UNIVERSITETET I AGDER

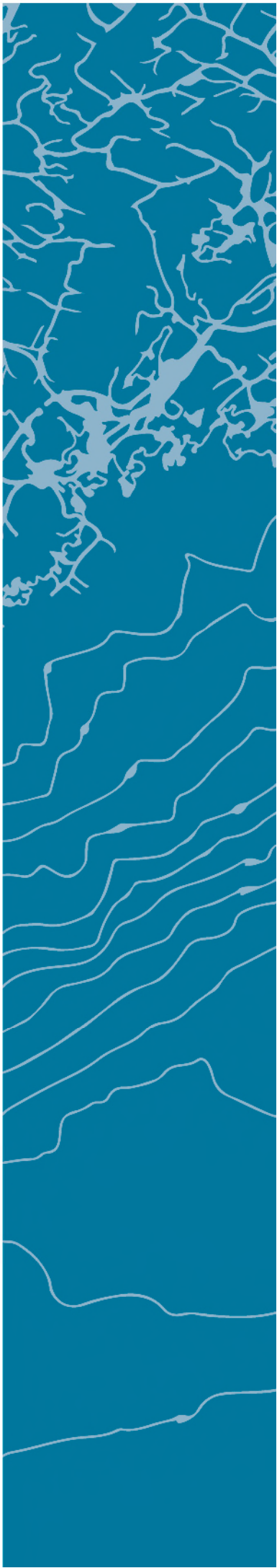
Alternative business models

- Implementation of Blade Installation Tool in Offshore Wind Market

Daria Lysova & Ida Engman

SUPERVISOR
Trond Randøy

University of Agder, 2018
School of Business and Law
Department of Management



Preface

The background for this research comes from encouragement from our employer, National Oilwell Varco Norway AS, to conduct a research about offshore wind market and find most suitable and profitable business model to be used by the company for introducing the installation tool to the industry.

We thank National Oilwell Varco, especially, Marine Construction segment, for sharing their competence and experience within industry. We also want to thank our tutor, Trond Randøy, for guiding us along the way and helping us keep the motivation.

Summary

As the world's population is growing and pollution is growing, the governments of modern global economies are constantly pushed to find alternative solutions for sources of energy. Focus is not only to produce green energy, but to cut cost for its acquire in order to make it more profitable for companies to work an invest within this segment. At the same time, after oil price collapse in 2015, the traditional oil companies were pushed to pursue new markets and come up with new products through research and development. National Oilwell Varco is one of those companies. The company has come up with a tool that has the intention to make the process of wind mill blade installation less expensive by reducing the installation time, reduce risk and possibilities to perform installation even in rough weather conditions.

In this thesis we have looked at conditions of modern wind mill market (competition, main challenges, new products, market share) and discussed what business model would be most profitable and least risky for NOV. We started externally mapping out the market, its structure, key players and industry potentials. Then turning the focus internally to the company and its main segments, as well as what has pushed it to pursue new possibilities in the market.

Our research is based on empirical method where we have combined both theory and empirical discussion. As far as the theoretical approach is concerned, we have relied mostly on Teece's outline of business models, his research on how to profit from innovation and on Michael Porter's value chain.

Empirical data is presented in a typical business model framework, the Canvas by Oderwalder and Pigneur (2010). We have discussed various customer segments, possible partnerships, revenue streams, cost structure for several models.

By assessing the findings based on the theoretical platform, evaluating the tool as an innovation and discussing the possible business model available we have concluded that hybrid asset sale model would be most profitable and least risky for NOV. The model is based on asset sale of the tool as one single transaction, but with possibility to rent NOV personnel for performance of Aftermarket activities and possible repair later. This model is the most common model for NOV and supports classic offshore project model that the company is used to. The organization structure supports the model, and revenue stream from single sales should minimize the risk of large investment and long dependency on other parties.

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Problem

Research in the industry of renewable energy in recent years has shown increased development and deployments of Offshore Wind Farms, especially in Europe (Colmenar-Santos, Perera-Perez, Borge-Diez & dePalacio-Rodriguez, 2016). Although the possibilities are great, challenges related to the high cost associated with offshore wind is a barrier. New and advanced technology is being developed to reduce cost and optimize all parts of Offshore Wind Farm development and operation. (Sun, Huang & Wu, 2012)

National Oilwell Varco is market leading company worldwide for delivery of drilling equipment to the Oil and Gas industry. The company is now researching the possibilities of utilizing their experience from offshore oil services deliveries in the offshore wind market. A new tool that can be used in installation of the blades on offshore wind turbines is in the concept phase. A new product development project is launched, and we have been given the opportunity to contribute to the business side of the project. The problem for this thesis is to investigate possibilities to identify the best business model to use when releasing this tool in the offshore wind market.

By using the Canvas presented by Oderwalder and Pigneur in the book "*Business Model Generation: A handbook for Visionaries, Game Changers, and Challengers*" (2010) we will investigate the market and the company resources for National Oilwell Varco, to map out differences in business models based on different types of revenue streams. Furthermore, we will present and evaluate the options and recommend the most attractive business model based on the following key values:

- Investments for company
- Organizational
- Potential for income and revenue
- Risk

We will explain what business models are and place the different elements of business models in the theoretical landscape. Then, to give the reader insight in the company National Oilwell Varco, the Offshore Wind Market and give a presentation of the tool itself we have a separate

chapter for introduction, before presenting the data used to assess each of the models. But first we will explain the relevance of our research.

Relevance

Adding value

Global wind power industry is becoming increasingly popular and interesting for investments. As the governments of developed countries are being pressured to reduce carbon-dioxide emissions, the focus on alternative energy sources has been rapidly increasing. World Street Journal states that in 2016 about $297 billion has been invested in renewable energy, while $143 billion has been spent on oil and gas, nuclear and coal energy sources. “Once supported overwhelmingly by cash-back incentives, tax credits and other government incentives, wind- and solar-generation costs have fallen consistently for a decade, making renewable-power investment more competitive” (Gold, 2018). As a result of that wind mill industry has been growing, in fact by about 27% in the past decade. The figures below show increase in wind mills on the global scale (IRENA, 2012).

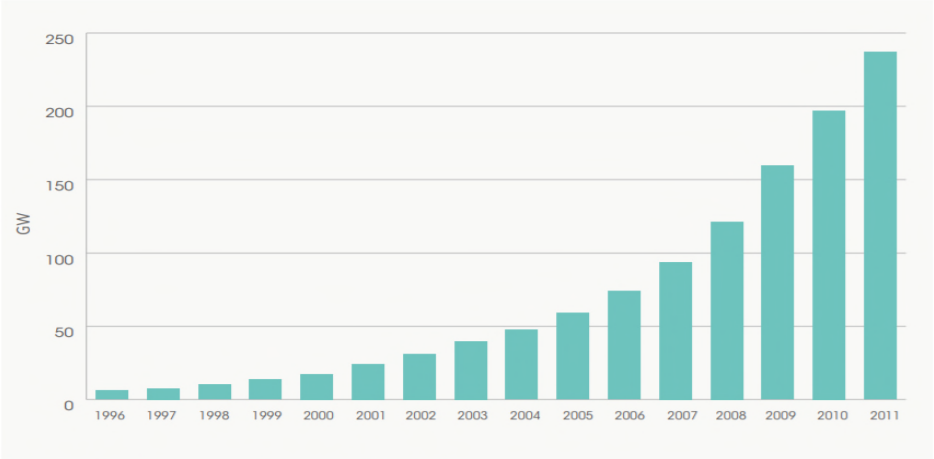


FIGURE 3.1: GLOBAL INSTALLED WIND POWER CAPACITY, 1996 TO 2011

Figure 3.1 borrowed from IRENA report, 2012.

Russell Gold (2018) refers in his article to Tony Clark, a former member of the Federal Energy Regulatory Comission, stating “It is just easier to get renewables built. There is that much less opposition to it.”

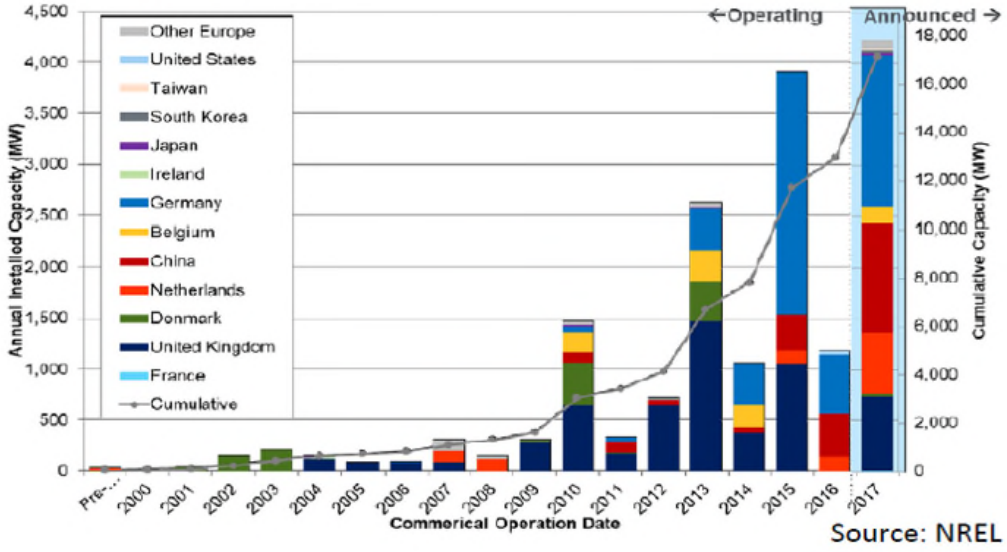


Figure borrowed from internal NOV report showing installed capacity.

Although technology development in the industry has been escalating as fast as the industry itself, one of the main challenges is still the installation cost of the wind mills. In order to install more deep-water offshore wind mills the industry need more robust turbines. The installation of those is even more important staring from loading on to the heavy-lift vessel, bringing it offshore and installing the blades. NOV has come up with the tool that can potentially reduce the installation cost of the blades. This thesis will look into which business model is most suitable for implementing the tool in to the market.

Business model are often explained as the way a company "does business" (Amit & Zott, 2012). By this explanation we can say that the business model concept has been around for as long as businesses. In fact, any business has a business model. What varies is companies' awareness of and use of the business model in the making of strategic decisions and everyday life of the firm (Teece, 2010).
Research and studies in the field increased substantially with the advent of the internet (Amit & Zott, 2001). The emergence of e-business not only created the possibility for businesses and business models, it also changed the way existing companies do their business and communicate with customers, suppliers, internally and the rest of the world.

In this thesis you will read about what business models are and the elements that a business model includes. In general term we can say that any business model has an external perspective

and an internal perspective. The internal possibilities that lay within the organization will influence the external possibilities and vice versa. Working on and evaluating possible business models will give the company possibility to bridge these two perspectives and form a basis for strategic decisions.

Since NOV is entering new market it is important to perform a thorough analysis of the risks prior to investing in business opportunities.

Business Models

A business model can be a description of how value is created within an organization. It can however in practice be much more than that. For instance, it can be used as a tool for managers to understand the link between value creation and value capture. It can be also used as a qualitative indicator to portray company's potential to create value. Business models are vital in attracting attention of investors, and past examples has showed that badly developed business models can stop companies finding investors and realize their business idea (Loock, 2012). For innovation business model and strategic considerations when introducing a new product in a market are crucial. These decisions can determine the success or failure of the product.

In this chapter we will give the reader an overview of what the business model is, research in this field and how they are used as strategic tools.

The business model as a strategic tool

Business model is often confused with strategy. Casadesus-Masanell and Ricart (2012) criticizes there is a lack of clear distinction between the two, and what they refer to as tactics. While strategy can be defined as: "A firm's theory about how to compete successfully" (Peng, 2014), "the business model is a tool for strategy success, hence the business model is an important strategic task" (Knutsen & Flaaten, 2015). By the words of Casadesus_Masanell and Ricart (2010) "a business model, we argue, is a reflection of the firm's realized strategy."

Definitions

Even though the term business model has been widely used in articles, books and publications since at least the mid-1900s, researchers has not been able to agree on one common definition. A study by Zott, Amit and Massa (2011) that included 103 publications on the concept of business model showed that; more than a third of these publications discussing the concept, lacked an explicit definition of what a business model actually is.

The term is widely used as an explanation, a notion or a reference. Despite the lack of a common definition, scholars and researchers seem to agree that business models answer questions of how to do business. How do we, as an organization, do things? Most definitions also seem to include the word value and give the notion that there is a result or goal that in most cases is profit.

We have listed a few of the many definitions we have found in current literature. Osterwalder and Pigneur (2010) defines business model: “A business model describes the rationale of how an organization creates, delivers and captures value.” While Baden-Fuller, Macmillian, Demil and Lecocq defines it as “the logic of the firm, the way it operates and how it creates value for its stakeholders (Casadesus-Masanell & Ricart, 2010).
Teece (2010) on the other hand is placing the customer in this context. He explains it as “The essence of a business model is in defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit.”

In 2006, Morris, Schundehutte, Richarson and Allen, differentiated the definitions of business model, based on their principal emphasis, into three categories: economical, operational and strategic. Placed in a hierarchy the economic perspective was the lowest level. Next was the operational level. This level emphasized on key elements they called “the building blocks of the organization (Morris et.al, 2006). These building blocks were focused internally on processes, infrastructure and resources, whilst the external perspective was captured in the highest level, the strategic (Morris et.al, 2006).

The elements of the business model

Lacking a common definition of the term, several researchers explains the business model by investigating the different elements or components. Casadesus-Masanell & Ricart (2010) argues that just knowing the different components of the business model is not enough, understanding their relationships is crucial. Early publications and research in the field has been criticized for acknowledging the relationship but giving little understanding of how these elements are inter-dependent (Morris, et.al, 2006).
Casadesus-Masanell and Ricart (2010) argues that the business model really consists of only two sets of elements: “(a) the concreate *choices* made by management about how the organization must operate, and (b) the *consequences* of these choices” (Casadesus-Masanell & Ricart (2010). Strategic, economic, organizational choices made by a firm all have consequences that will open or limit the possibilities for the next choice. In their example they use the case of Ryan Air and how their choice to compete on low price tickets had consequences for bargaining power, choice of airports, volume and more.

While Teece (2010) on the other hand emphasis on business model design and how this consist of these six ingredients that circles and determine how the company create and capture value.

1. Select technologies and features to be embedded in the product/service
2. Determine benefit to the customer form consuming/using the product/service
3. Identify market segments to be targeted
4. Confirm available revenue streams
5. Design mechanisms to create value
6. Design mechanisms to capture value

Morris, Schindehutte, Richardson and Allen (2006) decomposed the business models' key components into an even more detailed framework that "reflects a strategic level perspective on the business model" (Morris el. al, 2006) illustrated in figure 2, p. 13.

Component one: ***(factors related to the offering)***

How do we create value? (select 1 from each set)

- offering: primarily products/primarily services/heavy mix
- offering: standardized/some customization/high customization
- offering: broad line/medium breadth/narrow line
- offering: access to product/ product itself/product bundled with other firm's product/service
- offering: internal manufacturing or service delivery/outsourcing/licensing/reselling/value added reselling
- offering: direct distribution/indirect distribution (if indirect: single or multi-channel)

Component two: ***(market factors)***

Who do we create value for? (select 1 from each set)

- type of organization: B2B/B2C/both/other
- local/regional/national/international
- where customer is in value chain: upstream supplier/downstream supplier/government/ institutional/wholesaler/ retailer/service provider
- broad or general market/niche market
- transactional/relational

Component three: ***(internal capability factors)***

What is our source of competence/advantage? (select those that apply)

- production/operating systems
- selling/marketing
- information management/mining/info. packaging
- technology/R&D/creative or innovative capability/intellectual
- financial transactions/arbitrage
- supply chain management
- networking/resource leveraging

Component four: ***(competitive strategy factors)***

How do we differentiate ourselves? (select those that apply)

- image of operational excellence/consistency/dependability
- product or service quality/selection/features/availability
- innovation leadership
- low cost/efficiency
- intimate customer relationship/experience

Component five: ***(economic factors)***

How Can We Make Money? (select 1 from each set)

- pricing & revenue sources: fixed/mixed/flexible
- operating leverage: high/med/low
- volumes: high/med/low
- margins: high/med/low

Component six: ***(personal/investor factors)***

What are our time, scope and size ambitions? (select 1)

- subsistence model
- income model
- growth model
- speculative model

Figure 1, borrowed from Journal of Small Business Strategy, vol. 17, 1, Morris el al. 2006.

The Canvas

In the book "Business Model Generation" Osterwalder and Pigneur describe nine basic building blocks or elements that represents economic, operational and strategic choices that need to be made for the company to be able to achieve business success. Together they represent the canvas that forms the basis of the business model. The block are as follows:

Customer segments

Deciding on which customer segments to serve and which segments to ignore of one of the basic strategic decisions an organization must make. This decision forms a basis for how the business model can be designed to meet customer's needs (Osterwalder & Pigneur, 2010).

Value Propositions

The value proposition building block represents the value part of the business model. Any company offering one or several products to a customer segment needs to investigate how to create value. A product can meet a specific customer need, it can solve a problem, insure increase of income or create new customer needs, all of these are examples of creating value (Osterwalder & Pigneur, 2010).

Channels

This block describes how to communicate with the Customer Segments to deliver a Value Proposition, through five distinct channel phases: 1. Awareness, 2. Evaluation, 3. Purchase, 4 Delivery and 5. After Sales (Osterwalder & Pigneur, 2010). All phases that should be commonly known in any organization.

Customer Relationships

Through these channels Customer Relationships are formed. An organization should make a conscious decision how Customer Relationships is formed and maintained through the different channel phases. Typical questions to answer could be: What type of relationship does the customer expect? How do we maintain them? "Which ones have we established? How costly are they?" (Osterwalder & Pigneur, 2010).

Revenues Streams

The revenue is the generated cash. Osterwalder and Pigneur (2010) describes several ways to generate cash or Revenue Streams. These are divided in two main categories:

1. One-time payment transactions, like asset sale
2. Recurring revenue from ongoing payments, exemplified by usage fee, subscriptions fees, renting/leasing or licensing.

Another important factor that can influence the revenue generated is the pricing mechanism. Whether the company choose a fixed pricing menu, like list price or product feature dependent pricing, or a dynamic pricing strategy, like marked pricing or negotiations, this choice can make a big difference on revenue (Osterwalder & Pigneur, 2010)

Key Resources

The Key Resources building block is essential to every business model as these resources are what the company needs to be capable to move through the other building blocks and offer value to a customer segment. In other words, the Key Resources are the most important resources needed to perform the activities in the value chain.

Buildings, facilities, machines are physical resources that typically requiring investment, by the company, often capital-intensive (Osterwalder & Pigneur, 2010). Any business model relying on large investment key physical assets needs to make sure return on investment is feasible. Other factors that needs to be accounted for are whether the investments are representing cost that are reversable or irreversible.

Intellectual resources are associated with the brand, the reputation of the company or the product. It is also resources associated with intellectual property. Innovations can typically be protected by patents or copyrights. Later in this chapter we will explain to Profiting from Innovations by Teece (1986), and how analyzing the innovations appropriability regime is one of the three key elements to succeeding in commercializing innovations. Osterwalder and Pigneur (2010) also list human and financial resources as categories of the Key Resources.

Key Activities

"Like Key Resources, they are required to create and offer value Proposition, reach markets, maintain Customer Relationships, and earn revenues" (Osterwalder & Pigneur, 2010). Finding the activities that add the most value is an important strategic task. First step is to identify the main activities and place them into the value chain. The value chain is split between the primary activities, that have a direct association with the product, and support activities, that provides the necessary support needed to perform the primary activities. Analyzing the value chain can be done for many reasons. One reason can be to make the organization aware as to whether

they have the resources they need to perform the activities (Peng, 2014), another reason to assess which activities that needs to be performed in-house and which can be outsourced and third to simply provide the knowledge of which activities add value.

Key Partnerships

Osterwalder and Pigneur (2010) lists optimizing the business model, reduce risk and resource acquisition as reasons for why companies create alliances or partnerships. The Key Partnerships building block represents the network needed to be able to provide the Value Proposition, through the Channels, the relationships to the Customer Segments. It can be suppliers of Key Resources, Key Activities, Joint Ventures, in general any partner needed to make the business model work (Osterwalder & Pigneur, 2010).

Cost Structure

Any company and business model should focus on minimizing cost in every part of their processes, But, as Oderwalder and Pigneur 2010) points out, cost structures are often divided in two main groups: the cost driven, and the value driven. In any of the two, the Cost structure should be tied together with the other eight building blocks. A study done by Moritz Loock (2012) tried to identify what business model is more attractive for investors within renewable energy. 249 investor managers were picked out where most of those were interested in investing in solar and wind technologies. Conjoint analysis was used as a research method. “Conjoint analysis asks for choices with binary dependent variables that indicate whether respondents would choose or not choose one of the least two presented alternatives” (Loock, 2012). The investors were asked to choose between business models focusing on three different value propositions: innovativeness, sales capabilities and cost reduction. The results showed that investors preferred to invest to business models focusing on technology and service above low price. The cost structure for this marked segment should be value driven, to best be able to meet the customer’s needs.

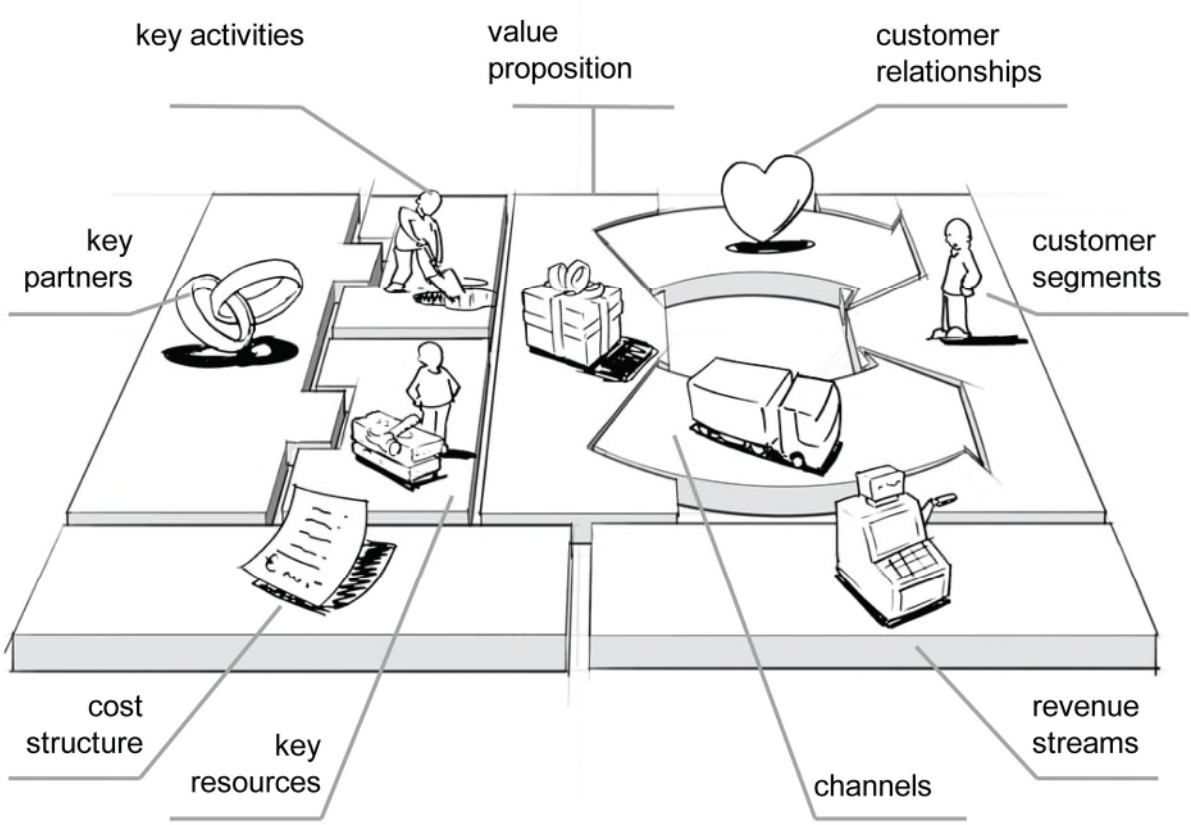


Figure 2, borrowed from Business Model Generation (Oderwalder & Pigneur, 2010) gives an overview of the interaction between the different building blocks described below.

In any of the different examples above, and whether the business model consists of six or nine elements, if it's a framework or a canvas, they all seem to agree with Casadesus-Masanell and Ricart that these are choices and they are interrelated by the consequences each choice has for the rest of the elements. Johnston, Christensen and Kagermann (2008) defined business models as consisting of four interlocking elements, not too different to the nine-block model of Ostewalder and Pigneur. The four elements are Customer value proposition (CVP), Profit Formula, Key resource and Key processes, but they emphasis on the importance of the first element. When showing these elements in a visual model, the last three elements are internally linked and grouped together before linked to the Customer value proposition (Johnston et. Al, 2008). They say that every successful business is operating by means of a business model already and by investigating and understanding the three elements "executives can understand how the model fulfills a potent value proposition in a profitable way" (Johnston et. Al, 2008).

The value of Value Chain

As mentioned earlier, a common word in describing and defining business model is value. Porter (1985) defines value as:" the amount buyers are willing to pay for what a firm provides them" (Porter, 1985). In this view value is an economic term. "Value is measured by total revenue" (Porter, 1985).

In our view, value can also be measured in other terms. Time can be a value, in the sense that a product or service can save customer/consumer time. Origin can be a value, some customers value or even require goods to have a certain geographic origin. Schumpeter was a pioneer in theory of value creation. In his view innovation was the source of value creation and economic development (Amit & Zott, 2001). Even reputation or status can be a value. For Products in retail a labels status or reputation within a customer segment can influence customer decisions. In other words: value is the factor that tips the scale: what makes the customer choose to buy this product instead of one by a competitor, or to buy a product at all.

The firm value chain was introduced by Porters (1985) Value Chain Analysis in the book Competitive Advantage. By breaking the business down by activities rather than departments, Porters analysis helps the firm identify how each activity creates value for its customers. The primary activities are the ones that are directly associated to the product, like research and development, production and distribution. The support activities are activities that add value only by assisting the primary activities. Even if the model was meant for value analysis in the economic term (Foss & Saebi, 2015) it can be adapted to a broader view if value as described above. The added value is what leads to competitive advantage, in Porters view. The value chain analysis, will help examine the firm's activities to see which and how the value flow across activities and adds to the value proposition for the customer, is central to the business model.

Also central is "the value chain and how it fits into the industry value chain" (Morris el. al, 2006). Only by understanding its environment can the company fully place their product or service into the value system and assess if their product or service adds value to the customer.

Business Model Types

One could argue that there are as many business models as there are businesses. Lack of a common definition and consensus of how to build a business model and the varieties within each element of the business model is so vast, it makes trying to classify business models difficult.

Even tough every business model is unique, scholars have tried to investigate characteristics in businesses that show similarities. Osterwalder and Pigneur (2010) describe these similarities by business model patterns and explain categories of businesses.

Unbundling business models focus on separating businesses within companies because the focus of each business type is different and can conflict with each other. This business model separates the three core business types: Product Innovation, Customer relationships management and Infrastructure management.

Long Tail business models focus on a high number of products, selling in low volumes. Multi-sided business models create value by facilitating interactions between interdependent groups of customers.

Baden-Fuller and Morgan (2010) investigate the notion of business models being used as model in their article “Business Models as Models”. As models they divide the concept of models in to two types:

- scale models being copies, scaled down versions of things, only capturing certain details of the actual real thing, and
- role models being, ideal models for the market to copy.

The basis is the notion that business models in discussions are both linked to actual firm, ex. the Netflix or Ryan Air business models, and to descriptions of ways to do business, ex. the low-cost airline model or the franchise model. In their argument, business models can be used as both role models and as scale models.

Either way, business models are not defined in a list where businesses can choose how they want to play, instead scholars and researchers emphasizes on giving companies the tools they need to build their own unique business model.

Evolution

In the modern world with fast growing technological development, quickly changing social trends and customer choices being strongly affected by that, modern companies are forced to adjust their business models accordingly (Gorevaya & Khayrullina, 2015). Therefore, one can argue that businesses and industries tend to change over time, adjusting their business models along the way. The transformation of business models is used by modern companies to increase efficiency, profit and attract new customers. Such transformation is done through outsourcing, reorganization, new types of services and products. Drucker and Forrester (1958) highlight two dimensions of business models: operational and dynamic.

Operational dimension refers how a firm conducts business. It describes what product or service a company chooses and how it delivers it to the customer in order to generate value. Several theories suggest that a combination of certain activities within a firm can help reducing transaction costs. Technological innovation leads to restructuring of industries and new types of business collaborations, thus new types of business models. It is important to look at business models at "ecosystem level" looking at which external factors influence them and how various firms symbiotically co-exist in the industry effecting each other's future structure (Fjelstad & Snow, 2017, p.33).

Dynamic dimension portrays how firms change over time and emphasizes the importance "to redesign an organization and its policies so that it stands a better chance of success" (Fjelstad & Snow, 2017, p.34). Successful organization adjust their operating elements to be more competitive in new industry conditions. Miles and Snow (1978) discuss life cycle of organization as "adaptive cycle" in which firms solve entrepreneurial problem of product/market positioning, the engineering problem of activities and resource configuration, and the administrative problem of balancing exploration and exploitation" (Fjelstad & Snow, 2017, p.34).

Gorevaya & Khayrullina (2015) uses descriptions similar to the patterns described above to outline five decisions companies tend to make to adjust their business models to industry transformation:

- Separation – this business models includes dividing business into several segments, where resources of the company are being shared for production, but the company offers several completely different types of product. Example can be ZARA, which has two segments: clothing line and household/interior products.

- "Long tail" – a model which show a long trail of business which starts with one types of product and they develops into something completely different. For instance, a forum for mothers which is being transformed into platform for selling used baby clothes, which later also suggest various baby products.
- Multilateral platforms – companies which gather database on customers through various surveys and can then earn profit if other companies want to use this database for their researches.
- FREE – a customer is being attracted by getting a product for free, for example upload I game via app on the phone, has to then pay later on for additional functions or to continue using the game.
- Open platforms – platforms used for gathering professionals within an industry to share experiences or working on developing one product. It can also be gathering place for several companies.

In the article "Flexible business models" Mason and Mouzas (2012) look at a market-focused approach and a network-focused approach, and how combining both helps firms to come up with flexible business models in order to tackle market changing conditions. The former shows that a firm can adjust to market demand, the latter portrays how companies change their traditional supply-demand relations into "web of interconnected companies whose identities and relationships matter" (Mason & Mouzas, 2012, p.1343).

The theorists also study Webster's Business Model Architecture. He outlines three main types of relationships within an industry: transactional relationships, network influence and corporate ownership (Mason & Mouzas, 2012). These relationships help companies being more competitive in new market conditions through three main variables:

- customer orientation (focus is on customers; their needs and satisfaction are measured; large focus area is also after-market service)
- competitor orientation (focus on competitors and their strategies; the company responds quickly to competitors' steps on the market)
- inter-functional coordination (still focus on customer, but business is divided into several functions which contribute to serving the market needs; managers have clear understanding of how they can contribute to achieving the targets)

Business Model & Innovation

David J. Teece is one of the major scholars in the field of researching how companies can profit from innovation. Teece proclaims that "When executives think of innovation, they all too often neglect the proper analysis and development of business models which can translate technical success into commercial success. Good business model design and implementation, coupled with careful strategic analysis, are necessary for technological innovation to succeed commercially: otherwise, even creative companies will flounder (Teece, 2010, p.184.).

Profiting from Innovation

The framework for "Profiting from Innovation" (Teece, 1986) explained how outcome of innovation and competitive advantage was decided by the appropriability regime, the dominant design paradigm and the complementary assets.

The appropriability regime can simplified be explained as how the innovation is protected, from imitations. This protection can be related to the complexity of the technology itself or legal instruments as patents, copyrights (Teece, 1986). The dominant design paradigm is related to timing. In the preparadigmatic stage the innovation is so new it has not yet been scientifically accepted, when the innovation has reached the paradigmatic phase (Teece, 1986).

The third and very important block, the complementary assets, is a collective term for all assets needed for commercialization of an innovation that is not directly associated with the innovation itself (Teece 1986). Sales, marketing, manufacturing, distribution are typical examples of complementary assets of a technological innovation product.

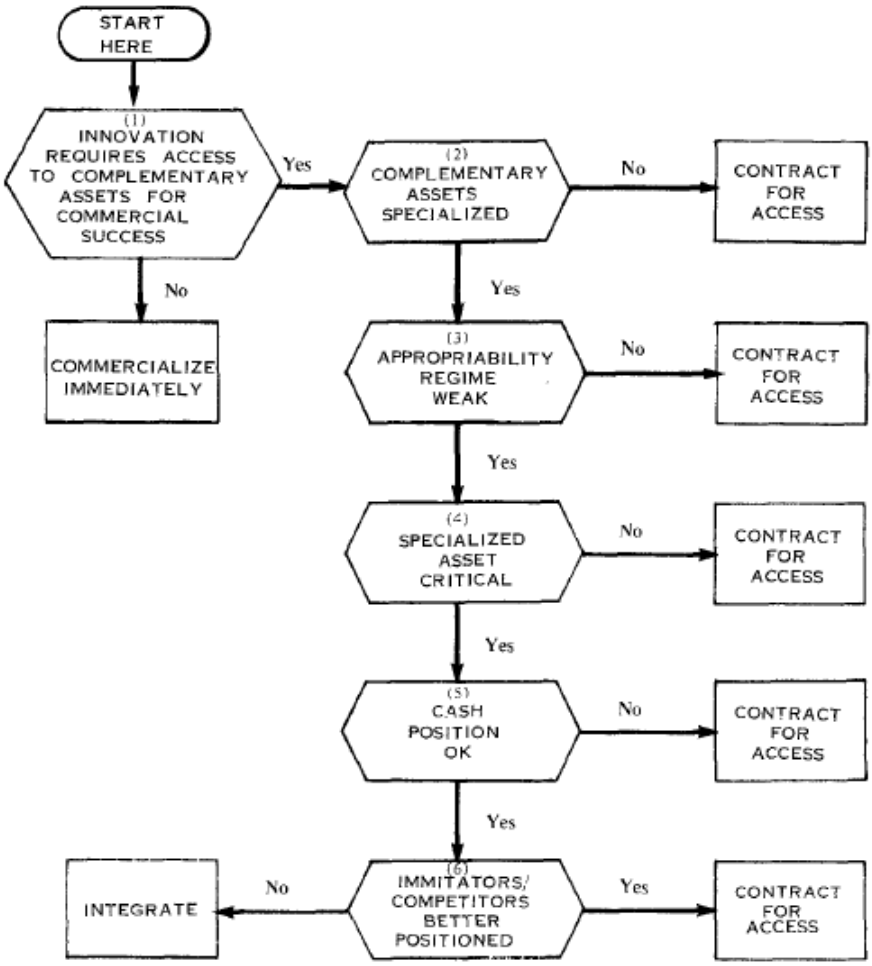
The complementary assets are differentiated by the dependence between the asset and the innovation. Generic assets require no form of specialization in relation to the innovation. Specialized assets have a unilateral dependence, while cospecialized asset are co-dependent on the innovation and there is a bilateral dependence (Teece, 1986).

These noncore assets that complement and support the core asset (Peng, 2014), consideration of design paradigm and ability to protect the technological property; this commercialization strategy (Teece, 2010) will in Teece's view determine the economic success or failure of the innovation.

The innovation commercialization strategy has strong links to the business model. The profiting from innovation framework doesn't provide a list of possible outcomes, it provides a frame

where companies can evaluate their available resources, their value chain that will help determine business model. At one extreme is the integrated business model where the firm takes responsibility for the entire value chain (Teece, 2010) both primary and support activities. The other extreme is outsourcing based on pure licensing (Teece, 2010), a model that will require a very tight regime of appropriability. In between these are the many hybrids that serves a combination of the two extreme approaches.
In the perspective of the value chain the complementary assets are linked to decision regarding organizations activities, in-house activities and outsourcing. Over the past thirty years the concept of outsourcing has been developing because of changes within the technology sector. Activities that previously were viewed as specialized are now considered generic and can be shared among companies and industries (Peng, 2014).

Teece (1986) emphasize on how assessing access to complementary assets can be critical in planning to commercialize innovation to avoid the situation where innovation companies or parties will need to give away large shares of profits to the owners of the complementary assets. The following flow chart (figure 4) borrowed from the article “Profiting from Innovation” (Teece, 1986, p. 296) shows decisions for accessing assets can be made through contractual modes or by integration.


START HERE
(1) INNOVATION REQUIRES ACCESS TO COMPLEMENTARY ASSETS FOR COMMERCIAL SUCCESS
Yes
No
COMMERCIALIZE IMMEDIATELY
(2) COMPLEMENTARY ASSETS SPECIALIZED
No
CONTRACT FOR ACCESS
Yes
(3) APPROPRIABILITY REGIME WEAK
No
CONTRACT FOR ACCESS
Yes
(4) SPECIALIZED ASSET CRITICAL
No
CONTRACT FOR ACCESS
Yes
(5) CASH POSITION OK
No
CONTRACT FOR ACCESS
Yes
(6) IMMITATORS/ COMPETITORS BETTER POSITIONED
No
INTEGRATE
Yes
CONTRACT FOR ACCESS

Method

The fact that wind offshore market is quite new for world economy, there is little literature and industry analysis to be found in comparison to oil industry, for example, that has been present for many hundred years and has been through several development cycle. Offshore wind industry is a "fresher" in world economy and only recently the focus on development and research has increased as the world leaders have become more aware of the huge importance of finding alternative sources of energy.

The method chosen for this thesis is of empirical character: we have looked into research and relevant literature, analyzed market reports, financial data and prognoses created by NOV sales team, looked into potential risks and best suitable business models. A large focus has been made on looking into theories and research that has been performed by others, analyzing it and seeing if it can be relevant for NOV. As a result of that we have gained a considerable understanding of the market, complexity of customer relations, risks, possibilities and have pointed out several business models that can be most relevant and profitable for NOV.

Johannessen, Christoffersen and Tufte (2011) argue that theoretical framework and empirical data go hand in hand in case of empirical research. Theories that are not supported by empirical research are just speculations, while empirical research without theoretical support can be viewed as too simplified. In order to conduct a good research, Johannessen et al (2011) strongly suggests combining theory and empirical analysis.

He points out two ways:

- From theory to empirical research – "deductive" method and consists of changing the view from general to specific, where general hypothesis is being tested out by empirical data.
- From empirical research to theory – "inductive" method and consists of drawing out conclusions from something specific to more general view.

Our method can therefore be characterized as deductive, where we looked at several general business models, market reports and customer groups within the industry, and through analysis of data have come up with a more specific focus on certain business models and potential customers that can be most relevant for our product.

Johannesen et al (2011) also points out several aims with conducting a research. Depending what goal is to be achieved, the researcher will have a certain angle of data gathering and analysis.

The aim with this research was to look into potential business models that will best suit NOV and its product. However, our research has covered most of those mentioned by Johannesen et al:

- To describe (we described the wind market industry and challenges its facing for future development and expansion)
- To understand (we analyzed data and market reports)
- To predict (we predicted what customer segments and business models would be most interested in our product – that was the main goal for research)
- To evaluate (we evaluated various business models and pointed out most and least relevant for NOV)
- To give foundation for decision taking (the analysis provided the foundation for what business model would be most profitable)
- To change (Robert Rappoport (1970) calls this "action research", where a researcher comes up with potential action points for defined problem solution. That is not relevant for this thesis but can be the next stage for future research – to look in to how NOV as organization should be structurally changed in order to get most profit from the chosen business model)
- To point out gaps (gaps that should be removed to achieve best profit when using suggested business model. We have named several challenges that we face when going for rental or sales' model but have not discussed the gaps in organization in depth, which can also be looked into at further research around the subject).

This master thesis is based on qualitative data. Johannessen et al (2011) describes this type of data that cannot be counted into categories in a straight forward way that quantitative data does. Gathering of qualitative data is described by Cato Wadel (1991) as "dance between theory/hypothesis, method and data" – a process where a researcher changes method of data gathering and moves away from the methods that were chosen in the beginning. Then new theoretical concepts are created. These concepts lead to change of theories and hypothesis. The change of theories leads to change of topic, focus and angle of research. This is very relevant to this thesis. As we continued with gathering qualitative data, we have moved from several

eventual business models to concentrating on two main models: rental and sales as it appeared to be more relevant for NOV according to the data gathered around other business models.

Qualitative data is often described as more “in-depth” research that provide comprehensive understanding of the problem and looks into correlation between several concepts. It is often criticized for not providing the “hard facts” and numbers but can be a good foundation problem solving/concept formulation prior to collecting quantitative date. There is a big difference between hard and soft data. Qualitative data is normally defined by soft data and can be described as form for data collected in text forms, interviews and film fragments (Johannessen et al 2011).

Johannesen et al (2011) suggest evaluation of qualitative through reliability, validity and objectivity. Reliability is critical in quantitative methods. However, within qualitative research it is less applicable as the data gatherings techniques are less structured. In order to increase reliability, it is suggested to rather provide a detailed description of context and the way research has been conducted and analyzed.
In order to find how valid, the research is one has to ask “Do we measure what we think we measure?”. Researcher should look into if there is a “bridge” between the data collected and the subject of research. Qualitative data is often criticized for being biased. Is it argued that due to the lack of hard facts and number the researcher has more freedom to mention mostly the findings and data that supports his/her view on the research question, while the facts contradicting it tend to be left out. In order to increase validity, it is suggested to use “method triangulation” where several research methods are used, for example both interview and observation (Johannessen et al, 2011, p. 247)

It is important that researcher brings unique perspective into the research, but it is even more important that it is not based on researcher’s subjective opinion. Therefore, in order to increase objectivity, one should make sure to mention all the facts gathered no matter if they support the researcher’s assumption or not. The reader should be able to see all specter of research findings and form his/her opinion based on that (Johannessen et al, 2011).

Company Introduction

To give the reader some background we will give a short presentation of the company National Oilwell Varco L.P (NOV), the history of the company, some of the challenges this company face and the tool for blade installation NOV wants to introduce.

National Oilwell Varco L.P

National Oilwell Varco L.P is one of the key players in the market among numerous suppliers of oil drilling equipment. Through the three segments: Rig Technologies, Wellbore Technologies and Completion & Production Solutions the company operates at 1200 locations in Africa, Americas, Asia, Europe and Middle East. Cutting edge technology and high quality makes NOV leading supplier of drilling equipment within the oil and gas sector. In the company's 150 years of history mergers and acquisitions has played a major role in their success. Acquiring sub-suppliers to control all types of deliveries and sub-deliveries, ensuring a strong supply chain allows them to score high on quality and on-time delivery. Today National Oilwell Varco delivers equipment to all parts of the oil and gas value chain, both onshore and offshore.

Challenges

It is a well-known fact that oil industry is cycle-based. Several external factors influence the industry, such as world's economy, politics and general market demand that have been a huge stopping factor for the company. Such external factors have put the company in crisis mode several times, most recently in the oil crisis the world is facing now.

The sudden drop in oil price, oil companies' lack of investments and changes in production and demand in recent years has greatly affected companies' worlds wide. Companies all over the globe, directly or indirectly associated with the oil industry, has been affected. As a result, we have seen major changes in the industry. Major cost saving initiatives has been initiated and many organizations has changed. As an example, National Oilwell Varco downsized from 82.000 to 44.000 employees in a period of two years.

Times of crisis often turns to a need for change. Even though the cycle will turn the market around eventually and the need for oil most likely will continue to grow, National Oilwell Varco is now looking towards different segments in the energy market. With the vast experience of

delivering equipment to offshore installations in the oil and gas industry, the company is now looking at the possibility of utilizing this experience to be part of the growing industry of Offshore Wind.

Lifting and Handling

Lifting and Handling (L&H) is a part of the Marine and Construction business unit in the Rig Technologies segment. Their core products are cranes and winches, and the business is concentrated on the production and construction markets. As this business unit is creating the tool this case is based, this master thesis will focus on the L&H business unit.

NOV and Offshore Wind

Offshore Wind is a completely new market for National Oilwell Varco, and for the business unit L&H. As part of the L&H strategy statement their expressed goal is to be among the top two players in target markets. Offshore wind being the first target in renewable energy, but strategy is not limited to offshore wind alone. The hope is that the newly developed product can open new doors where National Oilwell Varco potentially can earn profit independently of oil market variations. The statement furthermore emphasis on the technology, how this will add value to the customer through competitive advantage, and how flexibility in terms of revenue streams supports the goal for market position.

Blade Installation Tool

The Blade installation tool is the concept relevant for this thesis. Technologically the tool is still in a concept phase. NOV has launched an NPD (New Product Development) project and there are combined effort investigating technological, conceptual and organizational opportunities. The purpose of the tool is to make installation of blades to windmills for offshore installations safer, more time and cost efficient. The tool itself will be placed on the upper part of the tower onshore, holding the blades during transportation. Once the tower is installed offshore, the tool will start installing the blades to the nacelle one by one in the final position. The tool consists of three main parts:

1. Interface to tower (to be permanent and pre-installed)
2. Hydraulic tool (generic, can be used several times on several types of foundations and blades)

3. Gripper (expected to be specific to blade design)

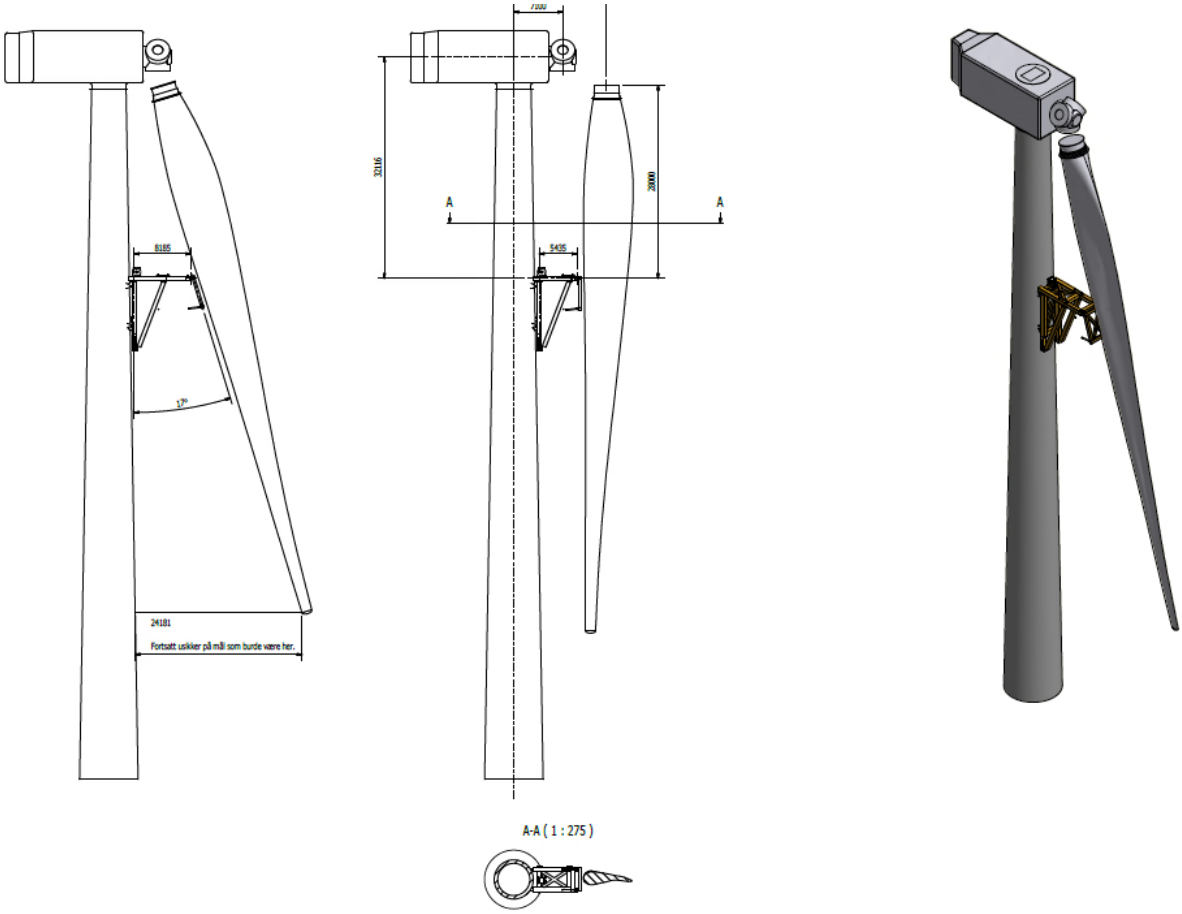


Figure 5 is showing the Blade Installation tool mounted on a typical turbine mast.

The Canvas

In this chapter we will outline the varieties in the nine building blocks using the Canvas presented by Oderwalder and Pigneur in the book "*Business Model Generation: A handbook for Visionaries, Game Changers, and Challengers*" (2010). We will look at what value NOV can deliver to their customers by introduction the new tool in the market and list the different customer segments that are available. We will explain different channels to reach the customer segments and how to maintain the customer relationships. The focus will be on identifying possible solutions for revenue stream; asset sale, renting/leasing or a hybrid solution combining the two.

We will identify the key activities by evaluating added value through the Value chain, the key resources needed to perform these activities, and last look at cost structure and key partnerships. The purpose if this chapter is to present the gathered data organized in nine blocks, to present the reader with external possibilities and internal possibilities and limitations. The analysis of these possibilities and the discussion is presented in the discussions chapter.

Value Proposition

«..the bundle of products and services that create value for a specific Customer Segment." (Osterwalder & Pigneur, 2010, p. 22)

Before evaluating how the installation tool can add value to the customers we will look at some of the challenges these customers face in the Offshore Wind market today.

Offshore Wind

Wind is a natural abundant resource and the potential for utilizing this resource for generating energy is exceptional. It is expected that the demand for renewable energy will only be growing in the future. Several reports, papers and studies are pointing in the same direction:

"The worldwide demand for renewable energy is increasing rapidly because of the climate problem, and also because oil resources are limited". (Breton & Moe, 2009)

"Nowadays, serious energy crisis and environmental pollution have forced people and governments throughout the world to look for sustainable alternative sources of energy". (Sun, Huang & Wu, 2011)

“EU’s demanding targets for renewable energy – 20% of final energy demand is intended to come from renewables by 2020”. (Green & Vasilakos, 2010)

“101 of the more than 570 cities on its books sourced at least 70% of their electricity from renewable sources in 2017, compared to 42 in 2015”. (Hunt, 2018)

Governments in all parts of the world are joining the effort to set the stage for a considerable climate change globally. In 2007 The European Union (EU) set the target that by year 2020 as much as 20% if energy consumption is to come from renewable energy sources. (Rodrigues, Restrepo, Kontos, Pinto & Bauer, 2015)

Wind power is considered a clean and renewable source of energy that will continue to expand in the years to come. Global Wind Energy Council report showed that in 2010 global wind installations supplied 2% of the global energy supply and the capacity was expected to increase by 160% by 2015. (Sun et al., 2012)

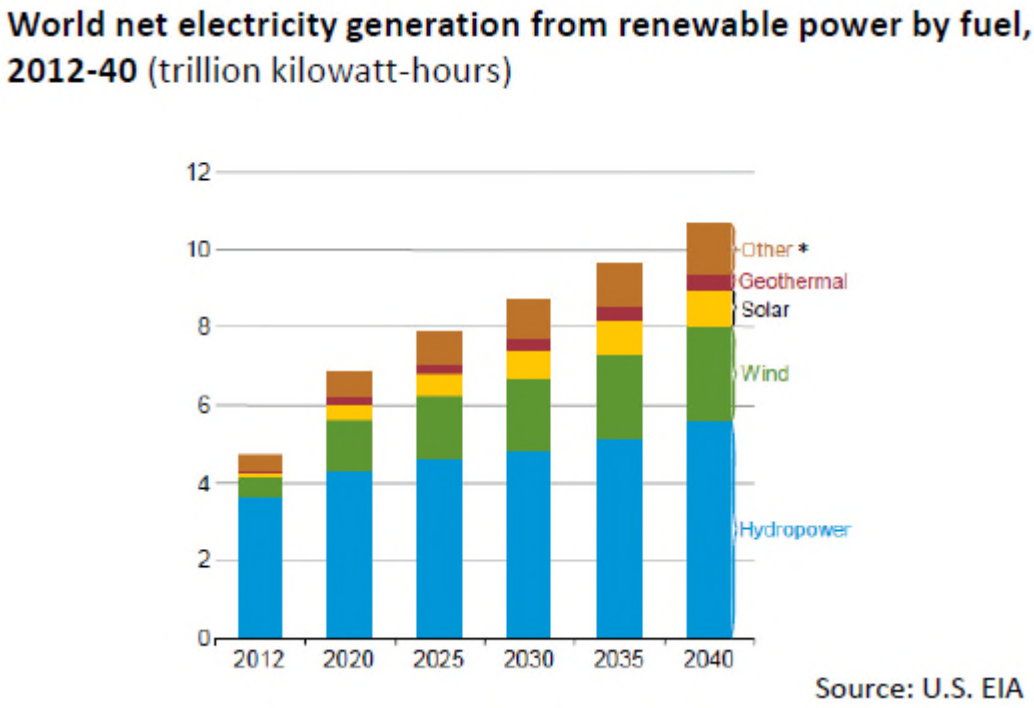


Figure 6 borrowed from U.S. EIA

As the wind energy industry expends in Europe, it is currently in a transition period of going from onshore installation towards higher investment into offshore. Densely populated areas in most countries make the onshore wind farms more difficult to build though installation process is much cheaper. Not having to consider space issues, noise regulations in residential areas (Sun et al., 2012) and the visual impact these installations have onshore (Breton& Moe, 2008) is contributing to offshore wind market competitiveness.

In moving the technology from land to offshore, Europe and especially Denmark was pioneers. The world first wind turbine was installed offshore in Sweden in 1990 (Sun el al.,2012) but the first offshore wind farm (OWF) was built in Vindeby in Denmark one year later (Breton & Moe, 2009).

In the early stages of this industry the criticism was that technology was not developed for offshore conditions, instead it was based on the technology and experience from onshore installations (Perveen, Kishor & Mohanty, 2013). For the initial projects the Capital Expenditures (CAPEX) were low, but highly dependent on the number of turbines installed (Rodrigues et al., 2015) as turbines and structure represented the biggest cost impacts.

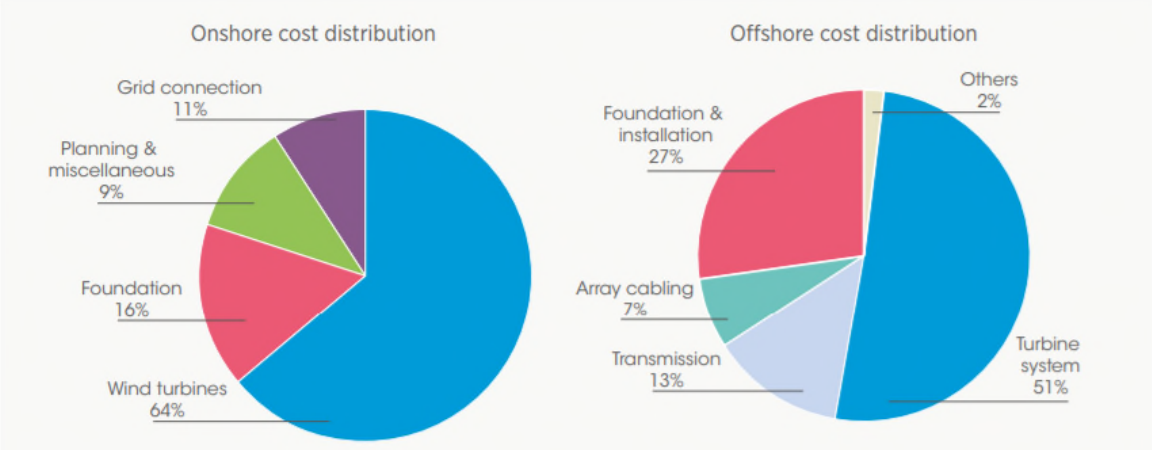


FIGURE 6.2: CAPITAL COST BREAKDOWNS FOR TYPICAL ONSHORE AND OFFSHORE WIND SYSTEMS

Source: Blanco, 2009.

Figure 7 borrowed from IRENA report, 2012.

As we can see from the figure above, the cost structure for onshore and offshore wind distribution is very different. The installation represents a much bigger cost in offshore. The report also shows offshore wind as being nearly twice as expensive as onshore.

Trends

Studies by NOV (Offshore Wind Report, 2016) showed that the average water depth of wind farm completed or partially completed in 2015 was 27,1 meters and average distance to shore was 43,3 km.

Wind turbines can be installed on a foundation placed on the sea bed. There are several types of foundations.

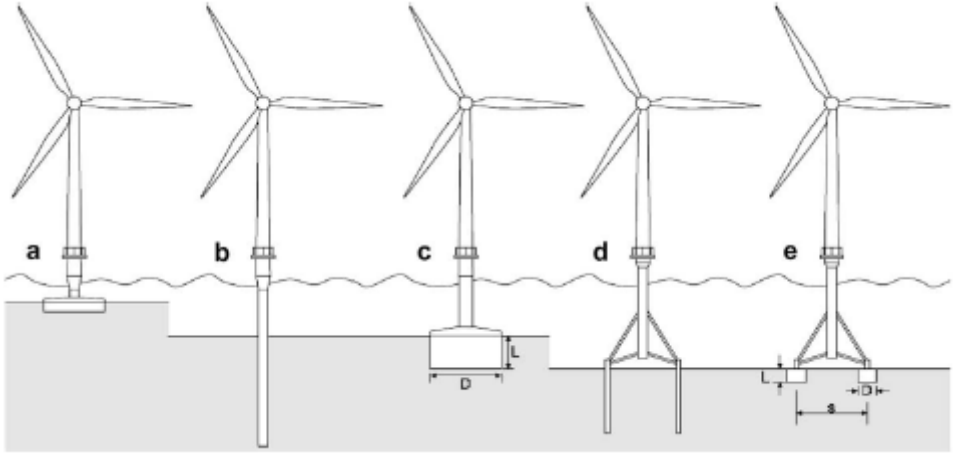


Figure 8, borrowed from Breton & Moe, *Renewable Energy, 34* (2009) show the different types of foundations available for shallow and transitional waters. a) Gravity based, b) monopile and c) suction caisson for shallow waters (0-30 meter) and d) jacket and e) suction piles for transitional waters (25-50 meter).

Rodrigues et al. (2015) lists and analyses the trends of offshore wind projects and the key characteristic is growth.

- Installed capacity is increasing
- Turbine capacity is growing
- Installation distance to shore and water depth is increasing.

These trends will require innovative technologies and approaches both to enable deployment and simultaneously to lower the cost of energy. Increasing water depth is influencing selection and design of substructure. There are already several prototypes of floating windfarms being tested worldwide. Increased distance to shore influence amount of subsea electrical cabling required,

current is moving from standard alternating current (AC) to high-voltage direct current (HVDC), construction, logistics and operations. All the above is associated with increase of cost.
To levelized the cost of energy the focus is on turbine scaling. Bigger and more reliable turbines will increase capacity with fewer installations and give higher possibilities for harvesting the stronger and smoother wind offshore.

Major Challenges

Although offshore wind energy is an attractive business concept it has its challenges. The need for offshore specific technology, material corrosion at sea (Breton & Moe, 2009), complex installation (Perween et al., 2014), access for maintenance and repair, availability of suitable vessels (Breton & Moe, 2009) are all mentioned in the last ten years.

The vast general opinion is that the main barrier preventing further deployment of offshore wind farms is the high cost (Sun et al.,2012). The extensive investment cost results in high cost of power, reducing offshore wind competitiveness compared to other sources of energy. And with market trending towards bigger, further, deeper above lead to capital expenditures rising, logistical challenges during construction and operations lead to operational expenditures rising, maintenance cost growing, and risk perceived by investors is increasing. (Rodrigues et al., 2015). Hopefully the solution to reduce cost of power and investment risk will emerge from the innovations in the field. “Although the industry is introducing many innovations, the largest driver of cost reduction is expected to come from increasing the rated power and power conversion efficiency of turbines. Fewer larger sized turbines minimize the balance-of-system requirements (i.e., less substructures and other infrastructure required to achieve the same project size). These larger machines do, however, require larger vessels and equipment, as well as enhanced logistical facilities to be enabled” (Wind Mapping Report, 2017, p.10).
I accordance with the trends bigger the turbines will need to be installed, thus bigger cranes will be required for installation.

Adding Value

Offshore Wind Report (2016) see opportunities for cost reduction in several areas. Number one is technological development in turbines, foundations and optimized soulutions for installation, operation and maintenance. Supply chain maturization and political support are other areas of opportunity for cost reduction. The report further showes that achieving fewer trips from port

to installation site, fewer maintenace trips per unit of installed capacity, reducing access dependency of weather conditions and ensuring healty & safety of workforce are all techincal and operations areas of focus for Offshore Wind Farm developers.

The intention of the installation tool developed by NOV is to increase safety, make installation process less weather dependent and save time, benefits that can also be of service during maintenance and repair operations. All these intentions can be value propositions for the potential customer segments.

Customer segments

"..defines the different groups of people or organizations an enterprise aim to reach and serve." (Osterwalder & Pigneur, 2010, p. 20)

David J. Teece writes that without thoroughly planned business models the companies will be unable to bring value no matter how great their innovation is for the consumers. To earn profits, companies need to succeed in business model design and understand customer needs as well as directions of technological developments. He states: "In essence, a business model embodies nothing less that the organizational and financial 'architecture' of a business" (Teece, 2010, 173).

To bring value to the customer and profit to the company, it is important to focus on customer segments as they are the ones we will be reaching out to. Canvas model describes customers as "the heart of any business model". In order to be able to reach out to the customers in the most effective way, companies tend to normally divide them into several groups with common interests, demands, expectation, behaviors, etc. An organization should decide on what customer segments to aim and what to ignore. Then focus on the ones chosen and actively work around their specific demands. For the Blade Installation Tool that means focusing not only on the key players of offshore wind marked but also on their specific need: to reduce installation cost. This is in line with prescription suggested by Teece (2010) above.

The Canvas describes several types of customer segments:

- Mass market
- Niche market (customers interested in very specific product)

- Segmented (divide customers into groups with very specific needs)
- Diversified (serves two unrelated customers groups)
- Multi-sided platforms (serves two or more interdependent customer segments)

Customer segment for our product is described as niche market since it focuses on a specific demand and interest for specific product. We will be looking into potential customers who are all interested in reducing installation cost for blade installation on turbines placed at wind farms. We will further on discuss some suggestions for potential customers at niche segment.
To identify the customer segments relevant for the Blade installation Tool we must look at the whole supply chain of the industry and examine operational flow, especially within installation process. This is due to our product targeting those steps within operations as potential cost saving.

The first relevant customer segment, the one controlling most steps within the supply chain, is the end-user. Those are the ones that own the wind farm, the main investors who decide which sub-contractors to choose for various parts of job. The end-user normally signs separate contracts for separate job types:

- Hires in EPIC to develop wind farm and perform the scope from finding the sub-contractor for building the wind turbines to arranging for aftermarket jobs.
- Finds sub-contractors that can perform the installation job on wind farms
- Arranges for party responsible to lay cables and connect them to the sub-station

Since the end-user chooses the different parties involved, it is in the position to influence how turbines designed and how they are installed. They normally end up with total cost for the whole project and should be interested in minimizing the installation cost as it is one of the most expensive parts of supply chain. If NOV manages to reach out to end customer and get their interest in the blade installation tool, they will at the same time be able to reach out to several sub-contractors and while having direct contract with the main investor and owners of the projects.

A typical installation process is done in several steps, illustrated below:

1. Port Logistics - turbine components need to be pre-assembled and stored in the port area being easy accessible for quick loading to the farm site.

2. Foundation installation - depending on foundation type, most common way of installing monopiles are by giant pile hammers used by the same vessel that installs turbines. Large foundations require vessels with heavy lifting capacities. Floating foundations are pre-assembled onshore and towed by tugs.
3. Transition piece - connecting foundation with turbine tower. Normally installed by the same company that installs foundations and turbines.
4. Turbine installation: smaller turbines are normally installed in one piece by heavylift cranes. Larger turbines installation is made in stages, where blades are attached one by one.
5. Substation installation – pre-assembled onshore and installed on site as a single unit normally by heavy-lift vessel or jack-up vessel.
6. Cable lay operations – cables connect turbines with substation and are normally installed by special cable-lay vessels. Cables are buried under the seabed.

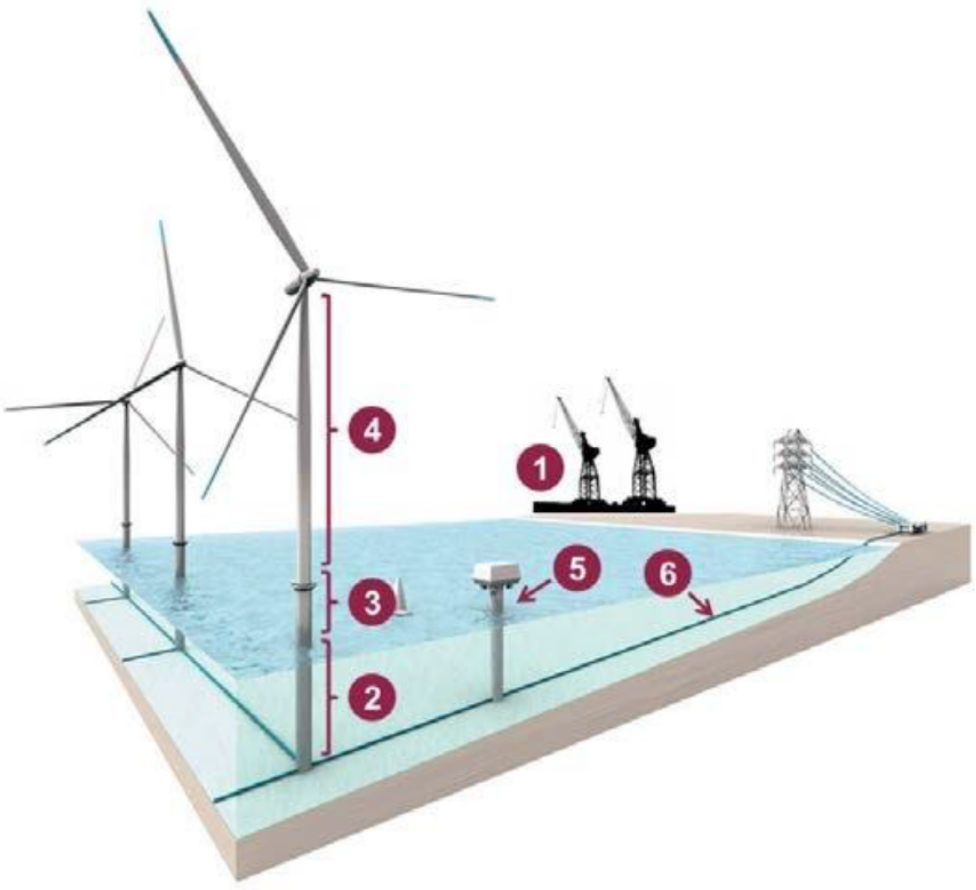


Figure 9, Illustration of installation process.

All types of operations mentioned above are very costly and several of these steps represent potential customer segment for the NOV tool.

EPIC Contractors (Engineering Procurement Installation Commissioning) – type of subcontractor that taken on the development of a complete wind farm and at same times take a share in the field. Example can be GeoSea or Van Oord. A contract often contains a 15-year fixed fee for electric energy produced and supplied to the grid. This group of customers can be of great interest for NOV as EPIC companies will ne installation tool over a long period of time not only for installation but for repair works during the whole contract period.

Another potential customer segment can be installation companies (turbine installation contractors, special foundation installation companies). They are the ones working with installing the turbines in the field and can be interested in reducing their costs, at the same time offering a cheaper installation process to their customers (the wind farms). Example: SeaTrack, A2Sea.

Third customer segment would be logistics companies. They are the ones being used by the installation companies to transport the turbines and lift them up from a vessel and place on to the pre-installed foundation. Companies like Biglift, BBC Chartering, Heavylift.
This group is however the least interesting for NOV as potential customer. They perform only one-time job and their scope is very limited to one operation: shipment of equipment from closest port to turbine manufacturer to the place of installation where the responsibility is taken over by installation company. Logistics companies have little risk and their internal cost are covered by other party. NOV believes therefore that there is little interest in our product from this customer segment.

Turbine and foundation installation companies (eg. Siemens, GE Energy) are the ones producing key pieces of equipment that go into complete wind farm.

O&M (Operation and Maintenance) support vessels are the ones supplying support services to the oil and gas industry with their fleet of vessels. In case a job needs to be done on the blades of turbine, tool produced by NOV can minimize the cost. Since O&M vessels work on the turbines quote often, such cost saving can be beneficial in the long run.

Customer Relationships

"…the types of relationships a company establishes with specific Customer Segments." (Osterwalder & Pigneur, 2010, p. 28)

Osterwalder and Pigneur (2010) describes several types of relationships with various customer segments. Personal assistance (based on human interaction), self-service communities (example, online videogame community) and automated services (automated self-service.

NOV has always focused on dedicated personal assistance as a form for customer relations. The company has years of experience within offshore oil and gas market having dedicated personnel following up each customer. This ensures knowing customer needs in details and customers trusts sales personnel with their investments.

Another form of customer relations that can be used is co-creation. Reaching out to, for example, logistics companies or installations partners and work together on developing the product and to reach potential clients. This type of symbiosis will allow reduced risk of investments and ensure a larger customer database, through networking.

Channels

"..how a company communicates and reaches its Customer Segments to deliver a Value Proposition." (Osterwalder & Pigneur, 2010, p. 22)

Since our product is new to the market it is important to have a clear strategy on how we will be reaching to our customers. It is also vital to have a clear understanding of how we will be keeping their interest in our product and support them throughout the lifecycle of it. Canvas model focuses on several functions that can serve as channels to reach our customer:

- Awareness - raising awareness about our product in the market and getting potential customers to be interested in purchasing it (NOV can achieve it through business networking, meetings with potential clients, various exhibitions and offshore wind forums)
- Evaluation – helping customer to evaluate value of the product
- Purchase – NOV can either suggest rental or purchase depending on the customer segments mentioned above.
- Delivery – how do we deliver the value of our product to the customer

- After Sales - NOV can provide aftermarket support and post-sale services of repairs and spare parts, as well as technical assistance.

Revenue Streams

".. the cash a company generates from each Customer Segment." (Osterwalder & Pigneur, 2010, p. 30).

Each revenue stream can have different pricing strategies, for example, fixed price, bargaining, volume dependent, market dependent, to mention some.
Revenue streams can be achieved through two types of transactions:

- Single transaction (one-time customer payment)
- Multiple revenues as result of recurring payments

The Canvas outlines several ways to generate revenue:

- Asset sale: selling ownership rights on physical produce from one owners to another. When selling a book, for example, a customer can read it, sell it, throw it as he /she has the ownership rights now. The is suitable for our sale and "split risk" model.

- Usage fee: used for selling a service. The more service is used, the more customer pays. Example can be laundry services at the hotel.

- Subscription fees: payment for continuous usage of service (gym membership, Spotify)

- Lending/Renting Leasing: Revenue stream here is generated by temporary giving the right to someone to use the product. The lender receives stable revenue income, while the renter can use the product temporarily without taking upon full cost and risk. This type of revenue stream is relevant for out rent model.

- Licensing: selling usage rights for the protected intellectual property. The company owning patent for the product does not manufacture it or get the profit from sales of the product. But receives regular license fee.

- Brokerage fee: revenue stream generated by services performed on behalf of two or more parties. Example can be shipping broker that gets brokerage fee every time he/she makes a booking between shipping company and cargo owner.

- Advertising: profit generated on advertising a certain product for a company (example: revenue earned by number of clicks on online adverts)

In our discussions we will be looking at two revenue streams:
Sales – where the tool will be sold to customer, and revenue is received once the tool is delivered to customer. Here we will investigate possibility for milestone payments and other ways to reduce financial risk.
Rental – where multiple revenues will be received through purchase of tool, as well as through service job of installation works performed by the Aftermarket personnel.

Key Activities

"..the most important thing a company must do to make its business model work" (Osterwalder & Pigneur, 2010, p. 36)

To identify which activities are key, we will see which activities add value through the value chain. Trough considering the typical value chain model as presented by Porter, we have evaluated each activity identify where value is added for the company. Believing that the key activities are those that give the most value for the company.

Primary Activities	Value
Inbound logistics These are all the processes related to receiving, storing, and distributing inputs internally. Your supplier relationships are a key factor in creating value here.	
NOV is not a production company. The core business is the machine engineering and not the actual production or manufacturing. The parts that will be required to produce the Blade installation tool is not considered essential. From the business in the oil and	No

gas industry it is expected that established supplier relationships will be used for ordering parts for manufacturing of this tool.	
Operations These are the transformation activities that change inputs into outputs that are sold to customers. Here, your operational systems create value. We have divided operations activities into three main groups: Engineering, Manufacturing and Project Management.	
The engineering activities will be most important in the first contracted tools. Once the first tools have reached the market the focus will shift to assuring quality is maintained in the manufacturing activities. Each new contract will not require engineering activities to the same extent as the first unit sold. Even though engineering activities in a innovation perspective is considered to add value, the engineering activities associated with operations are not. The manufacturing activities will be directly linked to each tool. Making sure to keep quality high and cost low will be likely important. Historically a lot of the manufacturing activities has been outsourced by NOV. Due to resent years downfall in oil and gas industry, NOV does most of product manufacturing in-house, provided available capacity. Considering the history of manufacturing being outsources, we expect NOV has considered these activities as not particularly valuable in the past and will there for not add value to this part of the business either. NOV is very proud of and has a strong and positive reputation for management and execution of projects. For NOV a typical project starts when a contract is signed and end when the contracted unit is delivered to the customer. The project manager is responsible for monitoring all processes related to the execution: From initiating project, trough performing engineering, distribution, manufacturing, preparations from transportation, installation and commissioning supervision, reporting both internally and externally to the customer, until the machine or equipment is delivered to the customer. Any issues related to the products delivered will be handled by the aftermarket organization, explained below in the services section.	No No Yes
Outbound logistics These activities deliver your product or service to your customer. These are things like collection, storage, and distribution systems, and they may be internal or external to your organization.	

The activities related to collection and storage will depend highly on manufacturing facilities being in-house or outsourced. For a typical NOV project, storage activities will be on a short time basis and limited to packing and preservation. If any part of the tools is being rented NOV will need to make sure they have facilities available to handle short- and long-time storage in periods in between contracts or usage. It should be expected that investment will need to be made to provide storage of new tools and tools in between rental contracts. Facilities will need to perform maintenance and preservation and do possible repairs when needed. Factors that will need to be considered are: location of storage, indoor or outdoor storage, maintenance and services needed in between usage.	No
Marketing & Sales These are the processes you use to persuade clients to purchase from you instead of your competitors. The benefits you offer, and how well you communicate them, are sources of value here.	
Marketing and sales activities will be very important and valuable for NOV in the business plan for the blade installation tool. Offshore wind is a new market for NOV as a company and new relationship will need to be established to be able to reach the customer segments targeted.	Yes
Service These are the activities related to maintaining the value of your product or service to your customers, once it's been purchased.	
The aftermarket organization is a separate business unit in Rig Technologies segment. Through 100 locations in 21 countries this organization help customers throughout the lifetime of NOV delivered products. For the Blade installation tool, it is expected that service engineers from the Aftermarket organization will be operation the tool. How this service will implicate the business model, considering these activities are performed by a separate business unit, is an important factor that can serve as a complication if not well planned and communicated.	Yes
Support Activities	**Added Value**
Procurement This is what the organization does to get the physical resources it needs to operate. This includes finding vendors and negotiating best prices.	

NOV has a large and strong procurement department handling all negotiations with established and potential suppliers. All though these activities are important it is not considered an added value. What will on the other hand add value is the potential for sale of logistics services. NOV also has a worldwide logistics and chartering department handling all services associated with delivery, export, transportation and loading of equipment. These services will enable NOV to sell the equipment and deliver to any customer worldwide. The coordination, transporting equipment for several projects at the same time, will serve as a potential to save cost. The added value for this activity is clear, as this serves a potential for revenue. But as an activity in a business model the importance is not considered substantial enough to be a key activity.	(Yes)
Technological development These activities relate to managing and processing information, as well as protecting a company's knowledge base. Minimizing information technology costs, staying current with technological advances, and maintaining technical excellence are sources of value creation.	
Implementing a new product in a new market can open new doors for engineering companies like NOV. Regardless the success of failure of this product, the company will most like start new relationships in a new market. New communication that will give the company information about products, processes, struggles and challenges in this marked and provide a potential for development of other products that can add value in the market.	Yes
Infrastructure These are a company's support systems, and the functions that allow it to maintain daily operations. Accounting, legal, administrative, and general management are examples of necessary infrastructure that businesses can use to their advantage.	
Years of delivering equipment to customers and numerous contracts through the history of the company has given NOV experience and confidence. The core business of Rig Technologies is well supported by several organizational functions. Global departments for legal, warranty, QA and compliance will be important and provide important support when commercializing this Blade installation Tool.	No

Key Resources

"..describes the most important assets required to make a business model work" (Osterwalder & Pigneur, 2010, p. 34).

To identify which resources are key organizations have typically performed a SWOT analysis, identifying its strengths, weaknesses, opportunities and strengths. Going even further a VRIO framework can be used to evaluate resources This framework assesses each resource by addressing four questions: Does the resource add value? Is it rare? Is it costly to imitate? Is it exploited by the organization? If the answer to all these questions are yes, a competitive advantage is implicated (Peng, 2014)

First, we will add a new factor to the value chain, and this is time. By placing the activities in a timeline, we will see that important resources will arise.

Asset sale

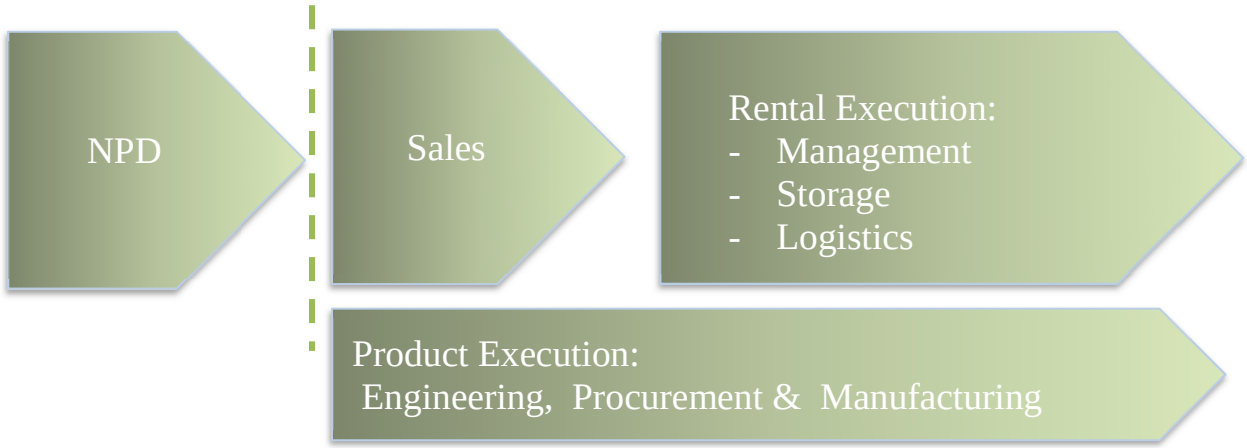
By following the typical NOV structure, the basic timeline for most any product would be as follows.

By this model, the two initial phases are important, New Product Development and Sales. If new products were not invented and developed, there would be nothing to sell, again of nothing is sold, there would be no business for the rest of the organization. Key resources for new product development and sales are human and intellectual. Development of new products implicates creativity and excellence in engineering resources. The result is intellectual property. Products are then sold by the human sales force, with experience and a close relationship to the market. Once the product is sold a project is initiated and lead by a project manager, also a human resource. Service and issues with the products once delivered to the customer is handled by the aftermarket department.

The only step in the model that requires any major physical resources is manufacturing.

Rental

For a rental contract the timeline would be different. New Product Development would still be required, without products there would be nothing to rent. The sales activity would still be key and require human resources. The main difference is to the execution phase



In this model the production of the actual tool is a support activity. Execution phase is handling the rental contracts and manufactured goods. Managing rental/leasing of equipment would rely on physical resources for storing units in between rental contracts and possibly logistic resources for transportation of the tool to site and back to the storing facility.

Intellectual resources

Oderwalder and Pigneur (2010) lists resources in this category as brands, customer databases, intellectual property (IP) and protection of IP.

Being a new player in the Offshore wind market, NOV is still a player with vast experience from delivering equipment to offshore related industries. The company has a strong brand. From the initial overview of the Offshore wind market and its challenges we learned that experience from offshore regarding material is important.

Even though the sales force is considered a human resource, the experience, and relationships to customers and networks in the energy market can be classified as an intellectual resource.

The Blade installation tool is a new product. NOV has already applied to patent part of the technology to protect the innovation from imitation from competitors.

Key Partnerships

"…the network of suppliers and partners that make the business model work." (Osterwalder & Pigneur, 2010, p. 38).

Hardly any companies have all resources and can perform all activities within a supply chain. It is quite common to enter aligned partnerships with other companies to cover the whole specter of activities.

NOV is historically a typical engineering company. The manufacturing and assembly of goods for several of NOV product lines has been outsourced to other companies. Recent years a lot of this manufacturing has been brought inhouse to NOV facilities. For the Blade Installation Tool, to our knowledge, there is no need to engage new partnerships with new suppliers or manufacturers. If future partnerships will be needed NOV will have the possibility to engage as a full company and not for this tool in specific.

Key partnerships is an important building block in any business model. Still, for the purpose of this tool and our discussions, partnerships with suppliers will not have a major role.

Cost Structure

"..all cost incurred to operate a business model." (Osterwalder & Pigneur, 2010, p. 40).

For NOV as a company commercialization of this tool will only represents a fracture of the total generated revenue, and one new product in a large and vast portfolio. Being a large existing company already, only the cost directly related to this product is relevant at this point. Still, offshore wind is a new market and success with one product can lead to several new business possibilities, so a god and solid plan of cost structure can give larger benefits then for this product only.

Being at an early phase of the NPD process, no actual calculations for engineering and manufacturing cost is available. For calculations purposes fictional cost is used by NOV based on experience from other products. The three parts of the product represents the product cost.

1. Interface to tower
2. Hydraulic tool
3. Gripper

It is expected that step 1 will include engineering cost only. The actual manufacture and design will be handled by the turbine company. Step 2 will represent the majority of the cost, while step 3 cost will be minimal.

Dependent on revenue stream other cost will need to be included. Any investments that needs to be made will represent not only cost, but also risk for NOV.

Discussion

Taking a step backwards, we remember how business model as a term lack a common definition. Even the concept of business models as being models is discussed.
We were, however, able to find some common elements that together explain what a business model is.

1. The main purpose is to create value for the customer
2. It answers questions about how an organization do business.
3. The main goal is to create revenue for the firm

Then we looked at how a business model consist of elements or building blocks, and how these elements are related. How the choices you make in one element influence or limit your choices on the other related elements.
Previous in this thesis we briefly explained how Johnston, Christensen and Kagermann (2008) combined the three elements Profit Formula, Key Resources and Key processes and view executive's ability to construct these elements to fulfill a potential value proposition as key to a successful business model. We chose the Canvas as our framework for gathering data. By mapping out information about the market, the challenges in the market, internal assets like key activities and key resources, the interrelations between these elements we ended up with a few possible business model plans to asses. In this chapter we will analyze these based on the following key factors:

- Investments for company
- Organizational
- Risk
- Potential for income and revenue

But first we look at the value proposition and the potential customers.

The Customer Value Proposition

Teece (2010) business model design recipe is a six-step circle. First step is the actual product. Next step is the value proposition, but he uses the word benefit instead. By saying you need to determine how the customer can benefit from using this product. This removes the expectation that the value proposed needs to be of economical basis. Dealing with business to business as

companies like NOV does, it is expected that the main goal for the customer is to create revenue. Meaning the goal for NOV would be to define how NOV and the product proposed can help the customers make more money. The value proposition is not the created revenue for the customer, it's how this product can help create this revenue.
NOV's purpose for developing the blade installation tool is to increase safety and efficiency and saves time in performing installation of windmill blades. Increase of safety by enabling installation with reduced manpower. By lifting the blade up to the nacelle by remote operation, people involved in the operation can keep a clear distance avoiding possible dangerous situations in case of any dropped object or similar. The possibility to hold blades during transportation and lift to final position will enable installation to be more efficient and faster than they would if blades are stored on the installation vessel separated from the foundation and nacelle. In a marked where rigs are hired on day-rates, time saved is cost saved. Avoiding lifts onboard the installation vessel will also increase safety for the crew onboard. These are the key benefits the customer gets from using this product. Additional value is provided enabling maintenance and repair to be performed using the tool during the lifetime of the windmill farm. The tool can be used both for changing blades and holding blades while doing maintenance and repair to nacelle and gear.

We have listed several potential customer segments. End user, EPIC Contractors, installation companies, logistics companies. turbine and foundation and O&M (Operation and Maintenance) support vessels. Which customer segment NOV should choose would in the theoretical perspective be the one the has the largest benefit from using the Blade installation tool.

The segment that will have minimum to no benefit is the logistics companies. Their vessels are not specialized this type of cargo or for these types of lifts. These companies are hired to perform or support a one-time service. They would therefore not be interested in to investing in tool which is used specifically for wind market, as they work for various segments and business and ship all types of cargo: from cars to oil drilling equipment.

Installation companies as customer segment would benefit from NOV Blade installation tool. The installation companies typically have specialized rigs built to handle the windmill installation to foundation. Vessels are built with space for transportation of turbine mast, nacelle

and blades, and are equipped with cranes needed for performing the installation. In addition to enabling the vessels to install with increased safety and less manpower, marketing a more efficient and cost-efficient installation would provide the installation vessel a competitive advantage in a cost sensitive market. O&M support vessels are in the same category. These companies would benefit from increased safety during operation and provide a competitive advantage.

Turbines manufacturers is the third potential customer segment. In any case where turbines are sold to a wind farm project where the installation are performed by other companies, the turbine manufacturers would not be involved in the actual use of the tool. The tool would not serve as a directly benefit to these companies, but instead serve at added value product giving their product a competitive advantage. In these cases, it would be expected the tool will be sold to the end user together with foundation giving NOV the role as third party sub supplier.
Recent changes in the market, moving towards bigger wind turbines offshore demands substantial financial funds for the parties involved. Siemens is one of the world's largest turbine supplier and is advertising they can cover the complete value chain, taking over responsibilities of installations, grid connections and finance. Siemens company is assuming the role as EPIC contractor.
The EPIC contractors and the wind farm operators are the customer segments that would benefit the most from NOV introducing the Blade installation tool. Being able to reduce cost and save time during installation would be a direct benefit to these companies. The added value to the wind farm operators being enabled to use the tool for maintenance and repair is also a direct benefit.

Challenges

One important factor that needs to be carefully considered is the interface part of the tool. To use the actual hydraulic tool in operation it is required that the foundation contains the interface needed for hang-off of tool. NOV has not been able to make this interface interchangeable or retrofittable for existing foundations. This means the product is only viable for new wind farm projects where manufacture of foundation is not initiated. How this serves as a challenge in at least three different ways. The firs challenge is timing. Pithing sale and marketing of the tools needs to be initiated prior to project start up, as the decision for buying, or including the tool in the wind farm project, needs to be made before decision and manufacturing of foundation starts.

Secondly, to be able to get the tool into the marked the foundation manufacturers will need to accept the interface or preparation for interface as part of their design. Third, the first and second reasons narrow the customer segment possibilities. The NOV sales force needs to spend their energy on the customer segments that have the strength and possibility to influence the design at an early phase. Installation companies and O&M vessels will most likely not be able to influence the turbine manufacturer to include the interface in their design, partly because they are probably not involved in the project at the time when decisions need to be made and partly because they lack the strength needed in the relationship with the manufacturers.

Another important factor to consider operation of the tool. NOV has intended NOV personnel would be performing operation of the tool. As described previously in the data chapter the department considered is Service Department that is part of the Aftermarket organization, a separate business unit in the Rig technologies segment. We recommend keeping the operators from the service department separated from the actual product. In conversations with the aftermarket department in Norway we have looked at their experience with rental of spooling device used for changing wires on Offshore box boom cranes. Even in their quotes to customers they keep the rental of the tool and the hiring of personnel separated. Initiation for collaboration with the service department should start prior to product launch as it would be expected service engineers will need information and training in operation the tool to be able to be an asset in operation.

Possibilities

Being new-comer at wind offshore market, NOV could consider forming strategic alliances or joint venture with other players. Several customer segments can be strategic partners. Strategic partnerships could help NOV overcome some of the challenges related to the interface part of the tool. Viable partners would be turbine manufacturers, EPIC contractors or even wind farm operators. For the purpose of this thesis the possible options for strategic partnerships or joint ventures has not been investigated. In the next part of the discussions we will be looking at options for Profit Formula, Key Resources and Processes that can fulfill the Customer Value Proposition.

Business models or models of business

Teece (2010) argues that technological innovation alone is not enough to guarantee business success. In his words business executives "..neglect the proper analysis and development of business models which can translate technical success into commercial success" (Teece, 2010, p. 184). Teece (2010) puts the integrated business models at one tip of the scale. For NOV, taking over the entire value chain of the windmill installation process would not only require huge investments, but it would imply risk that by far oversees the purpose of the Blade Installation Tool.

There have been several solutions for tools used for blade installation introduced in the market already. Technical solutions of these are not relevant to this assignment but knowing this provides a perspective on where to place the Blade installation tool, as an innovation, in the dominant design paradigm. It is safe to say the innovation has reached the paradigmatic stage. In the data chapter we established that technical parts of the tool will most likely be protected by a patent. The patent would be relevant for the operational part of the tool. As regime of appropriability patent in does not provide a strong protection against imitations in practice and this leads us to the other tip of the scale; licensing. As a possible business model for the Blade Installation Tool, licensing would require minimal to no investments for NOV. There would not be any organizational perspective challenging this business model. Considering there are other solutions for performing the installation process without using the NOV tool possibility for substantial income and revenue from a licensing contract are at the lower end. But, the weakness in appropriability regime is the strongest argument to not considering licensing as a possible business model for this tool. A license contract with for example the turbine manufacturer would give a vast insight into the technology of the tool and for NOV a huge risk for imitation.

The third block in Teece's "Profiting from Innovation" (1986) framework are the complementary assets. Previously we have assessed the value chain of NOV in relations to the product. Several of these key activities will serve as generic complementary assets to the Blade Installation Tool as an innovation. The one major specialized complementary asset for the Blade Installation Tool is the required modification to design of the foundation for interface to the operational part of the tool. One of the major challenges for NOV would be to plan the business model with the unilateral dependency where the tool is dependent on being able to implement the interface to the windmill foundation. NOV should consider even out the strength the turbine manufacturer has by either moving the relationship towards:

1. A bilateral mutual dependency which can be obtained by strategic partnership with turbine manufacturers, or
2. A unilateral dependency the other way around. This implies giving NOV a position in the offshore wind market that is so strong that the turbine manufacturers will have no choice but to include the interface in the foundation design, or
3. Use contractual methods to access the asset.

Considering the available key resources and the history of the company and their way of doing business leaves us with several possible business models. Most of these models would need to be hybrids, considering the interface challenge. But the first model presented is the most "pure", in its kind.

Asset sale model

The asset sale model is the first model we will discuss for the Blade installation Tool. By this model NOV will be selling the complete equipment to the customers as an equipment package. Interface to foundations or engineering of interface, hydraulic tools and blade grippers. For installation of a complete wind farm a package would consist of interface to all the foundations planned installed and the number of hydraulic tools and grippers needed for installation.

This model does not require any large investments from the company. It is a well-known model for doing business for NOV. The company has carried out projects by this model for several years and has vast experience. NOV's organizational structure is set up for successful carry-out of project on this sale's model. Key functions are set up within the organization to ensure the effective project-run: project department, engineering, finance, supply chain and aftermarket. NOV consists of many small companies acquired over the years and these cover various activities. That means that NOV will be able to manufacture the tool within the organization and not outsource to third party, minimizing cost and risk.

The sales model will imply minimal risk for NOV – they will only invest in pre-defined scope of work and once the product is delivered, the customer will take over the risk.

Since the NPD project for the lade installation tool is in such an early stage and we do not have the actual number to work with, we have used some fictitious number based on experience from previous projects to make some basic assumptions:

Basic Assumption	Cost	Margin	Price
Equipment	$500 000	40 %	$833 333
Engineering	$250 000	40 %	$416 667
Engineering Hours Required	1000		
Engineering Labor Rate ($/hour)	$250		
Installation	$0	40 %	$0
Operation	$250 000	40 %	$416 667
Total	**$1 000 000**	**40 %**	**$1 666 667**

The numbers above show that main costs would be engineering hours, production of the tools itself and operations costs (i.e. administration, project, supply chain). We target for 40% margin, which would generate income of USD 666.667 per sale of tool.

Our assumption is that financial risk is also minimal. NOV has the possibility to ensure positive cash flow during project execution through milestone payments. Furthermore, typical offshore contracts are set up making sure equipment manufacturers do not hold any financial risk of consequential loss. That means if equipment fails and causes delays within internal project plan of the customer, NOV will then only carry the cost for repairs, eventually delivery of new piece of equipment.

The asset sales model would not occur additional cost beyond cost for engineering, material and manufacturing of the tool. The possible revenue will depend on the income.
Income when using sale model will be the price established by sales team in combination with the viable customer segments and the benefit this customer segment will have from buying the tool. The customer segment that is most viable for this type of sales model is the turbine manufacturers. The benefit for this segment will depend on the role the company is assuming. For manufacturing alone, the benefit would be lower than if the turbine manufacturer provides the full operation of manufacturing and installation of the turbines. Any additional revenue for using NOV service engineers in operation of the tool will benefit the NOV company, but this revenue will locally benefit the Aftermarket organization and is not relevant to the tool itself.

Combinations with Contract for interface

A variation of the asset sales model is if NOV by contract can collaborate with the turbine manufacturing companies to design and manufacture the foundations including the needed interface. NOV can either provide the engineering necessary to implement the interface, or manufactured parts to include in foundation design. In the chapter of the Canvas for cost we have assumed the actual cost for the interface only represent a very small portion of the total cost of the tool. It would be expected that in either option the interface in this model would represent only cost, as the turbine manufacturers have no benefit of including this in their design. It can be assumed NOV would have to cover cost beyond the actual interface cost to make the arrangement beneficial for the turbine manufacturers. When we consider the strength and dependency of this relationship between NOV and the manufacturing company having a weak value proposition to the manufacturing company will benefit the deal for NOV.

On the other hand, this arrangement opens doors to not only several customer segments, but also to other possible revenue stream models for the rest of the tool. The additional cost for implementation of the interface can be covered by income from the rest of the tool, as long at this customer benefit from using the tool exceeds the benefit the manufacturing companies get from having foundations with interface included.

Hybrid asset sale model

The hybrid asset sale model has most of the same parameters as the pure asset sale model.

The investments needed are related to the interface contracts with the manufacturing companies. It requires no organizational changes for NOV and risk is still minimal.

Knowing the wind market is struggling to get investors onboard there are ways to help the customers by offering different types of payment plans. NOV would then take on a larger risk, starting their projects with a negative cash flow, but will at the same time help the customers reduce initial startup payment. To look at options fictional calculations has been set up to assess and visualize the possibilities.

	Single Payment	3 Year Down Payment	5 Year Down Payment	2-Split Risk
Equipment Payment	$833 333	$833 333	$833 333	$833 333
Other Payment	$833 333	$0	$0	$0
Quarterly Payment	$0	$75 108	$47 243	$110 001
No. of Q Payment	0	12	20	8
Total Payment	**$1 666 667**	**$1 734 627**	**$1 778 192**	**$1 713 342**
First Year Payment	**$1 666 667**	**$1 133 765**	**$1 022 305**	**$1 273 338**
Condition				
Down Payment Term	NA	3 Years	5 Years	2 Years

1. Single Payment:

In these contracts the payment is set up by milestones ensuring a positive or neutral cashflow for NOV throughout the project. A milestone payment plan can be set up in many ways, the essence is that the total amount is due at delivery of the equipment.

2. Payback over 3 years or 5 years:

With this model the customer pays the equipment over a period of 3 or 5 year, with quarterly payments. In addition to the quarterly payments, the customers pay a one-time initial fee for hardware(parts). When the 3 or 5 years has ended the customer owns the product. Funding over a different period can be accommodated on a case by case basis.

This plan will to try to implement/ sell equipment to the “Operations Budget”. The one-time initial fee will cover all NOV cost except the engineering cost. Total revenue for a payback plan will exceed the milestone payment plan as a small fee for interest and administration will be added to the total.

3. Split Risk

With this model the customer buys the equipment over a 2-year period, however if the equipment does not satisfy the client’s needs, the client can choose if they want to continue for one more year (which will finalize the purchase) or want to cancel the equipment. NOV will be left with the first-year payment as illustrated above. In addition to the quarterly payments, the customers pay a one-time initial fee for hardware, installation & commissioning and training. This model shows the customer that NOV are willing to split the risk and take share of the cost if they are not satisfied with the equipment. The potential for total revenue exceed the milestone payment if the customer continues the purchase for the 2-year period.

In any of the asset sales models, hybrid or pure asset sale the operational part of involving NOV personnel from Aftermarket is considered as separate contracts between the owner of the tool and NOV aftermarket business unit.

Hybrid Rental

The next model is the Rental model, based on rental of the tool from NOV when needed in combinations to include NOV Aftermarket personnel in performing the installation of blades.
This makes the structure more complicated than at sales model. Firstly, several parties are involved:

- Turbine manufacturer for interface for tool
- Rental customer: for operation of the tool
- NOV Operations for rental contracts for the tool to the customer
- NOV Aftermarket selling a service to the customer: trained personnel who will be installing the blades using the tool.

A rental model will imply investments in manufacturing tools by NOV. Instead of the customer owning and investing in the tool, NOV will have to make these investments and cover the engineering and operational cost.
In addition, NOV will need to cover cost of storing the tools in between rental periods. Any maintenance and repairs to the tools in these periods will be at NOV expense. Firm agreements of transportation from NOV facility to the rig/field where tool will be used will also need to be established.

Rental contracts for performance of specific work is typically set up for specific periods of time, even though payment often is based on day rates. In our calculations for rental income we have assumed a two-year contract based on fictious day rates, to show an example of potential income. Quarterly income shown below is based on different levels of tool utilization.
Day rates for utilization and lower rates for stand by time.

Rental Parameters	Price
Service Day Rate	$2 405
Standby Charge % to Day Rate	$1 203

	Year 1				Year 2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Tool Demand	1	1	1	1	1	1	1	1
Service Utillization	50 %	60 %	70 %	100 %	80 %	70 %	60 %	50 %
Service Day Rate	$108 225	$129 870	$151 515	$216 450	$173 160	$151 515	$129 870	$108 225
Standby Rate	$54 113	$43 290	$32 468	$0	$21 645	$32 468	$43 290	$54 113
Total	$162 338	$173 160	$183 983	$216 450	$194 805	$183 983	$173 160	$162 338
Sum of Total two year Income	$1 450 215							

In example above the potential income for a two-year rental agreement can cover the previously assumed cost for engineering and manufacturing of the tool. To lower risk of cancellation an initial start up fee can be added to the monthly or quarterly payments.

The NOV business unit responsible for development of the tool is, historically, not set up for providing rental of equipment. Even so, we do not expect Marine and Constructions business unit would face major challenges in performing projects in a structure for rentals. There several other entities within NOV with vast experience from rental of equipment. Departments providing supporting activities are shared by all business units in Rig Technologies and are used to different business model throughout the company.

Choosing this model, the risk must be closely evaluated. Firstly, the duration of the risk period will be much longer than for the asset sales model. The risk period starts once the contract for interface is signed with customer and continues all the way through Aftermarket operations during installation and commissioning. Secondly, the financial risk is increased as opposed to a sales model leaving NOV at risk for investments in manufacturing of tools for rental.

Adding personnel for performance of operation to the rental contracts causes more challenges. NOV has been operating for many years, selling offshore contracts to customers and then selling service and repair to the same customer once the rig is delivered and operating. The difference here is the rental contract will be initiated and administrated by NOV Operations, while actual operations will be provided by the aftermarket organization. As a contractual perspective the challenge will be of internal character as customers will think of NOV as one company. Establishing the relationship with aftermarket and keeping the rental of tool and hiring of personnel separated will be essential. In addition to the organizational challenges this

structure increases the risk. Not only does NOV have to deliver a well-functioning product but the company must ensure that our personnel is trained to perform blade installation operations to run smoothly. Since this is a completely new market segment, NOV has little to none experience with such operations.

It can be assumed that the value for the customer will increase by NOV including personnel for operations in the rental contracts. Increased value could imply increase willingness to pay, a factor that will indicate an increase of possible revenue. A rental model ensures income stream over several years and contributes to building relationships with customer over longer time-period laying the foundation for future wind farm contacts.

4. Rental

With this model the customer rents the equipment for set price per month then rents the equipment for as long as they need it.
Model can be adjusted to fit different needs and can include both operational day rates, stand-by rate and an adjustable initial invoice.

To succeed with a hybrid rental model, it is essential that NOV sets up a contract in a way that minimizes the risks at all stages. Contractual obligations and risk division must be weighed up to avoid revenue loss.

Conclusions and Recommendations

In the previous chapters we have tried to form a theoretical foundation for what business models are and how to use them. By evaluating the many definitions by different authors, we were able to find common elements to what business models are. These are:

1. The main purpose is to create value for the customer
2. It answers questions about how an organization do business.
3. The main goal is to create revenue for the firm

The purpose of the Blade Installation Tool is, in short, to be able to install offshore wind mill blades faster, easier and safer. All are factor that can be beneficial to customer segments related to installation of offshore windmill farms.

We then gathered data about offshore wind market, their challenges and NOV as a company and their organization. By combining the theoretical foundation on business models with this data, we have tried to assess the alternative business models NOV can utilize when entering wind offshore market with their new product.

Furthermore, we have assessed the tool as an innovation, by using the framework of Teece (1985) on how to profit from innovations. By this assessment we learned that being an innovation in a paradigmatic stage, with a weak regime of appropriability limits possibilities for potential business models. For the Blade installation tool business models that would require strong protection of the technology are not suitable. We found that having a specialized complementary asset at a unilateral dependency level that is not in the company's favor; and it limits the choices even more. The challenge for NOV in this regard is the required interface to windmill foundations.

The biggest challenge NOV is facing if they decide to commercialize the product is the fact that the tool requires interface being included in production of the turbine foundation. The interface is needed in order to get the tool to function and has to be built in to a turbine foundation at the early stage of production. Since the turbine foundation and blades are normally manufactured by different parties, NOV will have to contact both ensuring that interface is installed in order for the tool to be remotely controlled during the installation. That means that NOV will need to start selling in the idea to customer at the early stages of supply chain. Since the supply chain of wind farms is divided in several production processes, thus several suppliers, NOV will need

to convince the supplier of foundation to include interface in their design even though the benefits for the supplier is minimal.

Since the success of implementing the tool to the wind market and potential sales depend on the interface presence we recommend the sale department to try to influence customers with the ability to decide design. We believe the challenges NOV will meet, especially related to the interface to foundations, will demand a relationship with turbine manufacturers bordering towards partnership. A second possibility is to engage in the partnership with the turbine and foundation manufacturer. If NOV manages to overcome this challenge and implement the interface in foundation design, they will have several customer groups to choose from for the actual tool. Which customer segment to target will depend on how the project for installation of the specific wind farm is organized.

In cases where interface is already implemented the are two main roads for NOV, a rental model or variations of asset sales model. We believe a hybrid asset model is most attractive for NOV. The model implies providing the interface to manufacturer and selling the operational parts of the equipment to customers as a package. When choosing business model, it is essential to evaluate both financial profit and potential risk for the company. Even though a rental model could be more financially beneficial in the long run, with a larger potential income, it also implies a larger financial risk in initial stages of commercialization of this new product.

A hybrid asset sale model implies minimal financial risk. There are no large investments needed and cashflow throughout the project will be known when contract is initiated. We have also proposed alternative payment plans over three- or five-year periods. These payment plans will imply larger risk for NOV since projects will have a negative cashflow in the initial stages. But we believe that giving the customer several possibilities to choose from, NOV will appear to be flexible, diverse and competitive in comparison to other players on the market. It will also allow the company to have access to broad specter of customers, and therefore potentially more revenue in the end.

A hybrid sales model is also a well-known model for handling projects for NOV which means organization challenges are also minimal.

Even so, knowing the biggest challenge in offshore wind market is the high cost our recommendation for NOV is to keep both hybrid possibilities for sales and rental models open. Remembering the numbers presented in this thesis is for presentation purposes only and not having any knowledge of actual cost, further investigations will need to be made by the

company to get a better picture of revenue potential. Initialing conversation with the potential customers will also be needed to get a clear view of the customers potential saving before any firm payment plans can be established. As repeated several times throughout this thesis, knowing the value proposition and the customers perceived benefit for buying a product is essential and should be the main goal for any business model.

It is important to mention that as we have been working through this thesis NOV has acquired Gusto MSC. The company is a strong player on the market for both oil and gas and wind installations. As far as the wind market is concerned, Gusto delivers several types of offshore deep-water solutions that are used for installation purposes. It has a large customer portfolio and market network as long as long experience within engineering of wind installation technologies. We believe that through this acquisition and strong partnership NOV will have stronger position on the offshore wind market and have better chances of accessing profitable customers for potential tool sale. We have not evaluated this partnership in terms of potential tool sale due to acquisition being done late in the thesis writing process.

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