question has sought to recognize some insights about project management procedures followed during the project, how the planning and development processes ended up in relation to expected. In addition to some recommendations and lessons learned from the interviewee's point of view to modify and improve wind power projects management.

4.2.2 SURVEY QUESTIONS

In the same way as the interview, the conducted survey has been adapted from J. McLaren Loring's research methodology. The survey has consisted of four blocks of questions, which refer to the four research variables. Every question has referred to each indicator defined for each variable. It is important to highlight that the level of the indicators has been simplified to a three-grade scale (High-Medium-Low). A three scale grade has been adopted in order to be simpler, and because the gap between each level is big enough for an easier interpretation for the interviewee and the interviewer, with bigger differentiation among possible answers. Complementary, some of the descriptions of each indicator for each degree have been reformulated for a less complex understanding of them.

Network variable indicators are based in the notions and definitions developed in actor-network theory. Indicators of community participation draw on theories of public participation in decision-making processes. Whereas referring to indicators for community acceptance and project success, these are not based in a particular body of theory, but were developed through knowledge of the planning consent process [51][52].

Furthermore the survey has asked about the level of importance, following the three-grade scale (High-Medium-Low), of the eight factor of community acceptance presented in the previous chapter, in relation to each case study. A detailed template for the survey and a description of each level of each indicator is included in the appendix.

4.3 Case Study Description

The description of each case study has been done by focusing on the development process of each project, technical aspects, project location, local stakeholders, community participation processes and project management practices followed by the developers. Special attention has been given to the identification and handling of stakeholders including the evolution of their perception, and the three main factors that influence community acceptance, distributional justice (Distribution of costs and benefits), procedural design (Design of decision-making process) and trust (Community relationship with actors from outside). Framing and overflows framework developed by E. Jolivet and E. Heiskanen [4] has been embraced to enhance and support both descriptions. Transposing this framework to both case studies has helped to understand the emergence of different views on the project and on competing views, proving a better understating of the nature of the local controversies.

4.4 Case Study Analysis and Discussion

Case study analysis and discussion have been addressed together in the same section, in order to build a richer and more constructive argumentation. This section has aimed to provide an answer to both research questions formulated before, applying them to the proposed case studies. Case study analysis and discussion section has covered the identification of key local stakeholders, community participation and the distribution of power in decision-making processes. Besides of project management practices to deal with the local controversies caused through the management of uncertainty and ambiguity issues.

For the former four main tools have been applied. Points related to community participation and the distribution of power in decision-making process have been addressed with the public participation spectrum developed by The International Association of Public participation (IAP2) [41] presented before. This tool has helped to identify the level of participation of each local stakeholder set by the frame designed by the project developer, focusing mainly on the key players. The understanding of the assigned level of participation has provided some insights to assess the development of

the project, attitudes of support or opposition. In addition to if this level has worked as an enabler or as a constraint for the execution of the project.

Management of uncertainty and ambiguity issues have been analyzed with the models formulated by S. Schrader, W. M. Riggs, and R. P. Smith [40], and M. Thiry [22][23][41]. These two tools have been useful to evaluate the designed project frame, and the adopted project management practices for the different stages of uncertainty and ambiguity level. What has made feasible to create a connection with the evolution of community acceptance and episodes of overflowing towards the frame proposed.

S. Schrader, W. M. Riggs, and R. P. Smith [40] model has been used to analyze the information gathered for each case about the defined factors of community acceptance. Applying the model to the case of wind power projects, the problem solver role has been assigned to the project developer of a wind farm. The variables have referred to the different factors/controversies of community acceptance for each of the local stakeholders. And the value of those variables has been related to what dimension of the four dimensions of conflicts on project level corresponded to each factor of community acceptance for each actor. For this reason, this tool has been useful to evaluate the importance of each factor of community acceptance for each stakeholder, and the potential relationships and synergies among them, in addition to map the different factors on the uncertainty-ambiguity matrix proposed for the model.

M. Thiry [22][23][41] uncertainty-ambiguity matrix has been used to map the entirely evolution of each project and how each of them evolved with the frames adopted and the overflows originated. This interpretation has been complemented with the information and analysis made for the previous sections on community participation and factors of community acceptance. Moreover it has been a good way to make a comparison between the two case studies and a basis for potential recommendations, having as a reference the outcomes of both projects. Value management and project management have been the two categories where the analysis has focused by the used M. Thiry [22][23][41] model, since the state-of-the-art presented focuses in those two topics. The chapter ends up with the insights and good project management practices found, as well as some recommendations for project developers based on the experience of the case studies.

CHAPTER 5: WIND POWER IN DENMARK

5.1 DANISH WIND POWER DEVELOPMENT

According to the Danish Register of wind turbines, there were 5.196 wind turbines in Denmark at the end of February 2014, with an installed wind capacity of 4.823 MW. 2013 was an excellent year for the expansion of wind power in Denmark, wind-power production almost reached 30% of domestic electricity supply and wind turbines produced 9466 GWh electricity [13][14]. But the current political situation does not longer ensure support for wind power planning, making not possible to be a step closer to the ambitious 2020 target of producing 50% of the energy from wind power. Under this context, the Danish Wind Industry Association stated [14][15] that it is expected a flat growth in the following years or even more, a suspension of the municipalities' plans for the deployment of wind farm. The quote below corroborates this forecast.

"Det skyldes bl.a., at vi ikke vil tilslutte nye offshore-parker i Danmark før om tidligst 3 år samt, at planlægningen på land er stoppet i visse kommuner," - Jan Hylleberg, adm. direktør i Vindmølleindustrien [14]"

"One reason is that we do not want to connect new offshore farms in Denmark before the earliest three years, since the planning at the country is stopped in some municipalities - Jan Hylleberg, CEO of Wind Industry [14]"

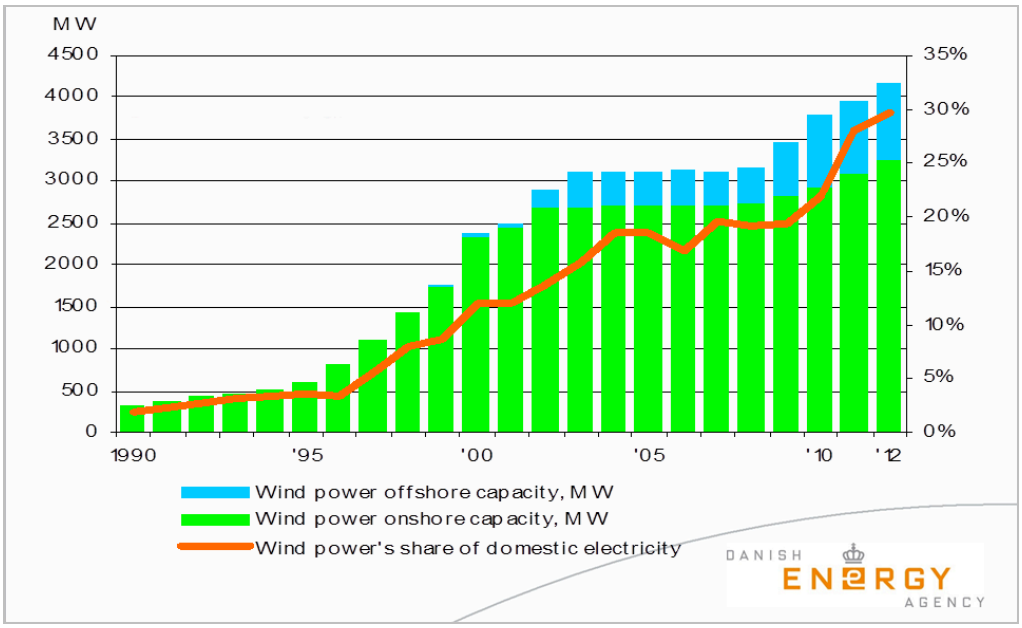


Figure 17 Wind power capacity and wind power's share of domestic electricity supply in Denmark [13]

The development of wind power in Denmark has been defined by strong public involvement and bottom-up projects [53]. Between 1980s and 1990s the Danish wind power sector was characterized by stable economic support by a feed-in tariff regime, small-medium scale wind farms, local entrepreneurship and cooperative ownership of wind turbines [8][54]. Cooperatives, a local and democratic ownership to wind turbines, played such an important role on the establishment of Denmark's wind power industry. But at the beginning of the 1996, local involvement in new wind power development began to disappear. Market-based mechanisms were adopted, there was a progression towards turbines owned by individuals or utilities, and relatively large wind turbines made difficult to maintain local support for new projects. So local opposition to new wind developments increased [8][54]. Denmark realized that to ensure continued development of wind power in order to comply with its strategy of 50% of electricity consumption from wind energy by 2020, to have backing in the local community was essential. Therefore, in 2009 Denmark promoted the current Renewable Energy Act 2009. This scheme re-established feed-in tariffs for wind power and was aimed to stimulate the local engagement and ownership in new wind energy projects. But the scale, cost and complexity of wind turbines have changed. Although the original pattern of popular and local ownership of wind turbines is not possible to restore, the experience in Denmark shows that public involvement in the planning phase and co-ownership increases the acceptance [53][55].

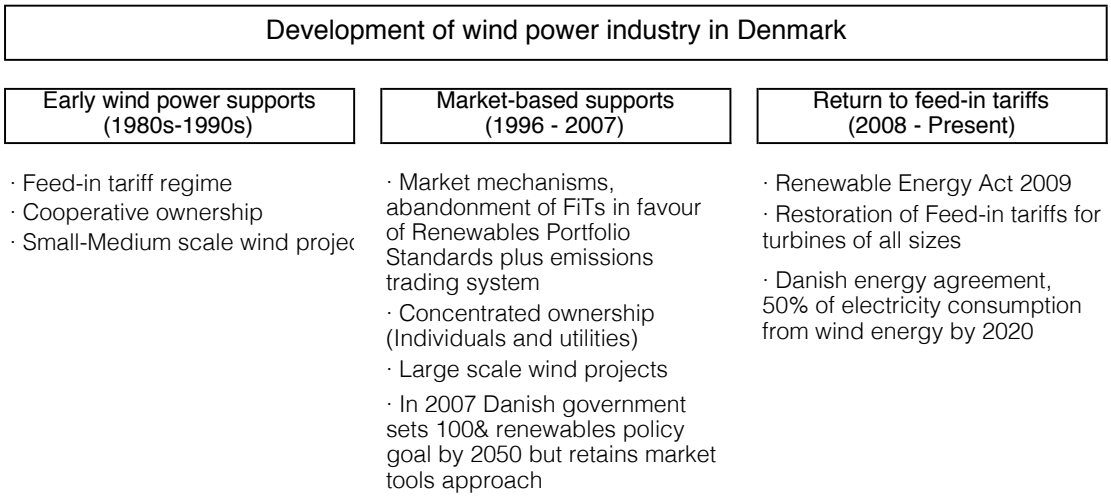


Figure 18 Development of wind power industry in Denmark

5.2 CO-OWNERSHIP – COOPERATIVES

"Cooperatives can briefly be described as an autonomous association of persons united voluntarily to meet their common economic or social needs through a jointly owned and democratically controlled enterprise. A cooperative may also be defined as a business owned and controlled equally by the people who use its services or who work at it [55]*"*

It is estimated that approx. 15% of the Danish wind turbines today are owned by cooperatives [55][56]. Wind turbine cooperatives in Denmark are normally partnerships, what function as cooperatives. As a partner it is owned a part of the wind turbine corresponding to the number of shares you buy, but one-person represents one-vote independent of shares. Often one share is equal to the yearly production of 1000 kWh from that particular wind turbine. There are typically no loans given for the bought of shares, so up front payment of total cost should be made [55][56].

Some of strengths of a cooperative ownership model are: a large public support and local involvement, benefits stay locally, early involvement of the local community, direct contact to local authorities as well as a dialogue and political contacts with many stakeholders through a widespread network. While possible weaknesses of a cooperative might be an upfront payment even before consents and financially weak at starting point depending of other investors when no grants [55][56].

5.3 RENEWABLE ENERGY ACT 2009

Renewable Energy Act 2009	
Provisions	Administrator: TSO Energinet.dk
Loss of value to real property due to the erection of wind turbines	· An erector of a wind turbine has a duty to pay compensation for loss of value of real property following the erection of the wind turbine. The size of the loss of value is determined by an appraisal authority. · Right to have loss of value on property covered if the loss of at least 1% of the property's value.
Local citizens option to purchse wind turbine shares	· The erector of a wind turbine has a duty to offer at least 20% of the shares in the wind turbine to those people who live within 4.5 km of the site. · Anyone living in the municipality where the turbine(s) are to be installed can apply to buy shares, but priority is given to the first group of people.
Green scheme to enhance local scenic and recreational values	· Financing of projects that enhance the scenery and recreational opportunities in the municipality. · It is paid DKK 0.004 per kWh for the first 22,000 full-load hours from wind turbine projects that are connected to the grid on 21 February 2008 or later.
Guarantee fund to support financing of preliminary investigations etc, by local wind turbine owners' associations	· Local cooperative ownership of wind turbines shall be supported by means of a guarantee fund. · In applying to the fund, local cooperatives consisting of at least 10 members living within 4.5 km of the planned wind turbine site

*It applies to turbines higher than 25m to be erected in their neighbourhood.

Figure 19 Renewable Energy Act 2009 [53][55]

The Danish Promotion of Renewable Energy Act 2009 stipulated a range of new initiatives, which should be undertaken to promote local acceptance and involvement, setting out the goals for local planning and development of onshore wind turbines. It created new four schemes: loss of value to real property due to the erection of wind turbines, local citizens option to purchase wind turbine shares, green scheme to enhance local scenic and recreational values, and guarantee fund to support financing of preliminary investigations by local wind turbine owners' associations [8][53][55]. Developers and other stakeholders can direct any questions they may have about the new regulations to Energinet.dk, which acts as secretariat for these new schemes, and is available for advice and guidance [13]. In connection with this, the Danish Ministry of the Environment's Wind Turbine Secretariat was established to assist the municipalities with their planning.

5.4 EIA Report – Onshore Wind Power Planning and Development

Planning and developing a wind farm needs both a financial support system, which can provide stable conditions for project developers and investors, a local sitting plan for which the authorities need to have the necessary means to further the siting and planning of wind turbines in the municipalities. As well as, a positive attitude towards wind power needs to be maintained in local communities by involving and channeling some of the benefits of wind power with them [8]. Obtaining project permission is crucial for every wind farm project but there are some regulations to consider, many stakeholders involved and everything is constrained to limited time and budget [18].

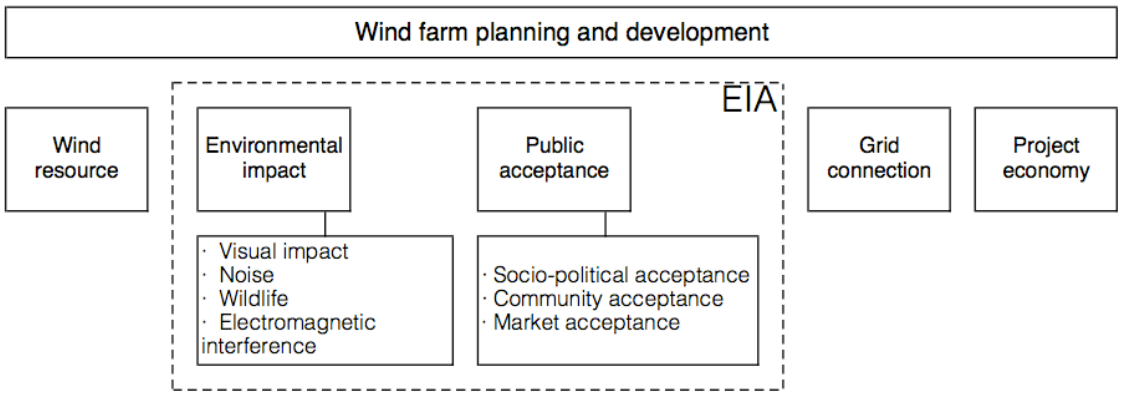


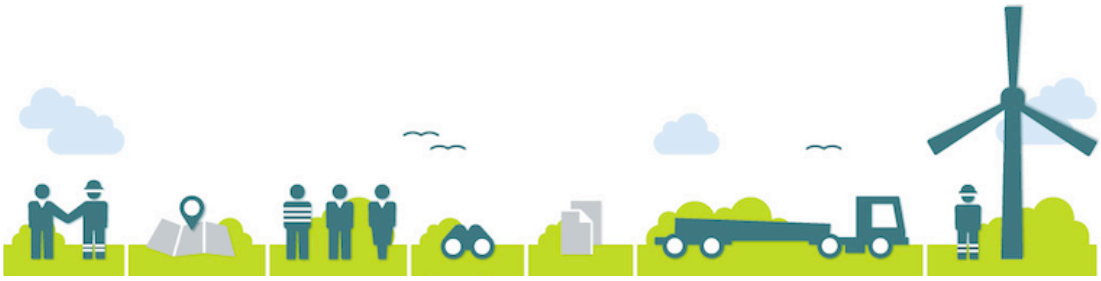
Figure 20 Five cornerstones of wind farm planning and development [18]

Municipalities, as a general rule in Denmark, are responsible for the sitting plan concerning the development of onshore wind turbines, even thought they receive assistance from the Danish Wind Turbine Secretariat under the Ministry of Environment [13].

The typical procedure to plan and develop a wind park in Denmark mainly consists of sitting plan guidelines prepared by the municipalities that describe the turbines' location and design, an idea and scope phase, and an Environmental Impact Assessment (EIA),

typically prepared together by the project developer, which has to accompanied these guidelines [8].

The EIA report is intended to fulfill the various regulations concerning the environment and to get permission for the project. It is the only point of contact required for wind farm developers, who are the responsible to ensure that the municipality receives all the correct information, and the local authority who checks that the project complies with the legal requirements. These rules regarding EIA apply in particular to wind turbines higher than 80m or groups of wind turbines with more than 3 wind turbines [18] [44].



EIA procedure in Denmark - Planning related to the erection of onshore wind turbines

1. Designation of wind turbine areas by municipalities plan

The responsible authorities for planning in relation to wind turbines in Denmark are:
· Offshore projects: Ministry of Climate & Energy - The Energy Authority
· Land based projects < 150 m: The Municipalities
· Land based projects > 150 m: Ministry of Environment – Danish Nature Agency
*The height is the total height to the tip of the blade.

Around 3 years

Around 1-1.5 years

Planning

2. Idea phase and scoping

Decision on whether an EIA is required:
Height of turbines > 80m
Number of turbines > 3

Screeing of potential sites

Invitation to submit ideas and proposals

Development

3. Preparation of a plan proposal

Drafting of planning proposals supplement to municipal plan and local plan

Drafting of an EIA for the project

Consultation relevant stakeholders

4. Project and EIA report

Public announcement è Public hearing (min 8 weeks) è Consideration of comments recieved è Any revision, plus consultation period and any new public phase è EIA approval and construction permission è Period for complaints

5. Construction

6. Grid connection

*Public involvement

Figure 21 EIA procedure in Denmark [53][18][57]

EIA report assesses the technical impact of a proposed wind farm, but it also allows all stakeholders to learn about the project, enabling them to have a chance to influence, creating a better acceptance of the project. It provides a possibility for information exchange between the developer, local authorities, and the various stakeholders. The EIA report should cover every conceivable aspect of a wind farm project that might affect the surroundings and the people who live there. More specifically, the report needs to demonstrate that the relevant legislation is complied what includes; minimum distances between turbines and dwellings, not exceeding defined noise levels, and various other demands that relate to the protection of citizens, the open countryside, the landscape, wildlife, agricultural interests and historic items of cultural value [18] [44].

Hence, together with a draft for the local plan, proposals from the municipal plan guidelines and the EIA can then simultaneously be sent into public hearing before entering the political reading process. The procedure depends on the co-ordination of the various approvals required, but in Denmark, where the EIA procedure is relatively well defined, the process may take a year or year and a half The entire process from having an initial project proposal until the final delivery and installation of a large onshore turbine is expected to take up to 3 years [18].

Despite it seems to be a smooth process, only a few projects have actually been implemented completely. A number of projects are delayed, downsized, moved to alternative locations or are given up. Municipalities usually seem to expect an increase in the number of complaints in the later stages of the planning and development process, when the project becomes more concrete. This highlights the importance of public information and engagement in the early stages of wind power planning. This also makes remarkable the notoriety of that an early engagement and communication with the affected community, the creation of a local network and trust, and possibly allowing citizens to introduce project proposals may lead to a smoother planning process [8]. Moreover if the scope of an EIA would also cover social impacts of a development, this will become an important foundation for a dialogue with the concerned population. It should be known who to address, when to address and how to address. If there is no understanding of the local social contexts and important issues for the concerned population, this cannot be known [44].

CHAPTER 6: CASE STUDY DESCRIPTION

Prøvestenen and Kalvebod Syd wind power projects respond to the local development plan for Copenhagen municipality area, Copenhagen 2025 – CO_2 Neutral Plan, which has set the ambitious target of being fossil fuel free by 2025. Both projects are siting in Amager Island, in the southeastern part of Copenhagen municipality. They have a similar size and were launched almost at the same time, in 2010, under the Energy Act 2009 regulation and following the EIA procedure for on-shore wind parks in Denmark.

Both case studies have been described in the next sections under the framing and overflows framework, considering their project location, main stakeholders and their network, community participation process, as well as the adopted project management practices by the developers. The identification and understanding those differences and similarities between both project planning and development processes has been essential for the case study analysis and for potential recommendations. But it is remarkable to highlight that while Prøvestenen wind farm is nowadays running and the turbines erected. Kalvebod Syd project is stack and even the construction phase has not started yet.

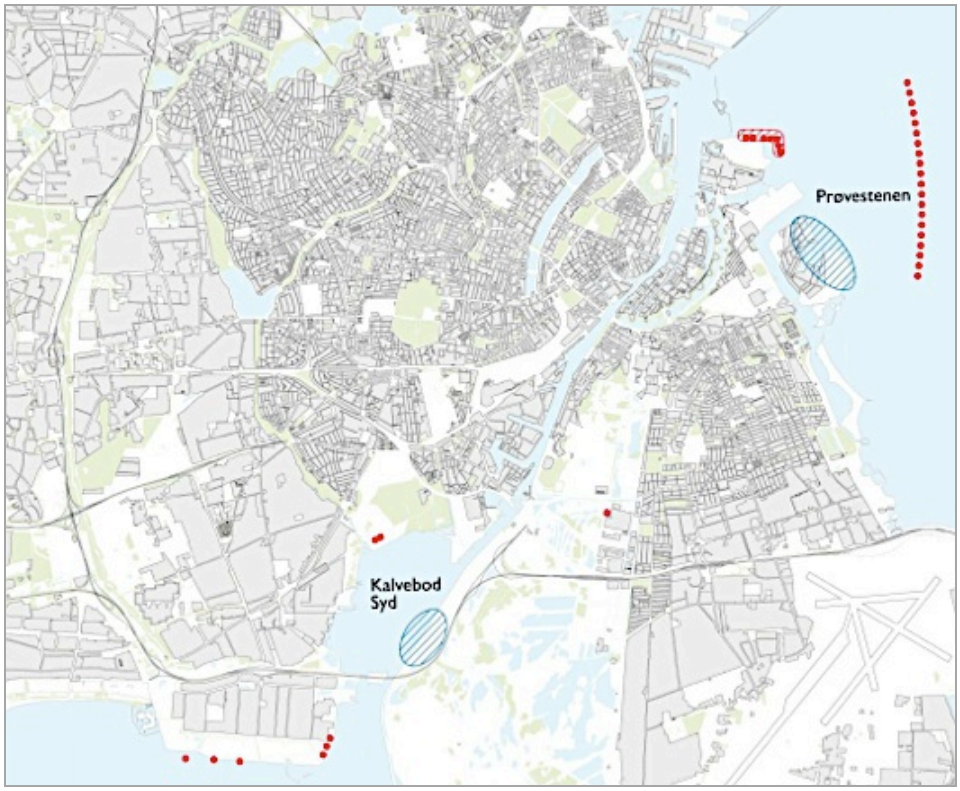


Figure 22 Copenhagen municipality [47][48][49][50]

The main source of data collection has been the interviews and survey taken with developer company and a variety of stakeholders for each project. The main intention has been to get different points of view for each project in order to check the consistency of the provided information, as well as to facilitate the identification and understanding of the local controversies, expectations and perspectives of the planning and development process for each of the case studies.

In Prøvestenen case, it has been interviewed the project developer company, HOFOR, and a resource person involved in other wind farms in Copenhagen and as board member in Danmarks Vindmøllerforening (Danish Wind Energy Association) as well as a consultant for the Prøvestenen cooperative, Hans Sørensen. While information from three different local stakeholders has been collected for Kalvebod Syd project. Hans Sørensen, as a resource person involved in other wind farms in Copenhagen and as board member in Danmarks Vindmøllerforening (Danish Wind Energy Association). The project developer company, HOFOR, and a local opposition group of neighbors from Hvidovre municipality, Stop Kalvebod Møller.

	Project Duration	Trubines			Power Output [GWh/Year]	Lifespan [Years]	Offered Shares (%)
		Number	Height [m]	Power [MW/Turbine]			
Prøvestenen	2010 - 2013	3	107	2	16	25	33% (1 Turbine)
Kalvebod Syd	2010 - ?	4	148 / 120	3	40 / 21	25	25% (1 Turbine)

Figure 23 Technical aspects of the projects [47][48][49][50]

The figure above shows the main technical features of each project. Project duration, number and characteristics of the turbines, power output and lifespan of the wind park, as well as the percentage of offered shares.

6.1 PRØVESTENEN

Prøvestenen is a three-turbine on-shore wind farm located in the north area of Amager, in Copenhagen municipality. The project was launched in 2010 by the initiative of Copenhagen municipality, and the turbines have been spinning since December 2013.

The project location and its surroundings played a key role as a facilitator for the deployment of this wind park, especially in relation to the visual impact. The closest local residential areas to the project are Amagerstrand neighbors and H/F Prøvestenen residents, a summerhouses area. Besides Amagerstrand park recreational area, which plays an important role for the local economy. The importance of the project location as a facilitator of the visual impact has been highlighted due to these local residents were already used to a landscape characterized by an industrial area (Chimneys, tanks…) and wind turbines, Middelgrunden off-shore wind farm. Therefore Prøvestenen project did not strongly spoil the landscape.

Figure 24 Prøvestenen

The main local stakeholders involved in Prøvestenen project are summarized in the figure below. They have been classified following the three dimensions of social acceptance criteria. There were obviously more stakeholders involved in the project but it has been only selected the key local ones.

Main Local Stakeholders - Prøvestenen		
Socio-Political Acceptance	**Market Acceptance**	**Community Acceptance**
Copenhagen Municipality (Local Administration)	HOFOR (Project Developer)	Prøvestenen Coop (Citizens) Miljøpunkt-Amager By&Havn (Landowner) Amager neighbors and H/F Prøvestenen (Local Residents) C&P (Local Industrial area)

Figure 25 Main local stakeholders - Prøvestenen project

Since the early beginning, Prøvestenen wind farm was designed and framed focusing on the engagement of the local stakeholders. The project developer firm, HOFOR, was experienced in participatory methods of project development, and employed both informal and formal methods of participation, even its headquarters was based in the local area. The first implementation of a participation approach by the project developer

was a rapid creation of a local group of people in order to create the Prøvestenen Cooperative. Some of the members were from Lynetten Cooperative, a near wind farm, but the most relevant aspect was that a local member of Miljøpunkt-Amager, the local information center for the environment, was designated as chairman of this group. Such an early engagement of the local community, stated as "unique" by HOFOR, sought to link the project to the local context, as well as a way create a network of local stakeholders. In this way the designation of a local chairman for the cooperative as well as the creation of a cooperative, what enabled local stakeholders to come together to establish a common target and become in potential investors for the project, made remarkable the desire of HOFOR to achieve a frame of a collective scenario.

Following the EIA procedure, public inquiries had to be necessarily carried out in order to obtain a planning permission. According to both interviewed stakeholders, the public hearings went well: opinions were expressed for and against, and the general conclusion was favorable, only in the last public hearing period especially more opposition opinions were raised. Thereby, HOFOR recognized the importance of networking with local residents, so instead of avoiding controversy, the firm decided to tackle it in an open and constructive manner. The result was a public meeting at HOFOR headquarters, organized as an “exhibition area” where citizens were given the opportunity to immerse and talk with a number of bodies including professional experts, HOFOR members, and representatives of the municipality. So local neighbors could express their concerns and they experienced to be heard. Additionally going beyond the minimum requirements set by the EIA procedure, a weekly local newspaper was launched with updated information about the project. Once the construction phase took off, Prøvestenen Cooperative, Amager representatives, HOFOR, and Copenhagen Municipality organized as well an open house in the project site to learn more about the project by those who were interested, giving them also the opportunity of getting into one of the existing turbines in Lynetten wind farm. Despite the frame designed, framing is always temporary and at risk of overflowing [4]. Overflows, the increment of complains, occurred when more actors were involved and more information was provided to them. Thus HOFOR attempted to reframe the project with the public meeting and the open house.

Under the Energy Act 2009 regulation and its provision of offering at least 20% of the shares to those local people who live within 4.5 km of the wind farm site. HOFOR extended this offer up to a 33% of offered shares, one whole turbine for the local stakeholders, while the firm held the two other turbines. Nowadays only 75% of that 33% has been sold, so HOFOR still remains a 25% of those shares. With this action HOFOR followed and complied its internal policy that aims to go further than the minimum requirements, providing a larger percentage of offered shares in all of its wind energy projects. HOFOR considers that this a good practice to involve more local stakeholders, as well the firm tries to offer the shares to the broadest variety of local stakeholders, avoiding potential monopolies of shares. This extension of the percentage of offered shares was a clear intention to involve local stakeholders, alienated with the established frame for the project. However, the lack of interest on buying shares might be seen as a risk of overflowing. Different factors can affect this decision: lack of

investment knowledge between potential buyers, amount of offered shares, the way of promotion those shares… Nevertheless HOFOR states that this is not a risk for the project, due to the project budget is estimated without including the revenues from the shares, and the remaining shares that HOFOR still holds are a way of investment for the firm.

What refers to the layout and design of the project, the initial plan was to erect the three turbines on the closest side to the industrial area of the small hill that splits the industrial area and Amagerstrand Park. But C&P, the local industrial business, showed its concerns especially in relation to safety reasons in case any turbine collapsed and crashed. Consequently HOFOR, who intended to settle the controversy and made significant effort to reframe the project, negotiated an agreement with C&P and By&Havn, the landowner. As a result, a consensus was reached but the new frame was only partially successful. It was agreed to erect the wind turbines on the top of the small hill. For this reason the project developer had to contract new studies about the foundations, as well as the new foundations requirements increased the costs. In this case the source of overflowing was the fact that C&P was annoyed because not having been considered for the turbines position what became a source of concern. Thus the new requirements forced the project developer to adapt frames and change their plans, incrementing the project budget.

6.2 KALVEBOD SYD

Kalvebod Syd is a four-turbine on-shore wind power project in the southwest part of Amager, in Copenhagen municipality. The project was launched in 2010, promoted by Copenhagen municipality, at the same time as Prøvestenen. But in this case the project still remains nowadays in the planning and development phases, the construction phase has not started yet, the turbines are not erected. The project resolution has scaled to an unresolved political debate and dispute between Copenhagen and Hvidovre municipalities, which is not resolved to date.

In this case the project site and its neighbor areas have made the processes of planning and development really complex, becoming one of the main constraints for it. The turbines are planned to site in a land, which belongs to Copenhagen municipality. This area houses the Kalvebod Environmental Centre, a soil and waste zone that is being filled with earth. When this work is finished, around 2040, it is expected the land to become into green recreational are, time by when the wind turbines will be removed. Kalvebod Syd is located close to the protected nature area of Vestamager, which is a bird sanctuary, and belongs to Tårnby municipality. Whereas that the neighbors from Hvidovre municipality are the closest residential area, just right in front of the project site. This particular aspect is strongly important in order to understand the controversies around this wind farm. While the four turbines are expected to erect in Copenhagen municipality, the aesthetics impact, visual and noise, is not for this municipality. It is for the residents of Hvidovre, the neighbor municipality. There are not other near residential areas neither in Copenhagen nor in Tårnby municipalities to the project. In addition the aesthetics impact is even stronger for Hvidovre neighbors, since there is not previous experience with industrial constructions or wind turbines in the area. The only

remarkable construction is a highway, which works as a gateway to the city of Copenhagen, an important element that will be discussed later.

Figure 26 Kalvebod Syd

The figure below shows as well the main local stakeholders involved in Kalvebod Syd project.

Main Local Stakeholders - Kalvebod Syd		
Socio-Political Acceptance	**Market Acceptance**	**Community Acceptance**
Copenhagen Municipality (Local Administration) Hvidovre Municipality (Opposition local adminitration) Danish Nature and Environmental Agency Media	HOFOR (Developer)	Hvidovre Neighbors (Local residents) Copenhagen Municipality (Landowner) Stop Kalvebod Møller (Opposition Hvidovre neighbors group) Wildlife protection groups (Oposition group)

Figure 27 Main local stakeholders - Kalvebod Syd

The planning and development phases of Kalvebod Syd wind farm have been characterized in every moment by a lack of involvement of some key stakeholders, showing a significant level of local resistance to the project precipitated by an ambitious top-down approach when communication with local community. The most active reaction came from Hvidovre municipality, which has felt uninformed and unfairly

excluded from the decision-making process, and annoyed about not having been included in the original plan. The three interviewed actors have admitted this recognition of lack of involvement in the early stages. Hvidovre municipality and its mayor were just officially informed of the project in connection with the public inquiry procedure. The communication channel was an email from Copenhagen municipality, which was not paid attention by Hvidovre municipality at a first instance. One of the main mistakes that has been made by Hvidovre, as the delegate of Stop Kalvebod Møller states. Therefore this lack of involvement of Hvidovre in the early stages on the designed frame was the way of starting the overflowing.

Another source of overflowing is the fact that Kalvebod Syd has been considered in every moment by HOFOR as a key and really important project both for the firm and especially for Copenhagen municipality. The project site is next to a highway, which works as a gateway for the city of Copenhagen. In this way, the project is expected to become a symbol for the city. The wind turbines would be visible for everyone entering to Copenhagen city, enhancing the aimed link "green city and Copenhagen" by the Copenhagen 2025 - CO_2 Neutral plan, as Stop Kalvebod Møller group recognized as one of the sources of the given relevance to the project by HOFOR and Copenhagen. Copenhagen municipality has refused to find another site, arguing that the soil and waste zone is the ideal location. The turbines will be removed by 2040 when the green recreational area will be established, besides there are some constraints due to Vestamager area and Copenhagen's airport, as well as the municipality got a dispensation from the state protection line. This controversy has culminated in a debate between two competing views on the visibility of the turbines: wind turbines are seen as beautiful symbols of modern dynamism (Copenhagen) or as ugly monsters spoiling beautiful nature (Hvidovre), with little room for negotiation. So, HOFOR has failed trying to frame the landscape as an iconic project just for Copenhagen municipality.

Kalvebod Syd project has been designed following many of the existing recommendations for wind power projects, carrying out the technical and environmental feasibility study reports necessary to grant a planning permission. HOFOR additionally designed two project proposals, one with a reduction of the turbines height to lessen their visual impact from afar. The firm also took the initiative to organize a public meeting in Copenhagen carrying out a presentation about the project. Local stakeholders were invited to express their questions and comments, opposing, supporting or just wondering about the project. In addition to it, HOFOR has offered a 25% of shares instead of 20%, one whole turbine for the local stakeholders, complying its internal policy, as a way to increase local participation. But still the visual and noise impacts of the turbines as well as the impact on the wildlife of Vestamager generated anxiety among the close neighbors of Hvidovre municipality. Accordingly, Hvidovre neighbors disagreed with the visualization montages of the turbines presented. Besides Hvidovre opposition groups mainly state that the environmental impact assessment report contains wrong calculations on the potential impacts for the birds on Vestamager protected nature area. For this last reason Hvidovre mayor and some local associations took action, writing to initiate a court appeal against the planning permission to the Danish nature and environmental agency. This process is not resolved to date, delaying

the project. The overflowing launched by Hvidovre municipality extended the public debate, and the local media expanded the debate with quite a lot of media coverage, showing that several local representatives felt they needed more information.

Hence Kalvebod Syd wind farm is a clear evidence that overflowing occurs when new actors, who were previously unaware, unconcerned, or resigned to not being able to have an impact, get engaged and start to develop their own, alternative vision and frames.

CHAPTER 7: CASE STUDY ANALYSIS AND DISCUSSION

Both case studies just presented on the previous chapter, have revealed the importance of designing adequate project frames, good project planning and management processes and community acceptance for the development of wind farms. Even within the same municipality, Copenhagen, developed by the same firm, HOFOR, and launched also at the same time, 2010, both projects have delivered totally different outcomes.

Linking all the collected information and the list of factors of community acceptance formulated in the State-of-the-art chapter, the figure below has been done in order to show those identified factors on each case study, which have played a key role during the planning and development phases. These factors have been rated as a positive agent, (+), understanding it as an enabler for the success of project. Or as a negative agent, (-), understanding it as a constraint or blocking mechanism for the success of project. For those factors that there has been not enough information, they have not been rated neither have been included in the analysis and discussion part.

		Prøvestenen	Kalvebod Syd
Site	· Local economy/Local costs and benefits and their equitable distribution	-	-
	· Wildlife/Ecosystem	-	(-)
	· Well-being/Aesthetic appreciation (Landscape and noise)	(+)	(-)
	· Emotional attachment to the place	-	-
	· Compensation of loss of property values/Home price depreciation	-	-
Project Management	· Local ownership/Shares-investment opportunities	(+)	(+)
	· Trust/Relationships between local community, local authorities and developers	(+)	(-)
	· Involvement and consultation of the local community in the decision-making process	(+)	(-)

Figure 28 Factors of community acceptance in the case studies

This rating of factors of community acceptance applied to the case studies has aimed to provide a good support for the upcoming analysis and discussion section. This last section mentioned have been organized and presented in such a way to deal, firstly with community participation and power in decision-making and then with the management of uncertainty and ambiguity. The chapter ends up with some findings

and recommendations for project developers about project management practices when planning and developing a wind power project.

7.1 Participation and Power in Decision-Making

Taking a look at the factor of community acceptance “Involvement and consultation of the local community in the decision-making process” on the figure of previous page, it can be noticed an important distinction on the adoption of participation levels and distribution of power for both projects. These ones have become an important factor of analysis in order to understand the gap between both planning and developing processes.

In the case of Prøvestenen, the frame designed by HOFOR showed the significance given to community participation by the firm since the early stage of the planning phase. A collaborative level was the dominant one through the entire project. HOFOR recognized the importance of partnering with the local neighbors for the success of the project, engaging them in the decision-making process from the beginning. Two evidences of this collaborative approach were the designation of a local member of Miljøpunkt-Amager, the local information center for the environment, as the chairman for the initiation of the cooperative, and the creation of a cooperative itself. The promotion of these two initiatives by HOFOR shaped a decision-making process (Procedural design) where the local stakeholders became a key player, with enough power to influence on the project design, consequently having a chance to reflect their expectations on the entire development of the project. In the same way, the initiative of creating a cooperative and the offer of a whole turbine, 33% of the shares, as an investment for the local community made a fair distribution of costs and benefits (Distributional justice).

However, in Kalvebod Syd project the most obvious problem has been the question of the choice of participating actors. It is clear that the initial lack of involvement of Hvidovre municipality started the overflowing. According to the IAP2’s spectrum of public participation [44], the community participation level on the project can be categorized in general as an Inform-Consult level. HOFOR and Copenhagen municipality confined themselves to comply just with the minimum required public hearings and meetings established by the EIA (With the exception the offer of 25% of shares instead of the 20% minimum). This lack of participation on the decision-making process, as well as, Hvidovre’s feeling of lack of power, can be one of the explanations for the lack of confidence and trust from Hvidovre municipality towards HOFOR and Copenhagen municipality, characteristic through the entire project. Besides the gaps in the participation process provide an insight behind the increment of opposition episodes throughout the development of the project.

What refers to the distribution of power in Kalvebod Syd, Copenhagen municipality has been a key player for this project. As it was mentioned before, Copenhagen launched Kalvebod Syd in order to achieve its ambitious target of becoming CO2 by 2025. The site of the project and its proximity to the highway, which works as a gateway for the city, have made of this project a symbol for the city under the title of green city. Without

forgetting that Copenhagen has more than ten times the population of Hvidovre [58] and it is also more influential on national level, have made that Copenhagen municipality has adopted a dominant role over Hvidovre. In this way, Copenhagen shift from a keep satisfied position, where it has to make sure that all the procedures and regulation are complied, to a key player position on the power-interest matrix. The top-down approach followed by HOFOR and Copenhagen municipality, probably adopted to get a fast track to achieve Copenhagen's target, maybe a too ambitious, induced the lack of involvement of Hvidovre and changed Copenhagen into a blocking actor for a proper development of the project. This highlights the evidence that it is also essential to consult the neighbor municipalities in which the wind farm will be established, and to provide information to them. Especially, even more when the project is located in one municipality, but the aesthetic impact affects to the neighbors of the close municipality but not to your own citizens.

7.2 Uncertainty and Ambiguity

This section assesses how the different identified factors of community acceptance deal with the management of uncertainty and ambiguity in each case study. S. Schrader, W. M. Riggs, and R. P. Smith [40] model has been initially used in order to analyze each factor, to conclude with the whole perspective of each project applying M. Thiry [22][23][41] model.

In the Prøvestenen wind farm, the choice of a collaborative frame established a positive effect over the factor "Involvement and consultation of the local community in the decision-making process". But it also enabled the creation of a network of relationships between the project developer, local authorities and the local community, bringing trust and confidence among them. This became into a positive effect over "Trust/Relationships between local community, local authorities and developers" factor, what made possible to keep low levels of ambiguity. HOFOR was able to recognize the importance of the variables "Involvement and consultation of the local community in the decision-making process" and "Trust/Relationships between local community, local authorities and developers". Understanding that the value of these two variables lies on value and personal dimension, being only possible to figure out the relationships of variables and values through dialogue and mutual understanding. Therefore these two factors can be categorized as Case 1 of the matrix developed by S. Schrader, W. M. Riggs, and R. P. Smith [40].

Case 1	Case 2
· Variables known · Value known · Functional relationships known	· Variables known · Value unknown · Functional relationships known

Figure 29 Prøvestnen – Uncertainty and ambiguity matrix I [40]

In relation to the management of uncertainty, both the creation of a weekly local newspaper, the public meeting with local citizens, experts, local authorities and the

developer firm, as well as the open house, facilitated the transfer of information through various channels. In the same way, the controversy between HOFOR, C&P and By&Havn, about the location of the foundations for the three turbines was resolved since HOFOR understood it was a matter within the dimension of interest. By negotiation with the two parts was possible to make an agreement. Even though it required the allocation of more resources, time and money, by HOFOR. All these actions carried out by HOFOR made possible to achieve low levels of uncertainty for the project, moving from Case 2 to Case 1

In the case of Kalvebod Syd, the top-down approach worked as a blocking mechanism for the project. Allthough HOFOR had prior experience dealing with community acceptance in wind power projects, enough resources and a proper organizational context, the firm established or maybe was forced to set this frame. Which did not give especial attention neither to the factor of "Involvement and consultation of the local community in the decision-making process" nor "Trust/Relationships between local economy, local authorities and developers". HOFOR could identify the variables within the frame, stakeholders and factors of community acceptance but it was not able to understand their values and relationships (Case 4). While Kalvebod Syd was a valuable project for Copenhagen, the project became a disturbance and annoyance for the pre-existing plans of a natural and recreational area of Hvidovre. There was a clear divergence of expectations on value and personal dimensions. Furthermore, quite a lot information was provided by HOFOR, public meetings and EIA reports. These actions were supposed to reduce supposed to decrease the level on uncertainty, but due to the immutable positions both Copenhagen and Hvidovre and lack of dialogue and negotiation among them about their of expectations, the project still remained on high levels of ambiguity.

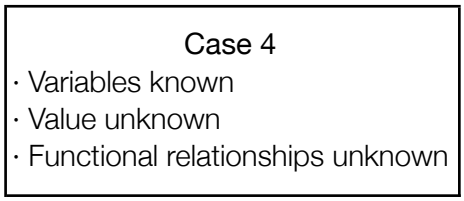


Figure 30 Kalvebod Syd – Uncertainty and ambiguity matrix I [40]

In relation to the factor "Well-being/Aesthetic appreciation (Landscape and noise)", it is a consequence of the sitting planning. HOFOR followed the procedures and technical regulations, two project proposals were submitted with different sizes for the turbines, but the visual and noise impact was a main source of concerns and ambiguity. Finally, the factor "Wildlife/Ecosystem" is the main argument of controversy nowadays. HOFOR has carried out the needed environmental impact assessment reports in order to obtain planning permission. Although this information has been provided, Hvidovre neighbors do not agree on how the obtained results about the impact on the wildlife were worked out, so the Danish nature and environmental agency is now the one in charged of checking the execution of the EIA. Anyway this situation may have been avoided if a collaborative approach, engaging the local community in the decision-making process,

instead a top-down one had been adopted from the beginning without having to reach this stagnation point.

In order to conclude this section, the evolution of both case studies has been mapped, using M. Thiry [22][23][41] uncertainty and ambiguity matrix. It can be appreciated that both project management processes were initiated with high levels of uncertainty and ambiguity in both cases at the beginning due to the high number of assumptions that were needed to make. But the adopted tools and approaches, the appraisal of project value, evaluation of possible changes and overflows that may influence the project execution with a continuous knowledge of the project situation, delivered then a different outcome for each project.

HOFOR was able to combine value management and project management for Prøvestenen, figure below (Green), closer to a program management framework [23]. The collaborative approach facilitated an open dialogue and mutual understating between developer, local authorities and local community, by engaging with the local stakeholders. Ambiguity reduction, figure below (1)→(2), was achieved by the importance given to community participation and trust, by the creation of the cooperative and designation of a local member as a chairman. Besides a low aesthetic impact due to a landscape characterized by an industrial area and wind turbines made easier to obtain low levels of ambiguity, non-understanding and non-clarity. Uncertainty reduction, figure below (2)→(3), was possible by proving information, public meetings, open house and newspaper and by negotiation to found agreements and solutions

In the Kalvebod Syd case, figure below (Red), the top-down approach, defined by a lack of involvement and trust with the local community, especially in the early stage of the project. It made not possible to reduce ambiguity and uncertainty levels in such a way to leave value management category, figure below (1)→(2). Essentially because value and personal dimension related to ambiguity issues, were not addressed by the project developer with the local community.

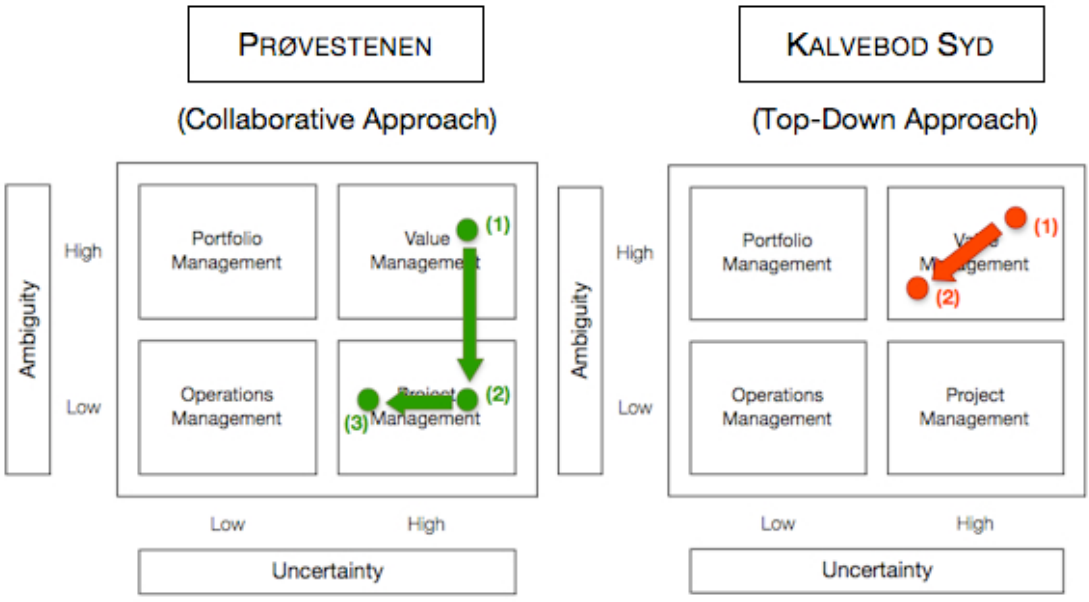


Figure 31 Uncertainty and ambiguity evolution in the case studies – Matrix II [22][23][41]

7.3 Findings And Recommendations

Prøvestenen and Kalvebod Syd projects have shown that a collaborative approach for the planning and development of wind power projects ensures to achieve low levels of ambiguity and uncertainty, this simplification that can be very favorable for an effective project management bringing successful outcomes. But management of uncertainty and ambiguity needs to be given more attention, as well as, project developers need to understand that ambiguity has a different meaning than uncertainty.

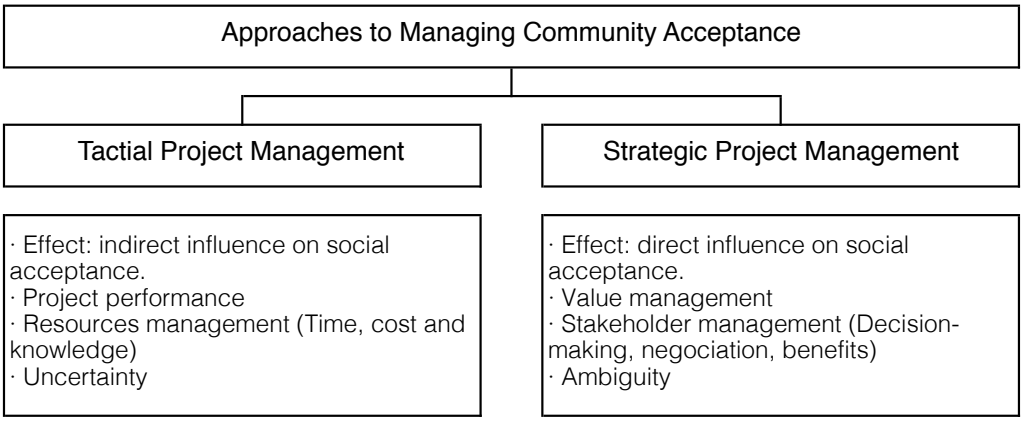


Figure 32 Approaches to managing community acceptance (Adaptation from [10])

From a project manager perspective, community acceptance can be influenced in two ways: indirectly through tactical project management focusing on project performance, or directly through strategic project management focusing on stakeholder and value management. Uncertainty is related to a tactical project management, while ambiguity refers to a strategic project management [10]. Both approaches are essential for the project, but in this case this collaborative framework calls for a strategic change in wind power project management practices, towards a mutual understanding between developers and local community, including this one in the decision-making process.

The two case studies have shown that a reduction of uncertainty can be very beneficial. The adoption of an increment of the percentage of offered shares by HOFOR has reveal the importance given to increase the community acceptance of projects by the firm. This co-ownership model creates a better benefit and costs sharing situations, it covers the interest dimension of conflicts in project by the negotiation of shares. However this tactical movement through allocation of resources is good and necessary, but not enough to deal with value and personal dimensions. It means, a tactical project management does not reach ambiguity issues, while a strategic approach by collaboration aims to reach them. So uncertainty reduction should be combine with a more strategic approach that adds value to the early stages of the project with adding complexity during the execution [59]. At the same time, it is important to keep an open channel to transfer clear and completeness information (Public meetings, informative brochures...). It enables uncertainty reduction, but it also helps to avoid situations of ambiguity and misunderstandings, especially relevant with informal networks since it can generate news and rumors resulting in a state not desired by the developer.

Planning and development processes usually tend to fail when evolving a project frame that accommodates both developer and local community interests [10]. It means that ambiguity issues are not properly addressed, maybe caused by a wrong interpretation of what uncertainty and ambiguity mean. In this way a collaborative approach also facilitates the management of stakeholder interests and expectations, an important element of strategic project management. This requires a proper proactive dialogue and mutual understanding about value and personal dimensions between developer and local stakeholders, what additionally brings the chance to create trust within a local network. This trust becomes as well an economic method of compensating the gaps in information [21]. How this management of ambiguity influences the project outcome can be appreciated in both case studies. While a collaborative approach oriented to value management, creation of trust and local network of stakeholder is reflected in Prøvestenen project, increasing the probabilities of success and implementation of the project. In Kalvebod Syd the lack of mutual understanding, lack of trust and lack of engagement around the controversies with the aesthetic impact and wildlife still blocks the project planning and development.

However, guidance on determining the scope and timing in community consultation and engagement has not clearly defined. Engaging the community at a too early and speculative stage without full information of the proposal is not recommended, it might create unnecessary ambiguity and concerns. While the lack of information may also create doubt and lose trust in people, turning into fear and opposition of the project proposal. Therefore a balance needs to be developed, so this aspect should be study in a further research [25][44].

Based on the findings of both cases studies and following the insights provided by some literature (A. Jobert et al. [37], E. Jolivet, E. Heiskanen [4], H. C. Sørensen [44], J. Szarka, R. Cowell, G. Ellis, P. A. Strachan, and C. Warren [6][60], K. H. Goh and V. Del Rosario [25], M. Wolsink [7][16][25], N. Hampl and R. Wüstenhagen [10], P. Devine Wright [61], E. Den Ouden [32], M. Giezen [59]., M.Thiry [22][23][41], R. Atkinson et al [21]). The main recommendation concludes that by an adoption of more collaborative approaches between developers and local community, engaging the local community at an early stage in planning the project, facilitates the management of uncertainty and ambiguity. A good management of these two concepts brings low levels of them for the project, avoiding in some how potential local controversies. This does not guarantee success but increases the probabilities for reducing local resistance while enabling the deployment of the wind energy industry. Project developers should aim to design a decision-making process, which seeks to accommodate influences and strategic input from the local community, but keeps strict control over techniques and design, achieving the most value while keeping the project simple [59].

Even though project developers should also elaborate a tailor-made collaborative frame to every specific project, the standardization of the implementation of cooperatives where developers are required to work with communities and authorities could improve and empower this collaborative approach. Designing a framework, which covers the three dimensions of community acceptance: distributional justice, procedural design and trust [60]. This implementation of cooperatives with the current project

management practices could be even more remarkable in Denmark, where the previous experiences and knowledge greatly facilitate the implementation of this model.

To conclude, taking a look at the insights from the state-of-the-art on actor network theory, innovation design, social acceptance, and project management. The recommended collaborative approach for the planning and development of a wind power, from a conceptual point of view, can be achieved by merging actor network theory, innovation design and project management. Reshaping relations between actors with different interests, where both technicalities and the social dynamics are connected in a network, influencing each other. Accomplishing a good project performance, by keeping control of time and costs, and creating meaningful value at every level. This conceptual model can generate valuable insights for project developers of wind power projects, for researchers in the field of wind energy, as well as, it might also be possible to draw lessons for other energy sectors

CHAPTER 8: CONCLUSION

Despite promoters of wind power have become increasingly concerned with stakeholder management and participation challenging the current practices of project management, there is still a high number of failed wind power projects. Concerns about the expansion of wind power are broadly presented as a problem of planning, due to comparatively low approval rates for wind energy development and delays in decision-making [60]. As well as wind project developers and authorities have encountered what was named "local resistance", ratifying that formal procedures for engaging local stakeholders might be insufficient [4][7][8]. Consequently it has become essential to expand the understanding of planning and community acceptance in order to increase the deployment of the wind power industry [5][6].

Under this framework, this master thesis was intended to deal, from a socio-technical perspective, with the management of uncertainty and ambiguity related to those controversies around community acceptance and local opposition in wind power projects, from the point of view of the project developer. Understanding that uncertainty leads to the acquisition of objective information and the answering of specific questions, and it is related to the instrumental dimension and the dimension of interest. While ambiguity leads to sense making, the exchange of views and the definition of situations/problems, and it is linked to value dimensions and personal dimensions [10][23]. Assessing these uncertainty and ambiguity associated to the local controversies and the interactions between them, was considered fundamental for an effective management of the project. A failure to clarify stakeholder expectations and priorities at an early stage can cause major difficulties later in the project [10]. It was also embraced the concepts of “framing”, a process through which actors come together to establish a common world and achieve a collective scenario of a desired outcome. And “overflows”, the repercussions that follow when actors do not conform to expectations, adopt conflicting positions and develop their own interpretations of the project and in effect ensure that new frames are enacted [4]. As well as, it was recognized the importance of including power and level of participation in the decision-making process factors for a richer research. Aiming the overall objective of identifying and providing some insights to support wind farm developers in order to set the most appropriate strategies to increase community acceptance and project value.

For the former, two case studies were taken into consideration, Prøvestenen and Kalvebod Syd, both of them within the Copenhagen municipality and launched at the same time in 2010. Thanks to a description of both projects and the background provided by the discussed state-of-the-art, a better understanding of what really means the concept “local community” could be achieved. It made possible to identify who was

involved, what were their expectations and interest and how these expectations were negotiated, thereby answering one of the research questions formulated. Afterwards the analysis and discussion was carried out focused on the distribution of power and level community participation in the decision-making process, and the management of uncertainty and ambiguity related to the factors of community acceptance identified in each case study. Tis enabled the identification of the frames and community participation approach designed by the developer. What made possible to give an answer to the second research question formulated.

The analysis and discussion showed that in the Prøvestenen case the adoption of a collaborative approach between the developer and the local community by an early engagement of the local community facilitated the successful achievement of project permission. While in Kalvebod Syd, the top-down approach established, the lack of engagement of the local community, the lack of mutual understanding and the lose trust, brought high levels of local opposition, what have done that the project still remains nowadays in the planning phase.

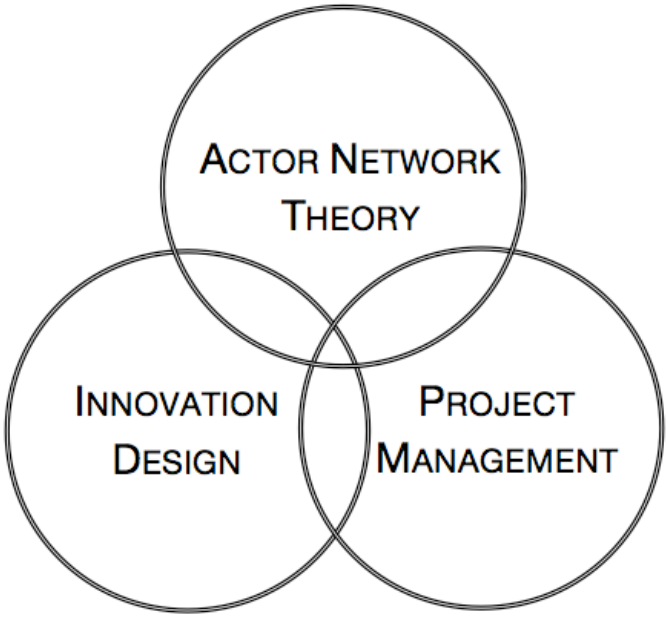


Figure 33 Conceptual model for the collaborative approach

Therefore based on the experiences from Prøvestenen and Kalvebod Syd, and based on some literature on this research topic (E. Jolivet, E. Heiskanen [4], J. Szarka, R. Cowell, G. Ellis, P. A. Strachan, and C. Warren [6][60], M. Wolsink [7]). The main findings and recommendations for wind power project developers point to a strategic movement in project management in order to adopt collaborative approaches between developers and the local community for this kind of projects, and a need for more flexibility in the current planning framework. Wind farm developers may be more successful if they engage local communities as partners in the planning and developing processes, additionally, a collaborative approach helps to figure out how to manage uncertainty and ambiguity, covering their four dimensions of conflicts on project level (Instrumental, interest, value and personal), and to keep low levels of uncertainty and ambiguity smoothing the project management process.

Previous experiences [5][6] also confirm that collaborative frames bring “win-win” solutions that may facilitate the outcomes for the environment, society and economy and the governance arrangements. Besides a iterative learning process of the current practices is needed for an improved understanding of the complexity of the factors that shape community acceptance in different contexts, contrasting views on alternatives and interest, and different ways to pursue them including key issues such as scale, ownership, framing and the distribution of costs and benefits.

At last this collaborative approach can be adapted into a conceptual model for the management of wind power projects and community acceptance. This collaborative approach can be achieved by merging actor network theory, innovation design and project management. Finding the sweet spot between actor network theory, project management and innovation design do not guarantee success but increases the probability of getting higher rates of local acceptance and thus potentially higher wind power penetration within Danish communities, as well as, it can generate valuable insights for project developers of wind power projects.

8.1 RESEARCH LIMITATIONS

A critique for the worked presented and an explanation of some of the research limitations must be carried out in order to complete this research. One main constraint was the lack of more time for researching. More papers of reference and sources of information could have been consulted in order to enrich the work by including more approaches, frameworks and perspectives, and challenging with them the already used ones. Besides the author did not have previous experience or strong background about social aspects of project management of wind parks.

Another two main limitations of the data collection for the case studies were: there was a lack of information in English about the case studies. Lot of the information was found in Danish so it was needed to translate, due to the lack of knowledge of Danish by the author. These translation processes might have lost some important details about the information. Besides the different interviews were conducted only with some of the stakeholders involved with the case study projects. The lack of more interviews with other actors might have not provided a whole perspective, and the information obtained could be presented in such a way to promote or to oppose both projects.

Furthermore the thesis looked only at local community participation and management of uncertainty and ambiguity when developing onshore wind farm projects. There was not done any comparison neither with offshore wind farm projects nor with other sources of energy. Besides the location of the wind farms also determines the area where the public attitudes towards renewable energy projects are analyzed, and this work focused only on two cases, Prøvestenen and Kalvebod Syd, near Copenhagen area.

REFERENCES

[1] R. E. Freeman and D. L. Reed, “Stockholders and Stakeholders: A new Perspective on Corporate Governance,” *Calif. Manage. Rev.*, vol. 25, pp. 93–94, 1983.

[2] E. W. E. Association. and EWEA., *Wind energy - the facts : a guide to the technology, economics and future of wind power*. Earthscan, 2009.

[3] “PMI-Project Management Institute.” [Online]. Available: http://www.pmi.org/default.aspx.

[4] E. Jolivet and E. Heiskanen, “Blowing against the wind-An exploratory application of actor network theory to the analysis of local controversies and participation processes in wind energy,” *Energy Policy*, vol. 38, pp. 6746–6754, 2010.

[5] R. Hiteva, “Review of ‘Learning from wind power,’” *Environ. Plan. C Gov. Policy*, vol. 30, 2012.

[6] J. Szarka, R. Cowell, G. Ellis, P. A. Strachan, and C. Warren, *Learning from Wind Power: Governance, Societal and Policy Perspectives on Sustainable Energy*. Palgrave Macmillan, 2012, p. 280.

[7] M. Wolsink, “Wind power: Basic challenge concerning social acceptance,” *Encyclopedia of Sustainability Science and Technology: Springer Reference*, vol. 17. Springer, pp. 12218–12254, 2013.

[8] K. Sperling, F. Hvelplund, and B. V. Mathiesen, “Evaluation of wind power planning in Denmark - Towards an integrated perspective,” *Energy*, vol. 35, pp. 5443–5454, 2010.

[9] M. Wolsink, “Dutch wind power policy: Stagnating implementation of renewables,” *Energy Policy*, vol. 24, pp. 1079–1088, 1996.

[10] N. Hampl and R. Wüstenhagen, “Management of Investor Acceptance in Wind Power Megaprojects : A Conceptual Perspective,” 2012.

[11] K. Borch, “Appendix B - Project description: Wind 2050 - Multidisciplinary study on local acceptance and development of wind power projects,” 2013.

[12] Technical University of Denmark, “Wind2050.” [Online]. Available: http://www.wind2050.dk.

[13] “Danish energy agency - Renewable energy - Wind Power.” .

[14] Vindmølleindustrien, “2013 var rekordår for vindenergi i Danmark.” .

[15] Vindmølleindustrien, “”Udbygningen i 2014 udfordres”.” .

[16] M. Wolsink, “Wind power implementation: The nature of public attitudes: Equity and fairness instead of ‘backyard motives,’” *Renewable and Sustainable Energy Reviews*, vol. 11. pp. 1188–1207, 2007.

[17] D. Bell, T. Gray, and C. Haggett, “The ‘Social Gap’ in Wind Farm Siting Decisions: Explanations and Policy Responses,” *Env. Polit.*, vol. 14, no. 4, pp. 460–477, Aug. 2005.

[18] N. Clausen, T. Cronin, and W. Jowittt, “Planning and Development of Wind Farms : Environmental impact and grid connection Wind Energy,” 2013.

[19] M. J. Pasqualetti, “Living with Wind Power in a Hostile Landscape,” in *Wind Power in View: Energy Landscapes in a Crowded World*, 2002.

[20] P. Gipe, “Wind Energy Come of Age,” *John Wiley Sons*, 1995.

[21] R. Atkinson, L. Crawford, and S. Ward, “Fundamental uncertainties in projects and the scope of project management,” *Int. J. Proj. Manag.*, vol. 24, pp. 687–698, 2006.

[22] M. Thiry, *Program Management - Fundamental of Project Management*. Gower Publishing, 2010.

[23] M. Thiry, “Combining value and project management into an effective programme management model,” *Int. J. Proj. Manag.*, vol. 20, pp. 221–227, 2002.

[24] S. Weaver and E. Sciences, “Minimising Community Opposition to Wind Farm Developments in New Zealand : Opportunities in Renewable Energy Planning,” Victoria University of Wellignton, New Zealand, 2003.

[25] K. H. Goh and V. Del Rosario, “Community Stakeholder Management in Wind Energy Development Projects,” 2007.

[26] J. H. Fujimura and B. Latour, “Science in Action: How to Follow Scientists and Engineers through Society.,” *Contemporary Sociology*, vol. 18. p. 788, 1989.

[27] J. Law and J. Hassard, *Actor network theory and after*. 1999, p. 256 S.

[28] B. Latour, *Reassembling the social-an introduction to actor-network-theory*, vol. 1. 2005, p. 312.

[29] C. Thuesen, “Understanding the Modularity of Socio-technical Production Systems,” 2012.

[30] O. Amsterdamska, “Surely You’re Joking, Mr Latour!,” *Sci. Technol. Hum. Values*, vol. 15(4), pp. 495–504, 1990.

[31] D. Bloor, “Anti-Latour.,” *Stud. Hist. Philos. Sci.*, vol. 30, pp. 81–112, 1999.

[32] E. Den Ouden, *Innovation design : creating value for people, organizations and society*. Springer, 2012.

[33] M. Wolsink, M. J. Bürer, and R. Wüstenhagen, "Social acceptance of renewable energy innovation: An introduction to the concept," *Energy Policy*, vol. 35, no. 5, pp. 2683–2691, 2007.

[34] IEA Wind Task 28, "Social acceptance of wind energy projects: Expert group summary on recommended practices," 2013.

[35] IEA Wind Task 28, "Social Acceptance of Wind Energy: State of the art," 2010.

[36] G. Walker and P. Devine-Wright, "Community renewable energy: What should it mean?," *Energy Policy*, vol. 36, no. 2, pp. 497–500, 2008.

[37] A. Jobert, P. Laborgne, and S. Mimler, "Local acceptance of wind energy: Factors of success identified in French and German case studies," *Energy Policy*, vol. 35, pp. 2751–2760, 2007.

[38] M. T. Pich, C. H. Loch, and A. De Meyer, "On Uncertainty, Ambiguity, and Complexity in Project Management," *Management Science*, vol. 48. pp. 1008–1023, 2002.

[39] R. R. Hahn, "Preventing Conflicts by Application of Psychology."

[40] S. Schrader, W. M. Riggs, and R. P. Smith, "Choice over uncertainty and ambiguity in technical problem solving," *Journal of Engineering and Technology Management*, vol. 10. pp. 73–99, 1993.

[41] M. Thiry, "Uncertainty and Ambiguity: Re-dimensioning the Project Management Space." National Center for Project Management Experts' Forum, 2010.

[42] S. R. Arnstein, "A Ladder Of Citizen Participation," *Journal of the American Institute of Planners*, vol. 35. pp. 216–224, 1969.

[43] U.S. Environmental Protection Agency, "Selecting the Right Level of Public Participation," in *International Public Participation Guide*, .

[44] H. C. Soerensen, "EXPERIENCE WITH AND STRATEGIES FOR PUBLIC INVOLVEMENT IN OFFSHORE WIND PROJECTS," pp. 3–6, 2003.

[45] IAP2, "International Association for Public participation." .

[46] R. K. Yin, *Case Study Research: Design and Methods*, vol. 5. 2009, p. 219.

[47] HOFOR, "HOFOR Vind web." [Online]. Available: http://www.hofor.dk/vind/.

[48] Københavns Kommune, "Vindmøller til københavnerne." 2010.

[49] Københavns Kommune, "Vindmøller på Kalvebod Syd." 2011.

[50] Københavns Kommune, “Vindmøller på Prøvestenen.” 2011.

[51] J. McLaren Loring, “Wind energy planning in England, Wales and Denmark: Factors influencing project success,” *Energy Policy*, vol. 35, pp. 2648–2660, 2007.

[52] D. J. Fiorino, “Citizen Participation and Environmental Risk: A Survey of Institutional Mechanisms,” *Science, Technology & Human Values*, vol. 15. pp. 226–243, 1990.

[53] Danish Energy Agency, “Wind Turbines in Denmark,” 2009.

[54] A. Kernan, “Denmark: Community Wind Energy Movement in Retreat - The energy collective.” [Online]. Available: http://theenergycollective.com/greenwell-future/230046/denmark-s-community-wind-power-movement-retreat.

[55] L. K. Nielsen, “SOCIAL ACCEPTANCE ‘Winning Hearts and Minds’ STATE-OF-THE-ART REPORT, Country report of Denmark.”

[56] H. C. Soerensen, “Danish experience in connecting local communities and wind power power.” 2013.

[57] KL, Vindmølleforening, and Danmarks Naturfredningsforening Danmarks Vindmølleindustrien, “Den gode proces.” 2009.

[58] Statistics Denmark, “"Statistics Denmark: Copenhagen City/Urban Area (Københavns Kommune, Hovedstadsområdet),” 2012. [Online]. Available: http://statistikbanken.dk/statbank5a/default.asp?w=768.

[59] M. Giezen, “Keeping it simple? A case study into the advantages and disadvantages of reducing complexity in mega project planning,” *Int. J. Proj. Manag.*, vol. 30, pp. 781–790, 2012.

[60] G. Ellis, R. Cowell, C. Warren, P. Strachan, J. Szarka, R. Hadwin, P. Miner, M. Wolsink, and A. Nadal, “Wind Power: Is There A Planning Problem? Expanding Wind Power: A Problem of Planning, or of Perception? The Problems Of PlanningA Developer’s Perspective Wind Farms: More Respectful and Open Debate Needed, Not Less Planning: Problem Carrier or Problem Sou,” *Planning Theory and Practice*, vol. 10, no. 4. 2009.

[61] P. Devine-Wright, “Public engagement with large-scale renewable energy technologies: Breaking the cycle of NIMBYism,” *Wiley Interdiscip. Rev. Clim. Chang.*, vol. 2, pp. 19–26, 2011.

APPENDIX: SURVEY TEMPLATE

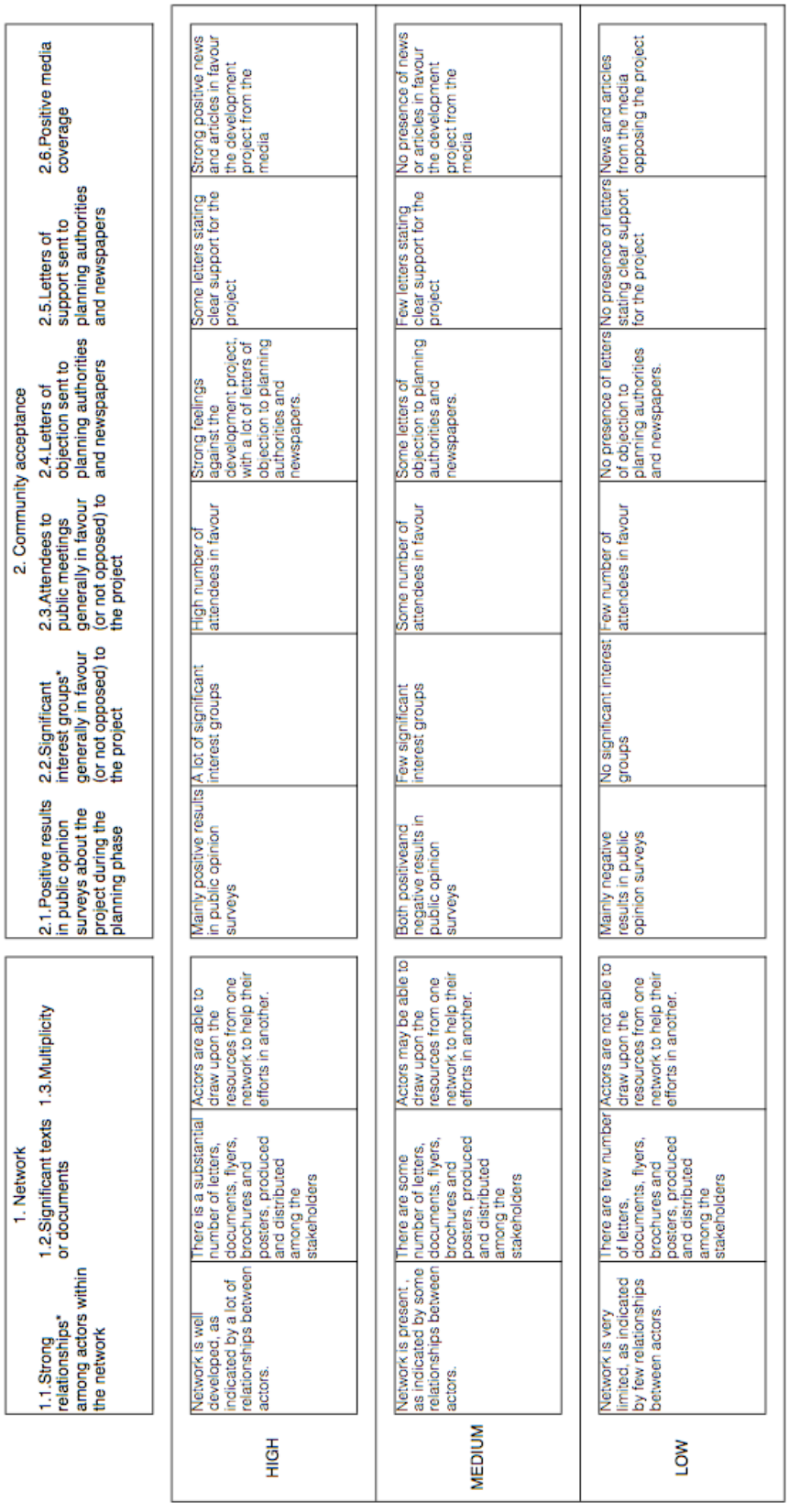


Figure 34 Survey template I

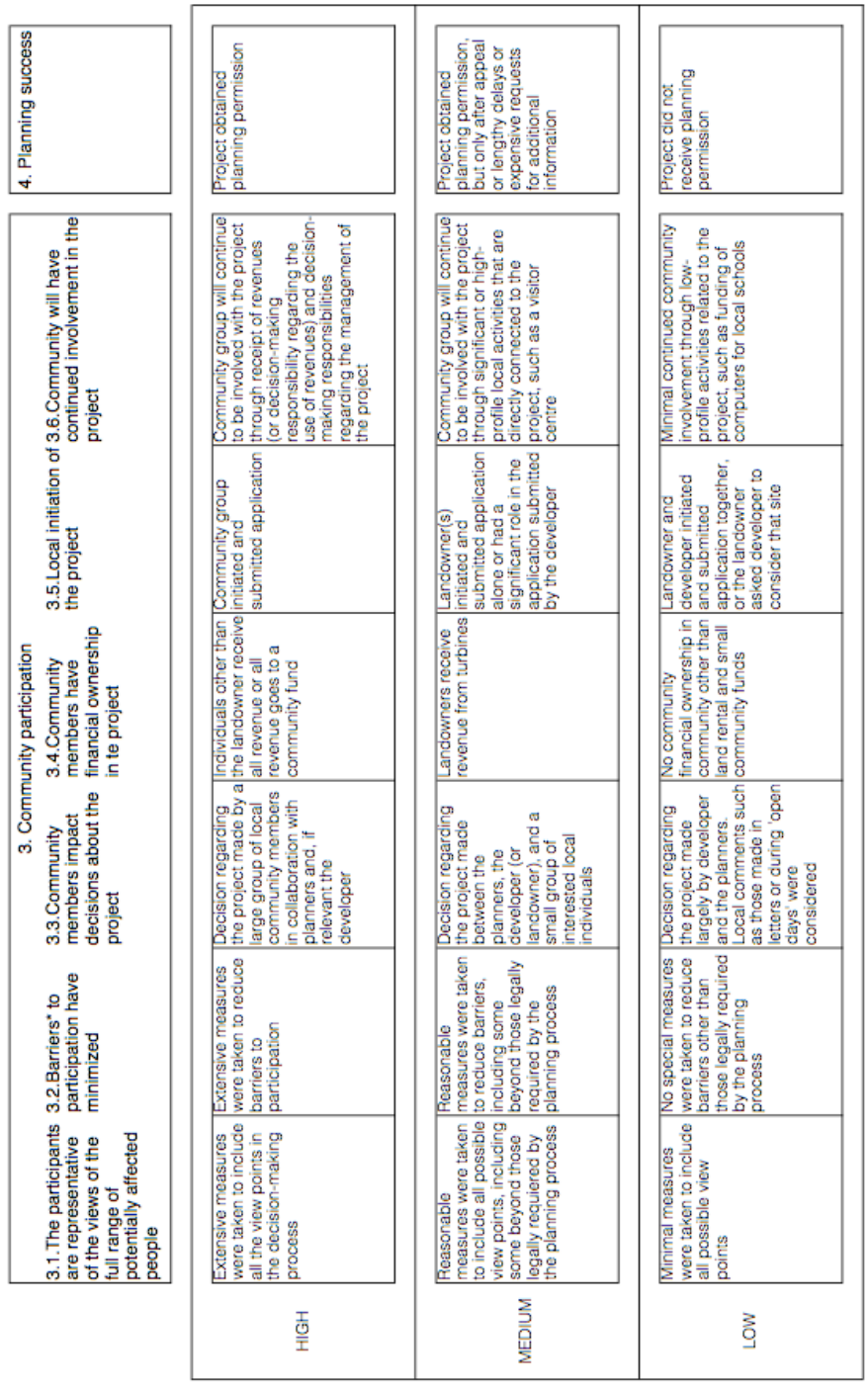


Figure 35 Survey template II

DTU Management Engineering
Technical University of Denmark

Produktionstorvet
Building 424
2800 Kongens Lyngby
Denmark
Phone: (+45) 45 25 48 00
Fax: (+45) 45 93 34 35
Email: receptionen@man.dtu.dk

www.man.dtu.dk