Mapping of the Business Model Experimentation Process for Coolcrowd

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Short Summary

This report is part of the Coolcrowd research project, funded by the Research Council of Norway, and has the goal to assess the potential for a local crowdfunding program that enables Norwegian farmers to install climate change mitigation technologies on their farms and the public to invest in local climate mitigation measures. A secondary project objective is to develop alternative business models for a locally crowdfunded climate program. This report aims to contribute to this objective by mapping the business model experimentation process from May 2016 to July 2019. The project was executed in an international research consortium consisting of partners in Norway, the Netherlands, New Zealand and Australia. The report also provides an overview of the business model designs that were developed by the research team.

Keywords

Sustainable business models, business model experimentation, crowdfunding, agriculture, climate change mitigation, carbon offsetting, transportation, case study.

Preface

This report is published as part of the Coolcrowd research project, financed by the Research Council of Norway. The project is an international research collaboration led by Ruralis (Institute for Rural and Regional Research) and includes the University of Oslo (UiO), Western Norway University of Applied Sciences (HVL), Norwegian School of Economics (NHH), BI Norwegian Business School, Norsøk, Eindhoven University of Technology, University of Western Australia and the University of Otago (CSAFE) as research partners. The overall objective of Coolcrowd is to assess the potential for a locally crowdfunded system that enables Norwegian farmers to install climate-friendly technologies and the public to invest in local climate mitigation measures.

A secondary objective of Coolcrowd is to develop alternative business models for a locally crowdfunded climate program, situated within work package 2.3. This report contributes to this objective by mapping the business model experimentation process within Coolcrowd. In doing so, this report aims to provide insight both from a process and content perspective by answering the following questions:

1) How did collaboration within the sustainable business model innovation process take place?
2) What underlying activities and processes can be identified in experimenting and designing its sustainable business models?
3) How have Coolcrowd's business models developed over time?

Special thanks go out to Boukje Huijben (Eindhoven University of Technology) and Pia Otte (Ruralis) for their provided guidance in writing this report. Gratitude is expressed to all the other research members for their input and possibility to conduct the necessary interviews to carry out this research.

Trondheim, Eindhoven, 06 September 2019

Gordon Haring

Table of Contents

List of Tables

List of Figures

Summary

This report is part of the Coolcrowd research project, funded by the Research Council of Norway and led by Ruralis, the institute for Rural and Regional Research in Norway. The project has the overall aim to assess the potential for a local crowdfunding program. This crowdfunding program enables on one hand Norwegian farmers to install climate change mitigation technologies on their farms while on the other hand it enables the public to offset the carbon emissions generated by their travel actions. This is made possible through crowdfunding, allowing the public to invest directly in local climate mitigation measures. One of the project objectives is to develop alternative business models for a locally crowdfunded climate program. This report aims to contribute to this objective by mapping the business model experimentation process within Coolcrowd. To be able to map this process, primary data, through the execution of interviews with research participants, and secondary data in the form of project documents and deliverables have been collected and analyzed. The report also provides an overview of the business model designs that were developed by the research team.

This experimentation process was made possible through the cooperation of 9 research partners from Norway, the Netherlands, New Zealand and Australia, forming an international research consortium. Various stakeholders like farmers, the Norwegian public, and transportation companies were incorporated in the experimentation process with the goal to guarantee the implement ability of the proof of concept study delivered by this research project. Different type of research or experimentation practices were identified in the form of focus groups, interviews, co-creation sessions, surveys, business model mapping sessions, digital prototyping, brainstorming sessions, literature studies, desk studies, guest lectures, student research or thesis projects, group discussions, seminars and conferences, collaboration with university courses, and choice experiments. It was identified that along the way, the practices moved from an explorative nature toward in-depth research. Furthermore, the experimentation process could be described as highly iterative.

During the business model experimentation process, emphasis was placed on collaboration among different work packages and researchers. Activities which fostered collaboration included project meetings, stakeholder meetings, research visits, joint writing sessions, video conference (project) meetings and co-creation sessions. Project meetings played an important role in discussing new developments

and aligning different research findings across work packages. Researchers took initiative to collaborate all year round in the form of research visits, joint writing sessions and consistent email, phone or videoconferencing contact.

Business model developments were captured inside eight identified business model dimensions. The eight dimensions consist of the type of crowdfunding model employed, the targeted backers in the business model, the organization and management of the crowdfunding platform, the collaboration among farmers, whether or not to create a crowdfunding fund, possible co-financing, the climate mitigation technology employed, and finally the subscription model. The different research and experimentations activities have focused on defining these business model dimensions and making educated decisions on the possible design options within these business model dimensions.

Lastly, the business model experimentation process within Coolcrowd could only partly be related to identified business model innovation processes in literature. This is mainly attributed to the different context (scientific research) in which process is taking place compared to most business model innovation studies described in literature (start-ups and companies).

Sammendrag

Denne rapporten er en del av forskningsprosjektet Coolcrowd, finansiert av Norges Forskningsråd og ledet av Ruralis – Institutt for rural- og regionalforskning. Prosjektets overordnede mål er å vurdere potensialet for et lokalt folkefinansieringsprogram. Dette folkefinansieringsprogrammet vil på en side gi norske bønder mulighet til å installere klimatilpasningsteknologi på sine gårder, samtidig som det også gir mulighet for folk for øvrig å kompensere for karbonutslippene de genererer ved reising. Dette muliggjøres gjennom folkefinansiering slik at allmennheten kan investere direkte i lokale klimareduserende tiltak. Et av formålene ved prosjektet er å utvikle alternative forretningsmodeller for et lokalt folkefinansiert klimaprogram. Denne rapporten tar sikte på å bidra til dette ved å kartlegge forsøksprosessen med forretningsmodellen i Coolcrowd-prosjektet. For å kunne kartlegge denne prosessen er det samlet og analysert primærdata fra intervjuer med deltakere i forskningsprosjektet og sekundærdata i form av prosjektdokumenter og leveranser. Rapporten gir også en oversikt over forretningsmodellene som ble utviklet av forskergruppen.

Denne eksperimenteringsprosessen ble muliggjort gjennom et samarbeid med ni forskningsmiljøer fra Norge, Nederland, New Zealand og Australia, og dannet et internasjonalt forskningskonsortium. Ulike interessenter som bønder, den norske allmenheten og transportselskaper ble innlemmet i forsøksprosessen med mål om å sikre implementeringsevnen som bevis på konseptstudien levert av dette forskningsprosjektet. Ulike typer forsknings- eller eksperimenteringspraksis ble identifisert gjennom fokusgrupper, intervjuer, samspillssesjoner, spørreundersøkelser, kartlegging av forretningsmodeller, digital prototyping, idédugnader, litteraturstudier, desk-studier, gjesteforelesninger, studentforskning eller avhandlinger, gruppediskusjoner, seminarer og konferanser, samarbeid med universitetskurs og valgeksperimenter. Det ble identifisert underveis at praksisen endret seg fra å ha en eksplorerende form til å kunne karakteriseres som dyptgående forskning. Videre kan eksperimenteringsprosessen beskrives som svært iterativ.

Underveis i forretningsmodellens eksperimenteringsprosess ble det lagt vekt på samarbeid mellom ulike arbeidspakker og forskere. Dette inkluderte prosjektmøter, møter med interessenter, forskningsbesøk, felles skriveøkter, prosjektmøter via videokonferanse og samspilssesjoner. Prosjektmøter spilte en viktig rolle for å diskutere ny utvikling i prosjektet og samkjøre ulike forskningsresultater på tvers av arbeidspakker. Forskere tok initiativ til å samarbeide hele året i form av forskningsbesøk, felles skriveøkter, og kontinuerlig kontakt via e-post, telefon eller videokonferanse.

Forretningsmodellutviklingen ble tatt inn i åtte identifiserte forretningsmodelldimensjoner. De åtte dimensjonene består av den valgte folkefinansieringsmodellen, de målrettede støttespillerne i forretningsmodellen, organiseringen og forvaltningen av folkefinansierings-plattformen, samarbeidet mellom bøndene – om de skal/skal ikke skape et folkefinansieringsfond, mulig med-finansiering, den valgte klimatiltak-teknologien, og til slutt abonnementsmodellen. De ulike forsknings- og eksperimenteringsaktivitetene har fokusert på å definere disse forretningsmodelldimensjonene og ta kvalifiserte beslutninger om mulige designalternativer innenfor disse.

Eksperimenteringsprosessen med forretningsmodellen innen Coolcrowd kan bare delvis relateres til identifiserte innovasjonsprosesser med forretningsmodeller slik som beskrevet i litteraturen. Dette skyldes hovedsakelig den ulike konteksten (vitenskapelig forskning) hvor prosessen foregår, da de fleste studier relatert til forretningsmodellinnovasjoner omhandler nyetableringer og bedrifter.

1. Introduction

Increasingly it is becoming clear that vast action has to be taken in order to reduce or mitigate the effects of climate change due to Greenhouse Gas Emissions (GHG). Recent studies find that it is unlikely that the currently observed temperature increase will stay within the 2°C range by the year 2100 (Raftery, Zimmer, Frierson, Startz, & Liu, 2017). This increase is expected to have a wide range of negative impacts on nature and living conditions on earth in general. A small selection of these negative impacts comprises of rising sea levels (Nicholls & Cazenave, 2010), vast ecological changes (Walther, et al., 2002), and climate-change induced migration and conflicts (Reuveny, 2007). In this light, nations from all over the world agreed to intensify the actions and measures necessary to mitigate these effects in the Paris Agreement. This agreement has been designed to limit global warming to 2°C. To reach this goal, Norway has pledged to do its part by striving to reduce greenhouse gas (GHG) emissions by at least 40 % by 2030 and to become a low-emission society by 2050 (Norwegian Ministry of Climate and Environment, 2017). Two important areas which have potential to contribute to this emission reduction are the transport and agriculture sector, being responsible for about 40% of Norway's GHG emissions in 2015 (Korsnes, & Sørensen, 2017). In order to make this shift, vast combined action has to be taken, not only by (local) government(s) but also the general public, researchers and businesses.

Unfortunately, it has been found that entrepreneurial projects focusing on sustainability face difficulties in raising funding from conventional financing sources. This can be attributed to the weaker focus on financial performance (Kleppe & Nilsen, 2017). To bridge this financing gap, it is expected that innovative financing methods such as crowdfunding could take up an important role. Crowdfunding is known as an innovative way to finance new ventures, projects or initiatives by relying on multiple smaller investments of a larger group of people (Belleflamme, Lambert, & Schwienbacher, 2014). This process usually is supported through an online platform. Hence, crowdfunding can be seen as method to connect two parties, on one side the party aiming to raise capital for its initiative and on the other side the investors, supplying a source of capital by investing relatively small amounts of funds.

Different types of crowdfunding exist and can be grouped in the following categories: donation-based crowdfunding, equity-based crowdfunding, loan-based crowdfunding or reward-based crowdfunding (Bradford, 2012). Crowdfunding has been found suitable for raising capital in both renewable and sustainable energy projects and innovative green technology start-ups (Lam & Law, 2016). According to Belleflamme et al. (2014), a possible motivation for this potential is that funders in crowdfunding

projects "*are motivated by more than merely consuming the product.*" (p. 5). Possible not-materialistic motivations could range for example from receiving recognition to identification with the project and its goals, simply helping others and supporting a specific cause, and participation in or belonging to a community (Vasileiadou et al., 2016). To the contrary, conventional investors tend to focus more on financial risks and returns of their investments (Kleppe & Nilsen, 2017). Coolcrowd, a research project led by Ruralis, the Institute for Rural and Regional Research, is contributing to explore this potential by investigating *crowdfunding of climate-friendly agricultural projects in Norway as an innovative way to stimulate the transition to a low-emission society.* (Coolcrowd, 2019) The aim of this research is to deliver a proof of concept for crowdfunding local agricultural climate change mitigation projects by connecting the agricultural and transport sector, where travelers contribute a certain amount of money to finance these local projects in order to offset the GHG emissions created by their travelling.

In order to provide this proof of concept, different sociotechnical aspects are researched to gain an understanding in the implement-ability, challenges and opportunities this novel way of financing local green agricultural projects brings in this specific national context. These different research aspects are captured in separate work packages. One aspect involved in providing this proof of concept is to develop alternative business models for a locally crowdfunded climate program, captured in work package 2.3 *(Coolcrowd, 2019).* Zott and Amit (2010) define a business model by "*the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities*" (p. 1024). The business model development takes a central role throughout the project, as it acts as a framework, which connects findings and lessons learned from different work packages.

Relevant to this context of transitioning from a high carbon society to a low carbon society, Johnson and Suskewicz (2009) argue that it is important to make a shift from developing individual climate-friendly technologies to creating whole new systems. Many new developed climate friendly technologies are integrated in old systems, due to the implementation of conventional business models, resulting in a misfit within the old system centered in non-renewable technologies. History has shown that fitting new technologies in old systems using conventional business models is largely unsuccessful. This embodies the importance of developing new business models to accompany the new developed technologies, as the business model can be used as a comprehensive framework for thinking about and shaping systematic change (Bidmon & Knap, 2017). This explains the central role of the business model innovation process within Coolcrowd.

In the context of business models and transitions, certain important dynamics are present. On one side, existing business models can hinder transitions by reinforcing the current system's stability. On the other side, (new) business models are also able to drive new transformations. Furthermore, they enable the set up or creation of a new regime or system without relying only on technological innovation (Bidmon & Knap, 2017). Therefore, an urgency exists to develop new business models in order to accelerate this transition. However, as many variables relevant to the success of new business models are unknown, it is not possible to analytically arrive at new models which have the goal to overthrow the old business models and systems. Therefore, experimentation in discovering and developing new business models is key (McGrath 2010). In other words, a discovery driven approach is necessary to arrive at these new business models as an alternative of the commonly applied analytical approach. Furthermore, there is a need to further understand the concepts, methods, strategies, and approaches in relation to this experimentation towards new business models, as identified by Bocken, Weissbrod and Antikainen (2018). In their call for papers, multiple themes that need further clarification or research are identified. Examples of these themes are "*business experimentation for sustainability across organizational contexts*" and "*best practices and case studies of business experimentation for sustainability*".

In this light, Coolcrowd takes the approach by experimenting with innovative business models. The aim of this report is to map the developments and the processes of developing the business models for this proof of concept, acting as a case study in the field of sustainable business model innovation. According to Breuer and Ludeke-Freund (2014), a sustainable business model can be defined as "*a business model that creates, delivers, and captures value for all its stakeholders without depleting the natural, economic, and social capital it relies on.*" (p. 3). Currently, a research gap exists regarding experimentation within the sustainable business model innovation process. Research regarding experimentation has mainly focused on processes within start-ups or businesses, usually without taking a sustainability perspective. Furthermore, this report describes the business model experimentation process within a research consortium, consisting of an interdisciplinary and international research group, thereby differentiating from the commonly found perspective. Creating value through sustainable business model innovation remains relatively underexposed and is argued to be an impactful new research area (Bocken et al., 2016). Therefore, this case study acts as an addition to current literature, presenting the development process of a sustainable business model in an ecosystem involving multiple stakeholders, within the context of an international research consortium.

Thereby, this report has the goal is to answer the following research question:

How can the business model experimentation process for Coolcrowd be characterized?

By answering the following sub research questions:

- ***RQ1: What underlying activities and processes can be identified in experimenting and designing Coolcrowd's sustainable business models?***
- ***RQ2: How have Coolcrowd's business models developed over time?***

In order to be able to gain an overview of this process and the developments, both primary and secondary data will be gathered. First, primary data will be collected in the form of semi-structured interviews project participants to gain insight in the business model experimentation process and the business model developments over time. Second, internal project documents relevant to the research question will be analyzed. The report will be structured as follows. First, the theoretical framework will be discussed. Second, the methodology section will discuss the setup and design of the research. Third, the results of the business model developments will be discussed and lastly the main conclusions are presented.

2. Theoretical Framework

2.1 Business Models

Over the years, business models have been a popular research field, creating many different notions and understandings of what actually conceptualizes a business model. Zott, Amit & Massa (2010) have provided a broad review of the literature on business models in which business model are conceptualized. Despite the wide variety of business model conceptualizations that have come to fruition due to different research interests, it is clearly possible to see the emergence of common themes in literature, namely: "*the business model is emerging as a new unit of analysis; business models emphasize a system-level, holistic approach to explaining how firms "do business"; firm activities play an important role in the various conceptualizations of business models that have been proposed; and business models seek to explain how value is created, not just how it is captured.*" (p. 1019). According to the same authors, the business model can be defined as "*the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities*" (Zott & Amit, 2010, p. 1024).

Connecting the technical and economic domain, Chesbrough and Rosenbloom (2002) define the business model as *"the heuristic logic that connects technical potential with the realization of economic value" (p. 529)*. Thereby, the business model acts as a framework, mapping across the technical and economic domain. Subsequently, it can be seen as a conceptual tool, consisting of a number of different elements that captures and defines this mapping across domains.

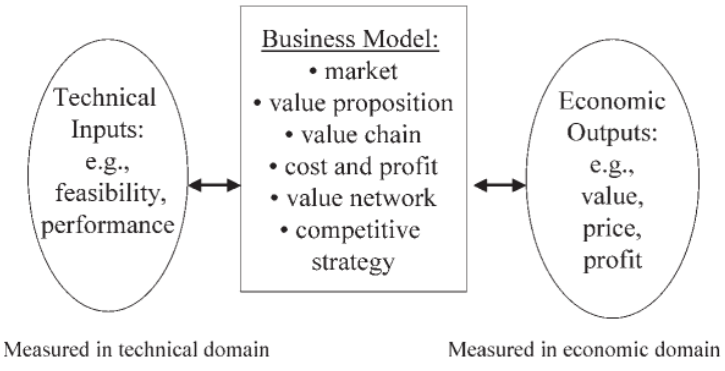

Figure 1: The business model mediates between the technical and economic domains. Source: Chesbrough & Rosenbloom (2002)

Still, the question remains of what actually are these different elements that enable the mapping across these two different domains? In the past (Hedman & Kalling, 2003) and more recently (Foss & Saebi, 2016), it has been found that no consensus exists on what different elements or concepts are included in the business model, and that different problems exist regarding the construct clarity. Over the years, different conceptualizations of what comprises a business model have been proposed. With the intention to integrate previous ideas about business models, Richardson (2008) organized the business model framework around the concept of value by defining four business model components. These consists of the value proposition, the value creation, the value delivery, and the value capture. The underlying rationale is that creating superior value compared to competitors for customers or stakeholders the organization is able to capture a greater amount of value compared to competitors or other organizations. The value proposition defines what the firm or organization will deliver to its customers whereas the value creation and delivery concept captures how the organization will actually both create and deliver the previous defined value. Finally, the value capturing defines how the organization will generate revenues and profits.

A more recent effort to integrate the business model concept by analyzing the theoretical developments and business model definitions in literature, Wirtz, Pistoia, Ullrich, and Göttel (2016) make the case for a recently converging business model view. They state that *"A business model is a simplified and aggregated representation of the relevant activities of a company. It describes how marketable information, products and/or services are generated by means of a company's value-added component. In addition to the architecture of value creation, strategic as well as customer and market components are taken into consideration, in order to achieve the superordinate goal of generating, or rather, securing the competitive advantage."* (Wirtz et al. 2016, p.41). Furthermore, they make the point that an existing business model should be looked at from a dynamic perspective, recognizing that in order to fulfill the above-mentioned goal, a business model should evolve or innovate in order to realign to internal and external changes.

2.2 Sustainable Business Models

Having discussed the concept of business models it is yet left open what comprises a sustainable business model. It is argued that sustainable business model design differentiates from the 'normal' or 'traditional' business model design described in the previous section by approaching the value proposition and creation from a broader perspective. This implies that the more traditional ways of defining value in terms of financial concepts are no longer satisfactory and are thereby accompanied or extended by environmental and social dimensions, thereby taking into account a wider range of stakeholder interests (Stubbs & Cocklin, 2008). This is largely derived from the triple bottom line approach, which is originally an accounting framework striving to foster sustainability. This is achieved by not only employing traditional financial measures such as profit and return on investment, but also incorporating two additional dimensions: social and environmental (Slaper & Hall, 2011). In combination, these three dimensions have also come to known as the three P's: People, Planet and Profits. According to Bocken et al. (2014) this leads to the following definition for sustainable business models: "*innovations that create significant positive and/or significantly reduce negative impacts for the environment and/or society, through changes in the way the organization and its value-network create, deliver value and capture value*" (p.44). In this definition, a clear reference is made to the value framework as defined by Richardson (2008), discussed in the previous section. Another interesting observation from Bocken et al. (2018) is that new (sustainable) business models do not necessarily or automatically always lead to environmental benefits. Hence, it is argued that 'sustainability checks' should be taken into account and incorporated into the business model development process, in order to guarantee its design also leads to environmental value or benefits.

This is also in line with the with the findings of Boons and Lüdeke-Freund (2012), having integrated the literature regarding sustainable innovations by adopting a business model perspective, to arrive at a general conceptual definition of what comprises a sustainable business model. In accordance with Stubbs and Cocklin (2008) and Bocken et al (2014), they argue that the business model's value proposition should clearly provide environmental and social values, however also consider the different (actors or stakeholders in the) supply chain, the customer interface by stimulating sustainable behavior and a sustainable financial model, usually shifting from a "price-per-unit" to a "job-to-be-done" or "pay-per-use" model.

This also leads to the argument of taking a broader perspective, designing a business model not only to capture, deliver, and distribute value according to the triple bottom

line reasoning from the perspective of one firm or entity, but also to actively consider the different stakeholders in the whole ecosystem derived from stakeholder theory (Jensen, 2000). By also taking into account their interests, a wider range of value is considered and possible captured. This is important as the interest of these stakeholders can largely be affected by the business model design, making it inherently either more or less sustainable depending on the decisions made in the design process of the business model.

2.3 Crowdfunding

Crowdfunding has a central place in financing the climate change mitigation technologies within Coolcrowd, and thus also in its business model. According to Belleflamme et al. (2012) the "*basic idea of crowdfunding is for an entrepreneur to raise external finance from a large audience (the "crowd"), where each individual provides a very small amount, instead of soliciting a small group of sophisticated investors*" (p.1). Another similar view is given by Mollick (2014) by specifically pinpointing the platform which has been an enabler of crowdfunding, defining crowdfunding as "*the efforts by entrepreneurial individuals and groups – cultural, social, and for-profit – to fund their ventures by drawing on relatively small contributions from a relatively large number of individuals using the internet, without standard financial intermediaries."*

Having defined crowdfunding, it is necessary to further differentiate between different types of crowdfunding as these will have larger implications on the business model design. These different types comprise of the donation, reward, lending and equity model type crowdfunding. Although very similar to each other, sometimes an additional differentiation between reward and pre-purchase crowdfunding can be made, where in the latter the funder will receive the actual product the entrepreneur is developing as a 'reward' for their funding contribution (Bradford, 2012).

In the first type of crowdfunding, the donation model, funders do not receive a return on investment. Usually donations are directed at non-profit or charity organizations close the funder's values or interests. However, donations to for-profit organizations are also possible. The reward base crowdfunding model offers something in return to the funder as a 'thank you'. Depending on the nature of the crowdfunding project, the reward could comprise of the actual final product the entrepreneur is trying to get funded. Other possible rewards could vary from a small thank you card to an experience or giving credits for the investment on the project's website. The third type of crowdfunding model, the lending model, aims to collect financial recourses from

multiple funders in order to finance a project. In return, the funders get paid back the money, usually including a certain interest rate, being compensated for the risk they face by making the investment. Startups or projects not being able to secure a loan from more conventional sources such as a bank are able to raise funds through this crowdfunding model. And lastly, equity crowdfunding compensates the funders usually with a share of the company or project and/or part of the profits generated. From all four different type of crowdfunding models, this is the most complex one, as it involves the sale of a financial instrument or security which comes with the necessary regulations, not always in favor of or helpful to the crowdfunding model.

2.4 Crowdfunding Sustainable Projects or Innovations

On one side, it is argued that sustainability projects or innovations contributing to a more sustainable society are facing challenges in funding their projects. The main reason is that their focus is not solely on financial performance (Kleppe & Nilsen). It could be stated that these projects contribute to a wider range of aspects (people, planet, profit) by not only considering financial objectives. These dimensions however, are not always easily translatable to the financial domain normally used to assess conventional funding applications (Slaper & Hall, 2011), not even considering the discussion whether financial metrics are always the best approach to capture the value or performance of a project.

On the other side, it is argued that projects with a sustainable orientation enjoy certain additional advantages compared to projects lacking a sustainability orientation. The underlying rationale is that interest in social or sustainable entrepreneurship or developments is increasing. A specific group or niche of people is attracted in financing these projects as they relate to their social responsibility and values (Hemer, J., 2011). For example, Calic and Mosakowski (2016) find through analyzing data collected from the crowdfunding platform Kickstarter that a sustainability orientation of a crowdfunding campaign has a positive effect on the campaign's funding success.

However, other research shows that no such relation exists. A study on 50 successful crowdfunding projects showed that "*although there were big differences in the amount of raised funds and achieved success rates, the sustainable orientation of the project itself was not so important.*" (Motylska-Kuzma, 2018, p. 1). This is accordance with the findings of Hörisch (2015), while studying the influence of environmental orientation on the success of crowdfunding. In this case, 583 projects were analyzed originating from the Indiegogo.com crowdfunding platform. From this analysis, no positive influence of environmental orientation on the success of crowdfunding

projects can be observed. This goes even further as the author states that "*it even provides initial indication that environmental orientation could negatively affect the success of crowdfunding projects*" (p.641). Hörisch continues to provide multiple possible theoretical based explanations explaining these results, relevant to Coolcrowd.

Finally, an interesting observation made in literature is that crowdfunding projects with a sustainable nature do not solely have the aim or motivation to raise funding. Next to the additional awareness and generated publicity also sought after by more conventional projects (Gerber & Hui, 2013), crowdfunding can possibly also create additional societal support for sustainability or in this case renewable energy as argued by Vasileiadou, Huijben, and Raven (2016) due to the active engagement.

2.5. Business Model Experimentation for Sustainability

As indicated earlier, there is a need to make a transition to a low-emission society. In making this transition, it is necessary to adopt new technologies which contribute to the drastically reduction of emissions, as the previous or current technologies no longer suffice. However, introducing these innovative technologies in a system being part of a high-emission or fossil fuel driven paradigm has historically shown to be unsuccessful. In that case, new technologies need to compete with existing technologies in well established markets, resulting in a non-level playing field. In that light, it is important to make a shift from introducing individual climate-friendly technologies to creating a systematic shift (Johnson & Suskewicz, 2009). It is argued that the invention of new technologies only really starts having an impact on society after the necessary systems around them have evolved, enabling them to thrive. The business model can be seen as a framework to drive this necessary systematic change (Johnson & Suskewicz, 2009). This is also acknowledged by Zott, Amit & Massa (2011) who found after reviewing the existing literature on business models that one of the common themes shared among the different conceptualizations of business models is that "business models emphasize a system-level, holistic approach." (p. 4)

Additionally, existing business models can hinder transitions by reinforcing the current system's stability, while new or innovative business models are able to drive the transformations necessary towards new systems. Furthermore, business models enable the set-up or creation of a new system without relying only on technological innovations (Bidmon & Knap, 2017).

Therefore, the case is made that there is an urgent need for new, innovative business models. However, many different variables relevant to the success of new business models are not known at present. Hence, experimentation in discovering and developing these new business models is key (Mcgrath, 2010). In that sense, a discovery (experimentation) process is necessary instead of an analytical approach, commonly employed in designing or problem solving. Realizing this, sustainable business model experimentation has recently become a popular research theme (Lüdeke-Freund et al., 2016; Lüdeke-Freund & Dembek, 2017) and is recognized as an important aspect to contribute to the formation of climate change transitions (Hildén, Jordan & Huitema, 2017). In spite of this gained attention, the sustainable business model experimentation is a relatively new research field, and a deeper understanding of the underlying processes is necessary.

In a recent publication, Bocken, Boons & Baldasasarre (2019) propose a novel framework that provides a systematic view on the sustainable business model experimentation process. This framework is based on three key issues which the sustainable business model experimentation process usually faces, which have been found through a literature review and the author's previous work. These aspects comprise of construct clarity, boundary setting, and uncertainty about outcomes. The issue of construct clarity refers to overall missing clarity on the sustainable business model experimentation (SBME) context and construct. This leads directly to the second issue, as it is hard to set the boundaries in which the SBME takes place due to the lack of construct clarity. Therefore, as the systems boundaries are not defined clearly, it is a challenge to assess the impacts of the implementation of a certain sustainable business model. The third issue, the uncertainty about the sustainable business model outcomes, is a consequence of the first two issues. Due to these unclarities, it is difficult to predict the outcomes of a certain sustainable business model. In that sense, unwanted effects could come along with the implementation which were not predicted beforehand. It is argued to include the system boundary as an explicit consideration within the experimentation process, as it affects which actors are involved in the experimentation process or are affected by its outcomes.

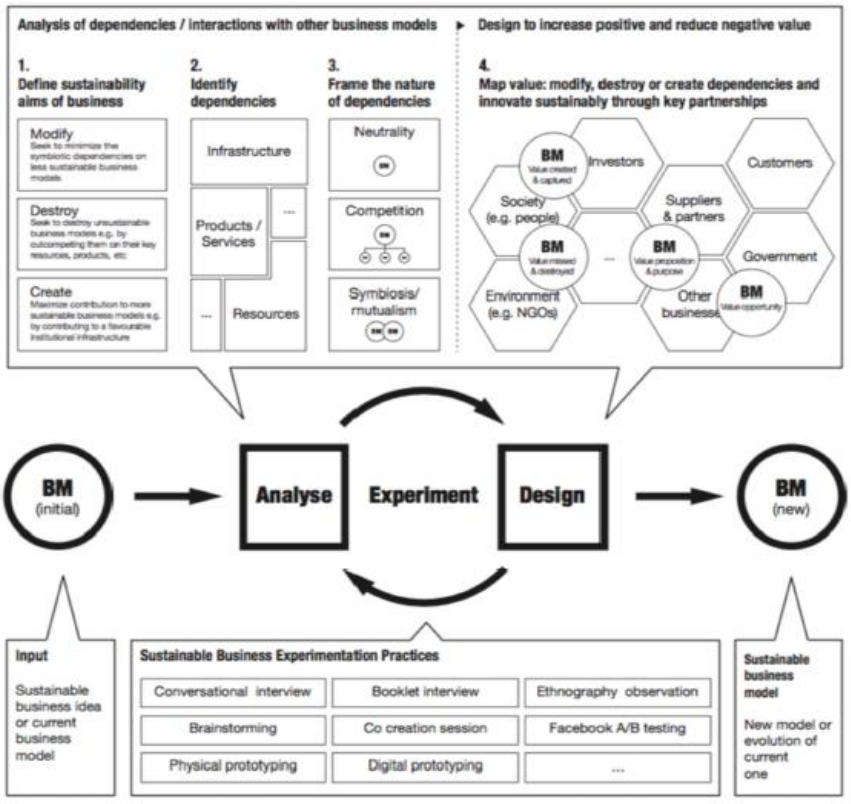

Figure 2: The Ecology of Business Models Experimentation (EBME) map, a framework for the SBME process. Source: Bocken et al. (2019)

Therefore, moving this system boundary, affects who is involved and impacted by the sustainable business model development and acts as a method to consider the (undesired) business model effects. Hence, from earlier analyzation it is argued that including these three concepts in the framework, not only positive societal and environmental outcomes are increased, but also a contribution to the financial viability of the developed business model is made. The Ecology of Business Models Experimentation (EBME) map is proposed as an approach that could drive sustainable business model experimentation, and has the goal to address these previous mentioned issues regarding sustainable business model experimentation.

The whole process starts with a new sustainable business idea which in the end results in a new sustainable business model. This is accomplished after iterating through the experimentation process, in which first an analyze and second design phase is defined based on analysis of interactions with other business models and the increase of positive and reduction of negative values by employing different sustainable business experimentation practices. In that process, first the sustainability aims of the business are defined. In doing so, it is argued that dependencies on other business models can either be modified, destroyed or created, depending on the impact on sustainability goal of the business. During the second step, the dependencies regarding the business idea are identified. These dependencies are reflected through existing infrastructures, products or services, or resources necessary to realize the business idea. In the fourth step, the nature of these dependencies is analyzed, stating whether they are neutral, competitive or symbiotic in nature. The fourth step then takes a design perspective by taking into account the results of the first three steps to explore how positive and negative value can be increased and decreased. An overview of the framework is presented in figure 3.

Another model, describing the creation process of original and useful business models from a conceptual perspective, is presented by Lund, Byrge & Nielsen (2017). In their paper they take a broader perspective, focusing on business model creation in general. Their model is based on the data collected from over 100 companies and 200 entrepreneurs in Denmark. From analyzing this data, they concluded that the process of coming to new, creative business models consists out of 8 different phases. In relation to these different phases, the necessary skills for the organization or entrepreneur to successfully execute each phase is also identified. The eight phases, in order of execution are respectively: Preparations, establishing a creative mind-set, understanding problem or situation, idea generation, professional mentoring and idea development, value proposition design, business model opportunity spotting, and business model implementation. In the results section of this report, this creation process conceptual perspective will be compared to the identified activities and process within the Coolcrowd project. This opens up the possibility to compare Coolcrowd's business model innovation process within a research setting to the identified process originating from researching companies and entrepreneurs.

Figure 3: The eight phases of the creative new business model creation (blue) and necessary skills related to the eight phases (green and pink). Source: Lund et al. (2017)

2.6. Business Model Mapping

Multiple tools have been suggested in literature in order to model and evaluate different business models or business opportunities. One of the most well-known and often used tools in business model mapping is the Business Model Canvas, as proposed by Osterwalder and Pigneur (2011). This mapping tool consist of 9 building blocks, wherein respectively the value proposition, key activities, key resources, key partners, customer relationships, channels, customer segments, the cost structure and the revenue streams are defined. Designing or mapping these aspects of the business model not only helps to assess the value proposition, but also how this value is created, distributed and captured in relation to the focal company or organization. Hence, business model mapping by employing the Business Model Canvas or any other mapping tool can be beneficial to clarify underlying value creation and capturing processes.

Figure 4: The Business Model Canvas. Source: Course 'Technology Entrepreneurship', Eindhoven University of Technology (2018)

However, legitimate questions can be raised whether certain mapping tools such as the Business Model Canvas are suitable or supportive in mapping sustainable business models. Firstly, this is due to the fact that mapping tools like the Business Model Canvas take a too narrow view in relation to value, or at least do not invite users to specifically consider a broader range of value, such as societal or environmental value. Secondly, possibilities are limited in mapping or creating an overview of a (complex) network of stakeholders, which is a prerequisite to arrive at an understanding of the shared value creation and capturing process through multiple stakeholders or actors inside an ecosystem.

In light of these observations, either adaptions to existing mapping tools or totally new business mapping tools have recently arisen in literature. One adoption to the

Business Model Canvas has been proposed by Bocken et al. (*2018*). In this adapted business model canvas, the value proposition has been extended to include different types of values based on the triple bottom line framework. Hence, the value proposition is adopted to account for 'people', 'planet' and 'profit' enabling the mapping of financial, societal and environmental value. This should stimulate users of the tool to take a broader perspective on the business model value proposition by including the environment and society.

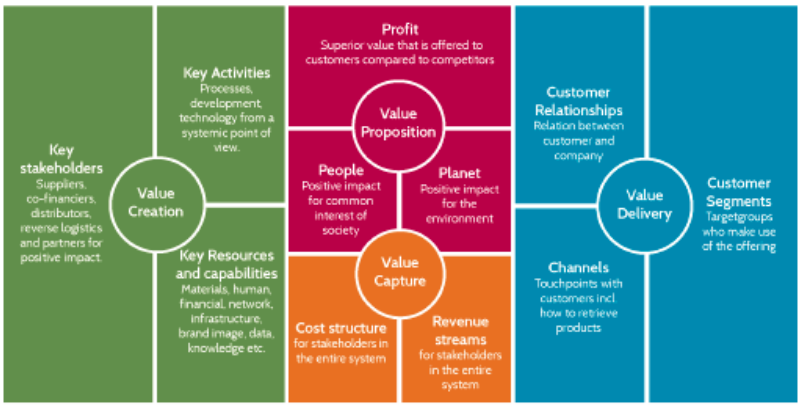

Figure 5: Adopted business model canvas to account for a more holistic view of value. Source: Bocken et al. (2018)

This logic behind this adoption to the business model canvas is also shared by Joyce and Paquin (2016), proposing a triple layered business model canvas. Similar to the approach by Bocken et al. (2018), the business model canvas by Osterwalder and Pigneur is extended to account for an "environmental layer based on a lifecycle perspective" and a "social layer based on a stakeholder perspective." It is argued that taking into account these additional layers into the canvas, a more holistic view of the business model is communicated and supports or leads users to innovate towards more sustainable business models.

Another paper by Bocken et al. explores a completely new business model mapping tool which has the goal to enable the development of business models which are fundamentally sustainable, explicitly considering the interests of different stakeholders. The aim of the mapping tool is threefold: *"understand the positive and negative aspects of the value proposition of the value network", "identify conflicting values, so that action can be taken to tackle these",* and *"Identify opportunities for business model redesign and realignment of interest to reduce negative outcomes and improve the overall outcome for the stakeholders in the value network – especially for society and the environment"* (Bocken et al. 2013, p. 489). This resulted in a mapping tool facilitating systematic value assessment, a holistic or multiple stakeholder view of

value, and a network centric perspective which encourages a more sustainable distribution of value across the whole network.

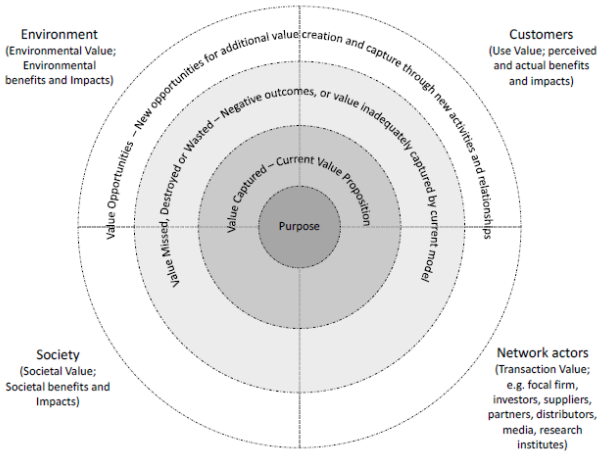

Figure 6: Value mapping tool for sustainable business modelling. Source: Bocken et al. (2013)

In their research paper, Brehmer, Podoynitsyna, & Langerak (2018) argue that especially sustainable innovation requires for stakeholders to collaborate across organizational boundaries, taking a similar stance as the theory discussed earlier regarding sustainable business models. Therefore, in analyzing business models of 64 innovative sustainable organizations they take a boundary spanning perspective. By taking this perspective, which is visualized using the Business Model Connect mapping tool (BMConnect tool, 2017) they argue that additional or complementary insights are gained to the component-based view of the business model such as the Business Model Canvas. In the website supporting the tool they describe that it *"allows you to make in-depth mappings of the business model's structure and content of value transfers, offering an array of options for both value creating, as well as value capturing transfers. It also allows you to map interactions between the business model and (innovation) ecosystem structures, making it possible to come up with novel insights."* (BMConnect tool, 2017). Hence, employing this tool should enable the user to take a more ecosystem approach, considering all different stakeholders in the model including the value they co-create and capture.

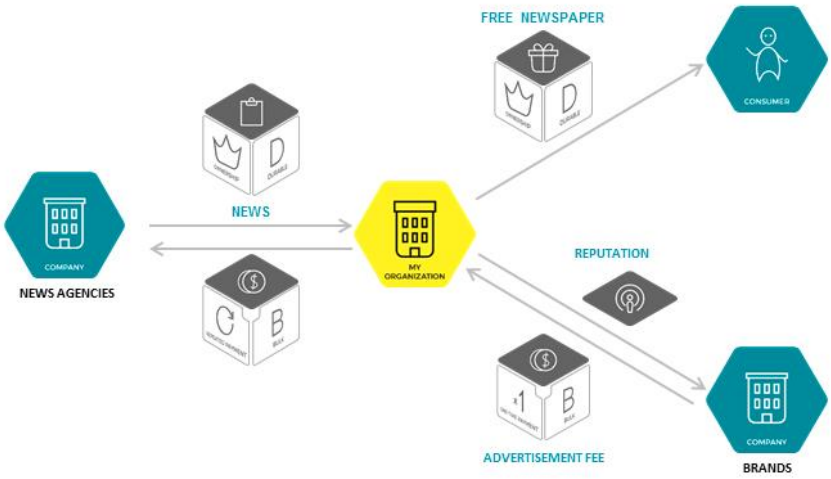

Figure 7: Business model connect mapping tool. Source: BMConnect tool (2017)

Finally, it is important to state that the mapping tools presented in this overview are not mutually exclusive to each other. It can be observed that these mapping tools are also employed in combination, in order to complement each other and arrive at a holistic approach to developing or analyzing different business models. This can for example be found back in the work of Brehmer, Podoynitsyna and Langerak (2018), where first the business model components were identified using the business model canvas and consecutively analyzed (coded) to enable mapping of the underlying business model structure by using the Business Model Connect methodology. Another suggestion is given by Bocken (2013, October 16) which proposes the combined use of the value mapping tool described above in combination with the adopted business model canvas, enabling a broader range of value to be defined.

This section has given an overview of different business model mapping tools, focusing specially on the sustainability aspect. By creating an overview, it is possible to analyze on one side what aspects some mapping tools contribute in designing a sustainable business model while on the other side it also reveals the limitations of certain (types of) mapping tools.

3. Methodology

3.1 Data Collection

In order to answer the research question, a broad range on data within the Coolcrowd project is collected. By analyzing this data, the goal is to map both the business model experimentation process and to map the business model development over time. Because any existing data within the project can be of interest for this research, initially a broad perspective is taken on the data collection. The data collected within the research consists of both primary data in the form of interviews as the main source used in this research and secondary data consisting of mainly project documents. Collecting these different types of data enables triangulation, increasing the validity of the research (Johnson, 1997). In addition, research findings are validated in a final interview with the research project leader.

Primary data

Primary data is collected through semi-structured interviews with relevant research participants. The goal of the interviews is to further explore the executed research activities, results and collaborations within the overall research project. These interviews will build upon the preliminary results of the secondary data consisting of different types of project documentation. Emphasis will be placed on how these aspects had impact on the business model experimentation process and business model developments. As different work packages interact with the business model innovation process, a range of researchers covering different work packages are interviewed. Semi-structured interviews are chosen as a tool to collect information due to the possibility to enable interviewees to further explore topics or issues they feel are relevant or important in relation to the topic of this research (Longhurst, 2003). An overview of the different interviewees can be found in appendix B.

After asking permission, the interviews were recorded in order to enable further analysis afterwards. Due to a fault in the recording technology, the recording of one interview failed. To cover this, a summary of the main interview results was made directly after the interview with the help of hand-written notes. It was considered that not every research participant is actively trained or well known to business models or to the development process of business models, but are rather responsible for a research deliverable which feeds into the business model experimentation or development process. To cover this, a presentation was prepared and presented before the interviews to introduce every interviewee to the research topic. Special

focus was placed on the underlying theory, the business model construct and terminology, the research methodology and the goal of the research and interviews. This enabled every participant to get acquainted and introduced to the research topic. Consecutively, questions were asked regarding the background and research interests of the participant and how this related to their activities within the research project. What followed were questions regarding their research activities within Coolcrowd, how this research was designed or carried out, collaborations with other project members, and what the (initial) findings were which were relevant to the business model experimentation and design process. As some researchers focused on totally different aspects within the research project, the interview guide was applied in a flexible manner. While some questions were relevant in one interview, others were not. The interview guide can be found in appendix A.

In total 5 interviews were conducted, which covered 7 different researchers. The duration of the interviews lasted from 29 minutes to 1 hour and 18 minutes. One interview was held with the three researchers simultaneously, who were most responsible for Coolcrowd's business model developments within work package 2.3. This enabled them to get a complete view, as the interviewees were able to complement each other in answering or discussing certain questions.

During the interviews, it was found that participants had a hard time recollecting the different research activities carried out. A possible explanation for this is that it is a research project spanning multiple years with complex interactions between the work packages. In order to account for this, a timeline of all relevant research activities within the project was created through the analyzation of the secondary data and a discussion with the research project leader. This resulted in a broad overview of some of the main research activities carried out in the project from the start of the research project to the date of the respective interview. This timeline can be found in in the interview guide in appendix A. After consultation, it was decided to take this initial timeline as framework to discuss the research activities of the interviewee within the project. This was combined with the drafted questions for the interview guide. It was found that interviewees found it easier to recollect the different research activities relevant to the business model experimentation or design process they were involved in, making the interview more productive and data collection more complete. Collecting this data enables the identification of Coolcrowd's business model innovation process. This identified process is then compared to business model innovation process identified earlier in literature. As mentioned earlier, the interview guide for the semi-structured interviews can be found in appendix A.

Secondary Data

The secondary data stream used for this research consists of a wide range of deliverables for the Coolcrowd project. This data does not limit to the deliverables for work package 2.3, in which this research is situated. Both general data in combination with data from the different work packages are included in the data collection. Collecting this secondary data enables both triangulation and a first mapping of the business model experimentation process, the research activities included and enabled to make an overview of the lessons learned from the different work packages regarding the business model(s). The secondary data contains, but is not limited to, Coolcrowd reports, content of the Coolcrowd website, presentations, news articles, meeting notes and thesis reports. In total 26 different relevant documents have been collected, consisting of six project deliverables, four presentations, three relevant web pages of Coolcrowd's website, three news articles, five different meeting note documents, and five other relevant project documents. An extensive overview of all the secondary data can be found in appendix C.

3.2 Data Analysis

As described before, the interviews were recorded to enable analyzing and processing afterwards. In order to obtain an overview of the business model experimentation process, interviews were either fully typed out or summarized including findings relevant to this process. Comparing and analyzing the findings for the different interviews results in a complete dataset regarding the experimentation process, enabling to capture and analyze the complete process. This also enables the comparison with the processes and framework identified in relevant scientific literature.

To capture the development of the business model, the interviews were scanned and reviewed for three different themes or aspects. The first point of interest were the research activities or experiments carried out within the sustainable business model experimentation process. The second aspect of interest can be classified as the collaboration within the business model experimentation process. And lastly, the third point relevant to the research were the business model developments, taking a content perspective. Points relevant to these three different aspects were coded accordingly.

Initial coding categories regarding the business model content were defined taking the Business Model Canvas by Osterwalder and Pigneur (2011) as starting point. Statements regarding Coolcrowd's business model or statements having an indirect

implication for the business model were coded to one of the nine building blocks of the canvas. This enables the relation of the different statements or research findings to a business model mapping tool, acting as a systematic translation tool. An overview of the different coding categories can be found in appendix C.

4. Results

As stated before, the project goal of Coolcrowd is to come to a proof of concept for crowdfunding local agricultural climate measures by connecting both the agricultural and transport sector, and by enabling travelers to effectively offset the carbon emissions from travelling.

An important deliverable of this proof of concept study is (a) viable business model(s), which can be implemented in Norway as an effective climate mitigation approach. From the perspective of both the research project and this report, this can be seen as the output of the innovation and experimentation process the research project moves towards as it progresses. Taking a top-level view, this process can be represented by figure 8. The input and start of the experimentation process are given by a new business model idea or possibly also a current business model to innovate. The experimentation process consequently acts as a learning process to validate the initial business model idea and to iterate this idea to a final business model which acts as a proof of concept for the research project. This validation and learning are done through different experiments or research activities, feeding into the business model. Each experiment or activity is situated in a certain research work package, and the business model framework acts as the connecting link between these different activities, explaining the central role of the business model in the research project. This view is confirmed during one of the interviews, where one researcher stated the following: *"I see that the business model helps to connect all the other work packages, taking up a central role in the project. It takes up a central role in the project, and glues everything together. All other work packages feed into the business model"* (Interviewee wp2.3, 2019).

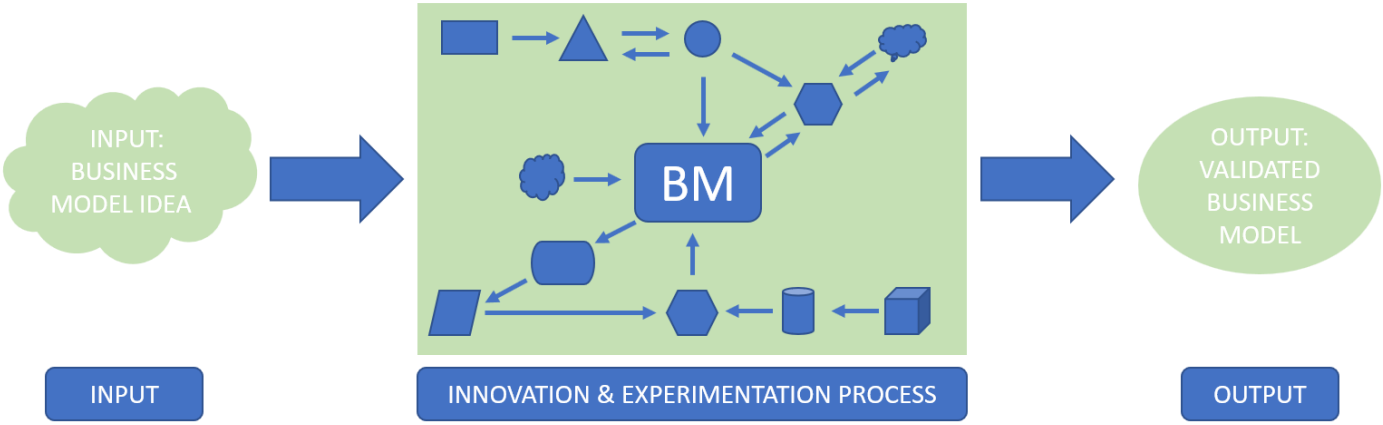

Figure 8: A top-level overview of the business model experimentation process. Based on figure 2 (Bocken et al, 2019)

This section of the report will give insight in the underlying activities and processes that took place within Coolcrowd in order to innovate and experiment toward its desired output: a validated business model of the initial innovative business model idea. For this purpose, different aspects related to the research project will be discussed. First, the initial business model idea will be further described. Consecutively, an overview of the research partners and stakeholders will be given who take part in the experimentation process. After that, an overview of the research activities and experiments within the research project will be displayed. This is accompanied with a process description. Thereafter, a section will be devoted to the collaboration within the project. Finally, an overview of the business model developments throughout the project will be portrayed, also aiming to give insight in the decision process regarding these developments.

Before continuing it should be recognized that the results presented here do not display the final results or final business model of the research project. In the time of writing this report (June 2019), the research project is still ongoing. However, it does give a representation of all research activities and processes from the beginning of the research project to the project meeting in Bergen (March 2019).

4.1 Input: The Business Model Idea

The project leader and initiator of the research project used her problem and situational understanding as described by Lund et al (2017) of both the GHG emissions, offsetting carbon emissions, and the situation of Norwegian farmers to come up with an innovative way to connect both worlds, though the means of crowdfunding.

The expertise view of these specific societal and environmental challenges Norway is facing resulted in a first idea generation phase towards a solution direction. This stage was initially executed within Ruralis, and other researchers were involved in developing and brainstorming to end up with this initial research idea. Soon after the initial idea was developed, a first literature study led to other researchers with expertise in the fields of agriculture, crowdfunding, carbon offsetting, climate strategy, sustainable business models, and legal aspects, among others. Involving researchers from these different fields let to a further maturing of the research design and initial business model idea, of which the framework for these developments could be found in writing and further developing the research proposal. Different work packages were identified and further developed which were necessary for the research to experiment toward a validated business model. These included work package 2.1, reviewing international climate crowdfunding schemes; work package 2.2, investigating the legal

and socio-cultural barriers; work package 2.3, in which alternative business models are explored and further refined; work package 3, exploring the farmer demand and design preferences; and work package 4, investigating the public demand and design preferences. This process largely took place between May and September 2016 and resulted in the research project approval by the Norwegian Research Council in December 2016.

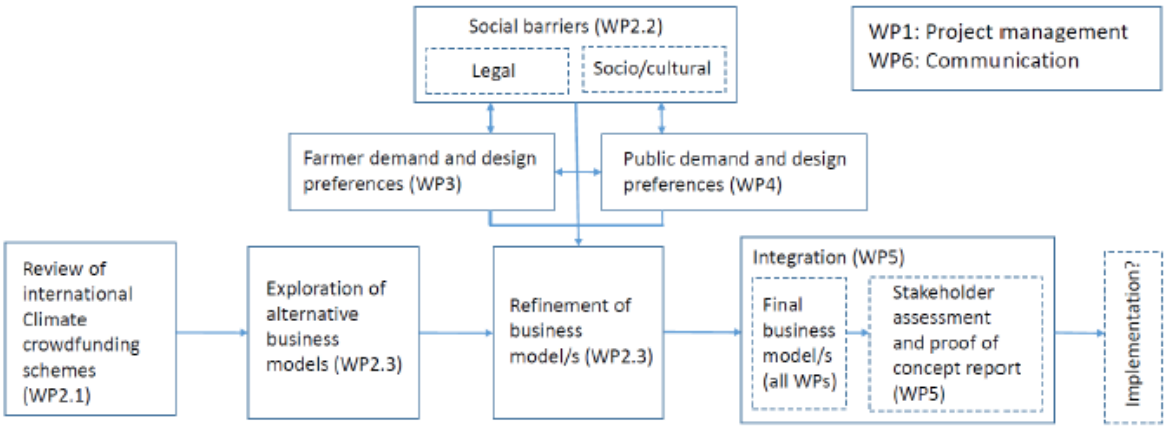

Figure 9: Overview of the work packages identified during the initial idea generation phase

This phase of the business model experimentation process is in line with the start of business model experimentation or innovation processes found in the literature. Bocken et al. (2019) state that a business model experimentation process starts with an initial input, which could either be an existing business model to be innovated or an innovative new business idea to be further explored. Coolcrowd falls into the latter category. Lund et al (2017), after having evaluated and researched 200 entrepreneurs and over 100 companies, identified an eight-step process leading to original and useful business models. The initial idea generation phase of Coolcrowd, taking place before and during the research proposal writing, is in line with the second, third and fourth process step Lund et al. identified, namely: Establishing a creative mindset, understanding problem or situation, and the idea generation phase. It is important to note that although these process steps took place within the initial phases and proposal writing of the project, this does not imply that they ended there.

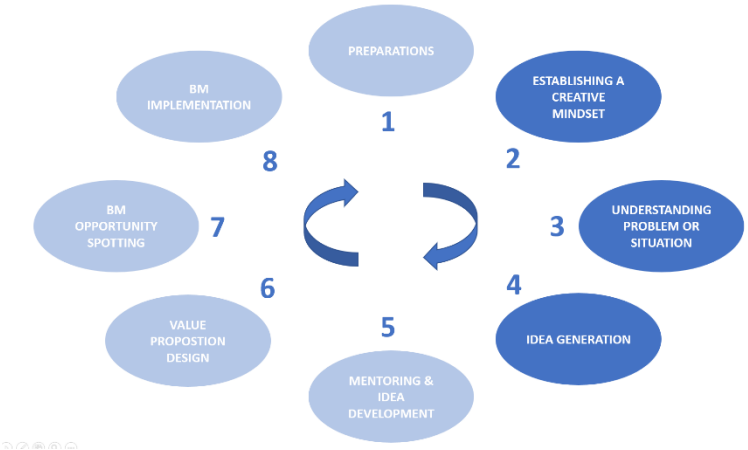

Figure 10: Three process steps from Lund et al which were also identified in the initial stages of the Coolcrowd research project

4.2 Research Partners and Stakeholders

In order to come to a viable proof of concept, both research partners with different types of expertise and different types of stakeholders are integrated into the business model experimentation process. On the one hand the research partners contribute with their own expertise to cover the different dimensions of the business model, while on the other hand relevant stakeholders or possible end-users are integrated in the experimentation process to align the proof of concept study to their needs and increase the possible adoption afterwards.

Research Partners

As mentioned earlier, exploring the initial business idea led to an initial literature search to investigate the current state of literature in the field. From this search, relevant researchers were contacted which were identified through the literature search. Through this method, researchers were recruited for the project or in some cases referred to by other researchers. In combination with known research relations from Ruralis, this led to an international and interdisciplinary research collaboration. In total nine different research partners participate, forming a research consortium consisting of Ruralis, University of Olso (UiO), Western Norway University of Applied Sciences (HVL), Norwegian School of Economics (NHH), Norwegian Business School (BI Center for GreenGrowth), Norsøk, Eindhoven University of Technology (TU/e), University of Western Australia and the University of Otago (CSAFE). Each partner contributes to the process with their own expertise. Ruralis facilitates the project management, leads the work package on the farmers' willingness to participate in crowdfunding, handles most of the data processing within the project and is heavily

involved in all other work packages. The University of Oslo gives input regarding the legal aspects for the design of the crowdfunding program. The Western Norway University of Applied Sciences, Eindhoven University of Technology and the Norwegian School of Economics contribute largely to the business model developments. The Norwegian Business School, with an expertise in climate psychology, facilitates the research on the factors that determine the public's willingness to participate in a locally crowdfunded climate program. Finally, Norsøk, the University of Western Australia and the University of Otago are involved in the farmer's side of the research and experimentation process, having expertise in agriculture, accounting of GHG emissions and choice experiments.

Figure 11: The 9 different research partners working together within the international research consortium

Stakeholders

The project is not only a collaboration between the different research institutes, but also aims to involve relevant stakeholders from outside the research project. Including these external stakeholders in the business model innovation process has the aim to improve the implement ability and feasibility of the proof of concept study. Although the implementation of the proof of concept is not in the scope of this research project, it is important to take these aspects into account to deliver relevant user-friendly research to society. Therefore, from the start of the research project, relevant external stakeholders have been identified and included in the research project. Throughout the whole business model development process, these stakeholders provide valuable feedback along the way on new developments or whenever input is required. The stakeholder participants are respectively SAS, Trøndertaxi, Bidra.no, two Norwegian

farmers' unions (Norges Bondelag, Norsk Bonde- og Småbrukarlag), Ducky, Cultura Bank, University of Agder (Rotem Shneor), Innovation Norway, and the Norwegian Environment Agency. It is observed that no specific work package is assigned to transportation companies. However, they are well represented in the project by SAS (airline company) and Trøndertaxi (regional taxi company) in the stakeholder group. Bidra.no (crowdfunding platform) and the University of Agder provide feedback on the crowdfunding aspect of the project. Ducky is specialized in engaging groups of people in sustainability, having developed a platform directed at organizations with this goal in mind. The Cultura Bank provides feedback on the financial aspects of the proof of concept design, and also has expertise in crowdfunding. The Norges Bondelag and the Norsk Bonde- og Småbrukarlag provide feedback from the farmer's perspective, being both umbrella organizations. Lastly, Innovation Norway and the Norwegian Environment Agency represent the overall Norwegian interests.

Figure 12: External stakeholders participating in the research project

4.3 Research Activities or Experiments and Timeline

In order to gain insight in the business model development process, an extensive timeline was made from data obtained from the interviews and secondary project data. The timeline runs from May 2016, the period in which the research proposal was written to June 2019, the end date of this research. It is important to note that June 2019 is not the end date of the Coolcrowd research project, resulting in some limitations in the sense that not all research and experiment activities have been completed and the business model(s) have not been validated fully. To increase

readability, different types of activities have been labeled according to different colors: Project meetings are visualized in blue; stakeholder meetings are displayed in red; research visits are shown in brown; research reports are labelled green; decisions regarding the business model is visualized in orange; remaining activities such as guest lectures, conference meetings, and specific research sessions have been depicted in black.

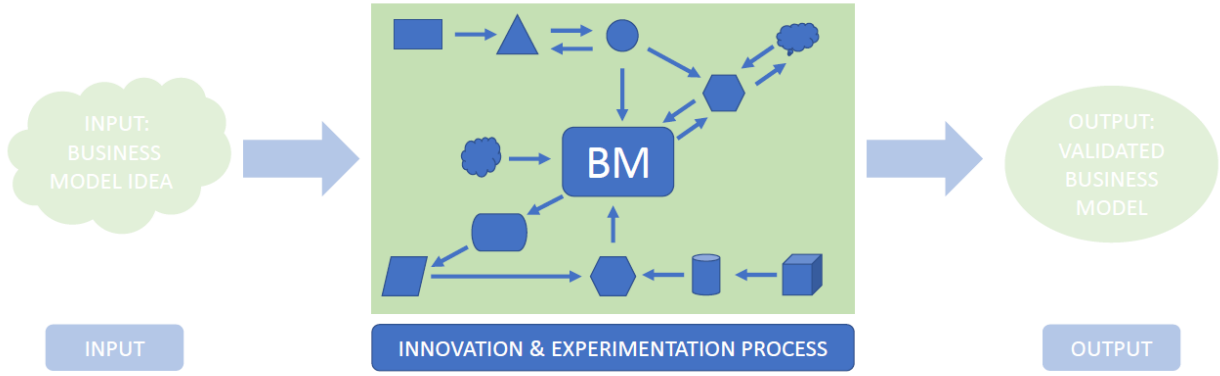

Figure 13: Focus point: Overview of research and experimentation activities feeding into the business model

Analyzing the timeline from a top view perspective, some interesting observations can be made. In the first half of the timeline, running roughly from the start of the project to June 2018, many activities are focused on either learning broadly about the different aspects of the project. Therefore, one could see this as the diverging stage. Different options regarding the aspects of the project are considered and ideas are gained. This is reflected for example through multiple seminar and conference visits, a desk study, first discussions with stakeholders, learning lessons from existing crowdfunding projects and platforms, and integration into student courses to foster additional idea generation. This is also confirmed by one interviewee who stated that: "*we really explored a lot in the beginning. Off course, not all the information was relevant in the end, but it also helped us in our thinking.*" (Interviewee wp2.3, 2019).

In the second part of the project, it can be observed that more in depth research is taking place, which leads to a more converging process within the research and experimenting phase. This is accompanied with data collection and the first evaluations and choices made for the final business model. Examples of activities which underline this are the multiple reports being generated, the research visits which focus on carrying out joint research, conducting a large-scale research survey, co-creation sessions, and the first decisions being made on Coolcrowd's business model. This was confirmed in an interview carried out during the Bergen project

meeting in March 2019, where it was identified that after the initial diverging stage, quite some in depth research had been done, stating that "*now we are almost finished with the data collection*" and "*and really have to narrow down [the business model further]*." (Interviewee wp2.3, 2019).

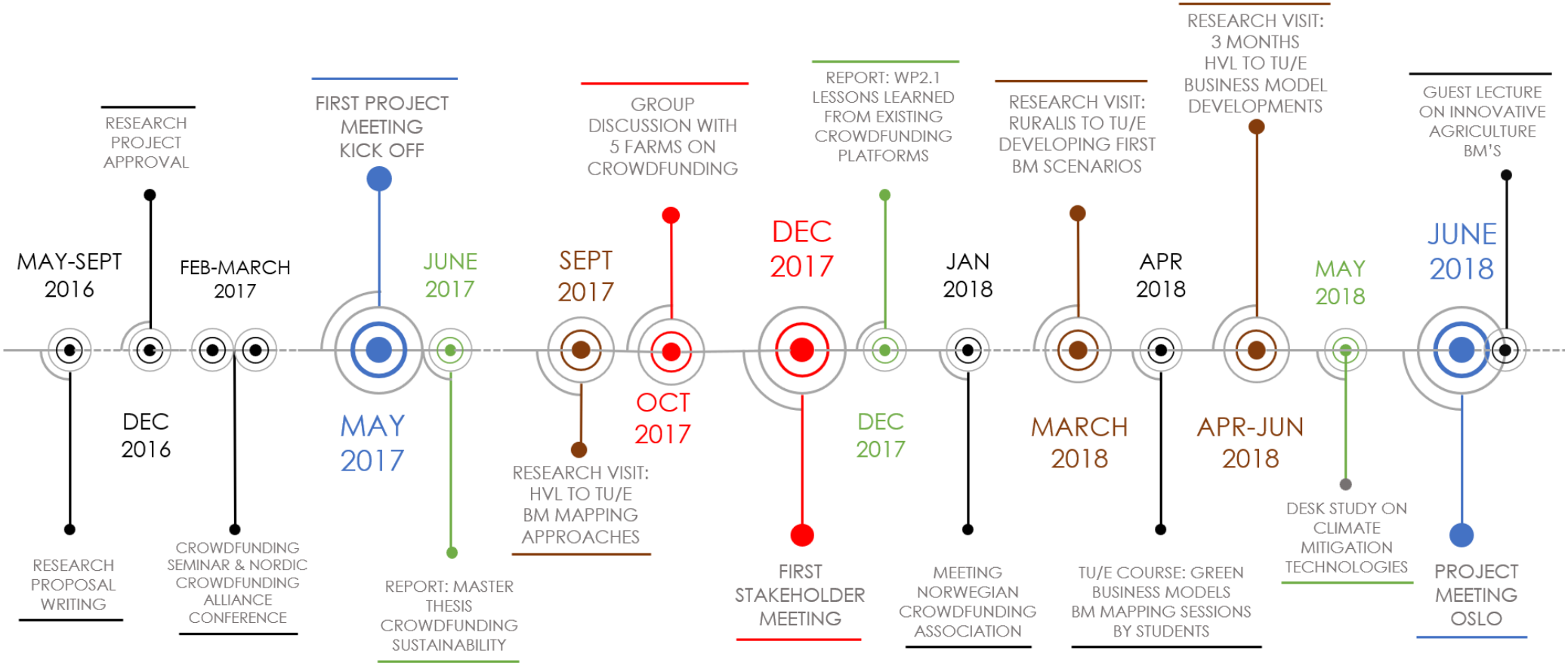

Figure 14: First part of Coolcrowd's timeline running from May 2016 to June 2018

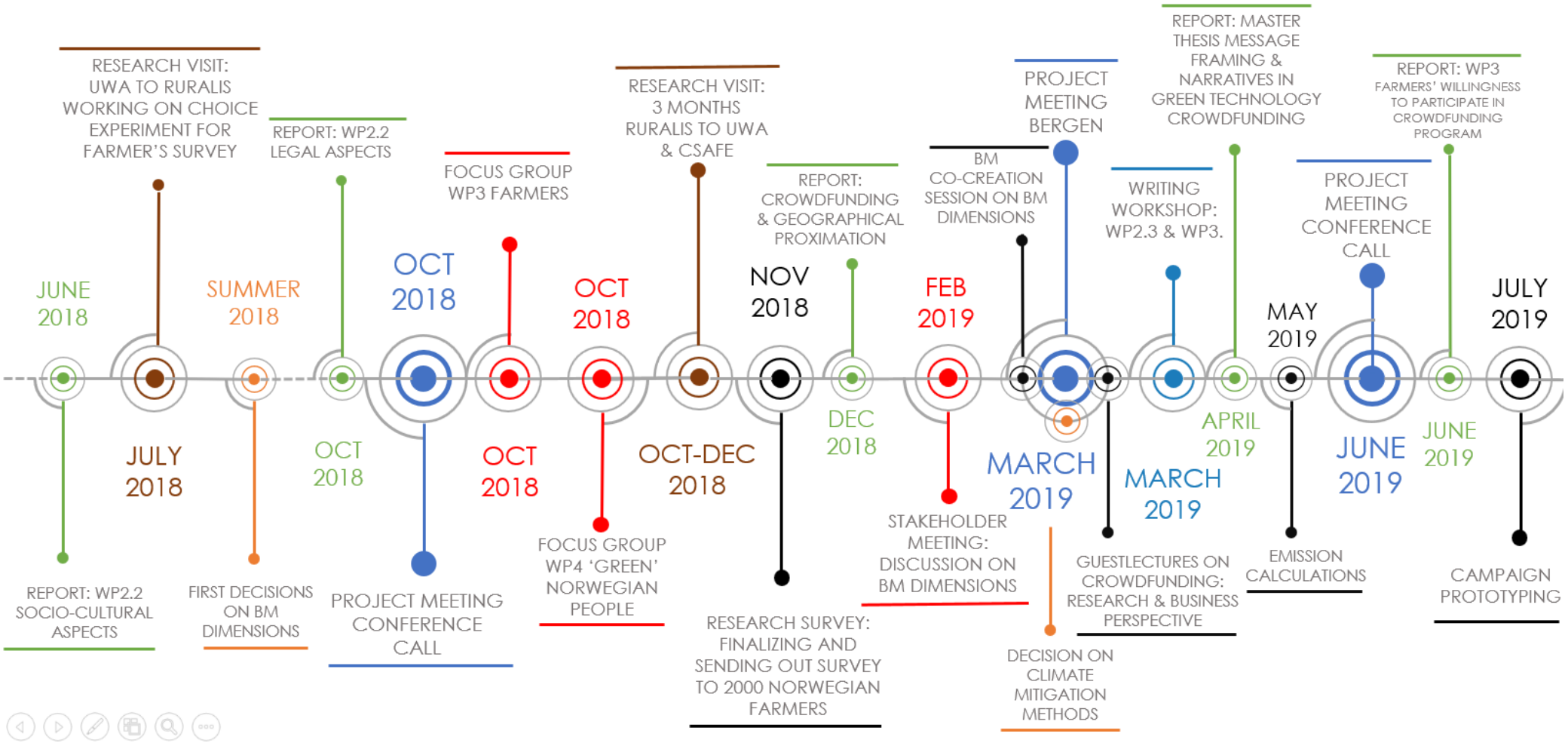

Figure 15: Second part of Coolcrowd's timeline running from June 2018 to July 2019

Research and experimentation tools

A wide range of research practices are incorporated into the business model development process, in total 15 different practices have been identified. An overview of these practices has been included in the figure below.

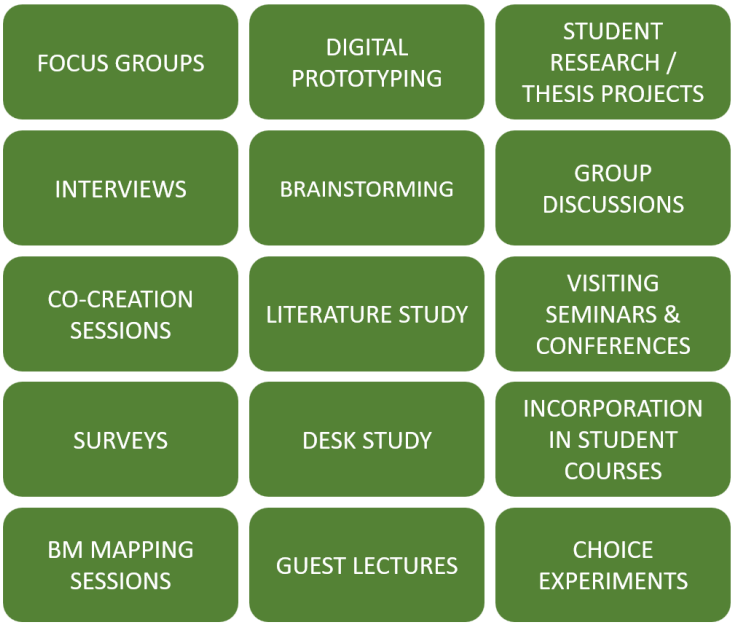

Figure 16: An overview of the different research or experimentation practices within the business model development process

These practices include focus groups, interviews, co-creation sessions, surveys, business model mapping sessions, digital prototyping, brainstorming sessions, literature studies, desk studies, guest lectures, student research or thesis projects, group discussions, visiting seminars and conferences, collaboration with university courses, and choice experiments.

- Researchers attended multiple conferences and seminars, mainly during the first period of the project. These visits, which included presentations regarding different aspects relevant to the research project, helped to learn about the latest developments and specifically the situation regarding crowdfunding in Norway.

- Student research projects and master theses focused on a wide range of topics, including projects addressing the crowdfunding of sustainability projects, crowdfunding and the relation to geographical proximity, and the message framing and narratives in green technology crowdfunding. Furthermore, Coolcrowd hosted a guest lecture within a course focusing on sustainable

business models. In return, students worked out and generated different business model scenarios and ideas, which were used as input in the business model experimentation process.

- Desk studies were employed to investigate and learn broadly about certain aspects during the early stages of the project. For example, one study focused on investigating the different climate mitigation technologies currently available on the market while another desk study focused on mapping the socio-cultural barriers regarding crowdfunding in Norway.

- Multiple literature studies were carried out. One study, part of work package 2.1, focused on the lessons learnt from existing crowdfunding platforms and projects. This research is an important input for work package 2.3, which focusses on development of alternative business models of climate mitigation crowdfunding in Norway. Other literature studies were mainly part of other project reports or master theses.

- Guest lectures, and business model mapping sessions took place mainly during the project meetings or research visits. The guest lectures offered relevant insights on the different research aspects within Coolcrowd. These lectures took both a scientific perspective, by inviting relevant scientists, and a more entrepreneurial or business perspective by hosting relevant business people. To illustrate this, one guest lecture was given by a scientist from the university of Gothenburg on the success factors of (social oriented) crowdfunding campaigns, while other lectures focused on the business side of (equity) crowdfunding (AROUND) or innovative business models in agriculture in the Netherlands (COCRATOS). Business model mapping sessions were held in a group setting together with research participants. An example of business model mapping tool employed in the project is the Value Mapping Tool developed by Bocken et al. (see sections 2.6). Subsequently, according to one interview, the results of such a mapping session was used as an input for the survey design, targeted at Norwegian farmers.

- Surveys are employed to learn more about the two connecting parties in the crowdfunding campaign, in particular in relation to crowdfunding: the Norwegian farmers and the general public. Questions specifically dealt with crowdfunding in general but also presented specific questions related to

Coolcrowd in order to gain an insight in for example the farmer's preferences regarding the crowdfunding type employed or questions related to other business model dimensions. Specially for this reason, a choice experiment was incorporated into the survey, designed to draw conclusions regarding what the best type of crowdfunding model to be used, the amount of cooperation and interaction between farmers and the public, collecting farmers' views regarding the possibility of co-financing, and the best way to run the crowdfunding platform and by which party.

- An important input for the survey designs were the group discussions and focus groups with the respective parties. Group discussions were employed to gain a first insight into the familiarity and view of farmers regarding crowdfunding, and specifically the crowdfunding of climate mitigation measures on their farms. Three types of different focus groups are part of the learning or experimentation practices, namely focus groups with Norwegian farmers, Norwegian people, and companies. Group discussions and co-creation sessions are also held together with stakeholders such as transportation and crowdfunding platform companies as discussed earlier in section 4.2 of this report, mainly to guarantee the implement-ability and feasibility of the proof of concept study.

- Building on the lessons learned from other research or experimentation tools, multiple prototype campaigns are designed. These campaigns are subsequently used as an input for the survey targeted at the general public to learn about their preferences regarding the different business model dimensions. In the different campaigns, variations are made regarding these dimensions. Implementing this approach, enables the lay people to base their choices and preferences on tangible examples.

- Both existing crowdfunding platforms and campaigns are analyzed in order to gain an insight in the best practices. Platforms have been analyzed regarding their overall business model, also making use of business model mapping tools, while existing crowdfunding campaigns have been researched in forms of relevant scientific literature and collection and analysis of data on crowdfunding campaigns in the field of sustainable technologies.

Business Model Creation Process

Comparing Coolcrowd's business model creation process to the identified process of Lund et al. (2017), similarities can be observed. Multiple steps of the 8-phase model can be translated to the activities or practices identified in the research project. The only steps of which no evidence or translation can be found comprise the first and the eight step in the cycle: the preparation phase and the business model implementation phase. The business model implementation phase is simply not observed due to the fact that implementation of the developed business model is not within the scope of this research. The identified preparation phase in the literature comprises mainly of activities to set the right conditions for the team to go through the initial stages of the business model creation process. This implies for example implementing different creativity techniques and taking away objects or boundaries that may hinder the creativity and creation process. No evidence has been found for this step. It is observed that although implementing this step in the process could lead to beneficial effects in the initial stages of the business model creation process, it is definitely not a prerequisite for successful business model development. Subsequent research projects could take this preparation step into consideration

The second, third and fourth step of the business model creation cycle, consisting of *establishing a creative mindset*, *understanding problem or situation*, and *idea generation*, have already been identified to be part of Coolcrowd's business model experimentation process in section 4.1 (figure 10). Although they were part of the initial business model idea generation phase, they did not end there. The business model development process within Coolcrowd takes a very iterative approach. As the work packages are interrelated and depend on each other, different phases can be observed throughout multiple points of time in the project. For example, organized focus groups both with farmers and the lay people can be classified at least partly as an activity within the *understanding problem or situation* phase. Furthermore, the *Idea generation* phase has certainly not stopped after the initial stages of the research project. To name one example, collaboration with a university course centered around sustainable business models evolved around generating new ideas regarding the business model, and took place around April 2018.

The fifth phase in the cycle, *professional mentoring and idea development*, which requires the key skill identifying existing business models, can be clearly observed within the activities in work package 2.1: review of international climate crowdfunding schemes. During the research activities within this work package, relevant existing

business models were identified and analyzed. This was subsequently published in the report: *Lessons learned from existing crowdfunding platforms*.

The sixth phase, *value proposition design* can mainly be related to activities focused on understanding the customers' or in this case stakeholders' needs. This is an ongoing phase in the business experimentation process, reflected in activities such as focus groups, surveys targeted at farmers and the general public, business model mapping sessions, and stakeholder meetings where different interests and needs are revealed and considered.

The seventh and last phase identified within the Coolcrowd project, centers around *business model opportunity spotting*. One of the key skill part of this phase is the *evaluation of potential solutions and test and validation of potential*. This is executed in the research project by designing multiple prototype campaigns. These designs are built upon the lessons learned from the employed research or experimentation practices. Subsequently, these campaigns are incorporated in the survey targeted at the general public and discussed during focus groups. Through this way, potential business model solutions are tested and validated.

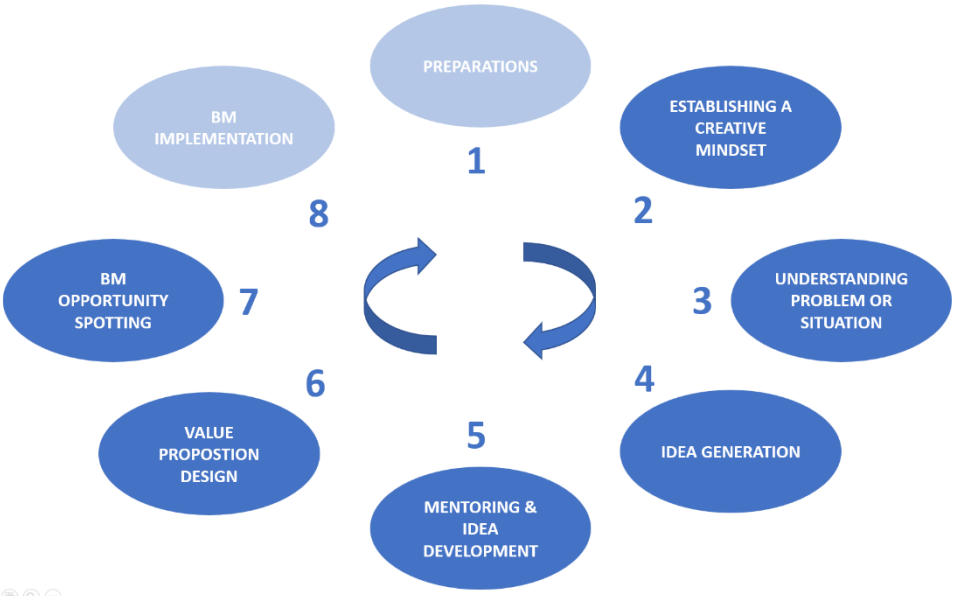

Figure 17: The six phases from Lund et al. identified in the Coolcrowd business model development process

4.4 Collaboration

As this research project is interdisciplinary, with a lot of research partners and other stakeholders involved, it is interesting to shed light on how the collaboration within the project took place. There are nine different research partners working together to deliver the proof of concept study. On top of that, multiple external stakeholders are integrated in the business model innovation process. The project aims to integrate processes or activities that foster extensive collaboration among the different parties. Among these activities are project meetings, co-creation sessions, stakeholder meetings, research visits, joint writing sessions, video conference (project) meetings, and of course more regular contact through mail, telephone and videoconferencing. From the interviews it was identified that the project leader had an important role in the collaboration process, and will therefore also be discussed in this section.

Project Meetings

Project meetings have a central role in the coordination and collaboration within the project. Physical project meetings are organized at least once a year, and create the possibility for all research participants to meet up in person. Hosting of the project meetings is rotated among the research participants within Norway, which resulted in projects meetings to take place in Trondheim, Oslo, and in Bergen. Additionally, video conference project meetings, following a similar layout as the physical project meetings, are organized more frequently albeit not on location and shorter of nature. During the project meetings, every work package updates the research team on the progress made since the last meeting. This enables everyone to be up to date with the latest developments and research findings from each particular work package. During this process, feedback is collected and implications across other work packages are discussed. Additionally, future directions for the research project are identified together and agreements are made on (interrelated) tasks and to do's. Documents and work presented during these meetings are distributed through a shared Dropbox folder. Additionally, other project related documents and deliverables are shared among researchers through the same manner. It is also common for project meetings to facilitate guest lectures and co-creation sessions, which will be further discussed later in this chapter. One of the researchers has identified the project meetings to be one of the "*many good attempts [within the project] to integrate [different lessons or research results across the work packages]*." (Interviewee wp2.2, 2019)

Stakeholder Meetings

As discussed earlier, stakeholders such as transportation and crowdfunding companies are incorporated in the project to improve the implement-ability and feasibility of the proof of concept study. Therefore, stakeholders are actively engaged in the business model experimentation process. This is mainly facilitated through organized stakeholder meetings, in which the stakeholders come together to give input on the recent developments. Usually this is facilitated through group discussions or workshops in which the goal is to collect the different viewpoints of the stakeholders. To name an example, one stakeholder meeting focused on discussing the different identified business model dimensions (as discussed in section 4.5). Inputs were enquired regarding these dimensions, discussing for example the different crowdfunding model options, different options regarding the hosting of the crowdfunding platform, the two possible type of backers (individual travelers or companies), among others.

Figure 18: Coolcrowd project meeting in Bergen at the Western Norway University of Applied Sciences (HVL) in March 2019

Research Visits

Another aspect of the project contributing to the overall collaboration is the research visits between the different project members. These visits give the opportunity to work together closely on a certain research aspect for a longer period of time. One interviewee noticed this and stressed the importance that “researchers [within this research project] stay actively in contact with each other and also pay each other visits [outside the organized project meetings]” (Interviewee wp2.3, 2019). Additionally, it fosters knowledge exchange regarding expertise of one partner to the other. For example, the Western Norway University of Applied Sciences visited the Eindhoven

University of Technology not only to work together on aspects of the research project within work packages 2.1 and 2.3, but also to learn about new (in-house developed) business model mapping approaches which have been subsequently applied within Coolcrowd's research activities. On another occasion, the University of Western Australia visited Ruralis to work together closely on work package 3 by contributing with their expertise on choice experiments. The work focused on implementing this technique in the survey targeted at the Norwegian farmers to learn more about their preferences regarding different crowdfunding and business model design options. Additionally, a seminar was organized at Ruralis to give insight in carbon farming in Australia, a practice stimulated by the government acting as a climate mitigation measure by storing carbon in the soil. In a third and fourth research visit, Ruralis visited both the University of Western Australia and the Centre for Sustainability at the University of Otago to finalize the farmer's survey and to work on a comparative study between Norway, Australia and New Zealand regarding the willingness of farmers to participate in crowdfunding to fund climate mitigation measures on their farms.

Joint Writing Workshops

In order to support research dissemination across the different work packages, a joint writing workshop has been organized. More of these sessions have been planned in the future. In these sessions, multiple days are allocated specifically to work together on translating Coolcrowd's research findings to journal papers in order to distribute the project's research findings to the public. To date, work package 2.3 and 3 have worked closely together in this type of setting, writing on the success factors for green crowdfunding projects and the effect of framing on crowdfunding campaign success. Next to the dissemination of research findings, implementing these sessions within the project also sets an incentive for the work packages to work closely together.

Video Conference Meetings

Video conference meetings have an important function in the project. As a group of 9 research institutes from different locations in the world are working together, it is not possible to meet each other regularly in person. To overcome this, video conference meetings have been implemented on various levels within the project. Video conferencing is applied for some of the project meetings. On one hand this enables everyone to be updated quickly and to discuss important aspects that need coordination between the different work packages on a more regular basis. On the other hand, implementing video conference project meetings prevents additional carbon emissions, which are also tracked within the research project. Additionally, video conferencing has been applied as an alternative of one-to-one telephoning or

within the context of three or more researchers discussing aspects of the research project.

Co-creation Sessions

Another instrument used within the project to stimulate collaboration comes in the form of co-creation sessions. These sessions have mainly been organized during the project meetings where most researchers were present. These sessions act as a tool to integrate the different research findings to date. To do so, the development of the business model is set as the central framework for these sessions. For example, during one session, a business model mapping exercise was organized. The business model mapping was hosted by the Western Norway University of Applied Sciences, after having learned about it during a research visit to the Eindhoven University of Technology. In another co-creation session, also held during one of the project meetings, input was asked regarding the different identified business model dimensions and the corresponding directions to take within these dimensions. To do so, a poster session was organized which invited everyone to include their arguments in favor or against each business model dimension option taking into account their expertise and (results of) research activities within Coolcrowd. Co-creation also is part of the stakeholder meetings, as it was stressed in one interview that "*you try to develop [the business model concept] together with stakeholders and users.*" (Interviewee wp1, 2019)

Figure 19: A co-creation session organized during a project meeting. Source: personal picture (left) and Coolcrowd website (right)

Project Leader

Observing statements regarding the collaboration within the project from the different interviews, it becomes apparent that the project leader holds an important role in facilitating the collaboration among the different researchers within the

project. In one interview, it is stated that in order to integrate all the different lessons from the work packages, good communication is essential. The project leader feels that part of her job is to "*facilitate the other project members and to see how I can connect everyone*". This is confirmed by another project member who describes from her experience the project leader to be the "ecosystem builder" of the project. Yet another research participant describes that she appreciates the fact that the project leader "creates many opportunities or arenas where we get together, where we present the findings of our work to all others, and we get to know what the others are doing." All in all, it can be concluded that Coolcrowd's project leader has an active role in facilitating collaborations within the project by connecting the right people and creating opportunities for research members to work together.

4.5 Business Model Decisions and Developments

Initial business model idea

In order to give an overview of the business model developments within Coolcrowd, it is good to start with the initial business model idea. As described earlier, the aim is to deliver a proof of concept for crowdfunding climate-friendly agricultural projects in Norway that promotes a rapid transition to a low-emission society. In realizing this goal, the crowdfunded climate program is functioning across the transport and agricultural sector, by enabling the general public to offset their carbon emissions as a result of their traveling by contributing a relatively small amount of money to enable the installation of climate mitigation technologies at farmers. A basic graphical overview of this business model idea can be seen in the figure below, where the travelling people and farmers are connected through the flow of funds.

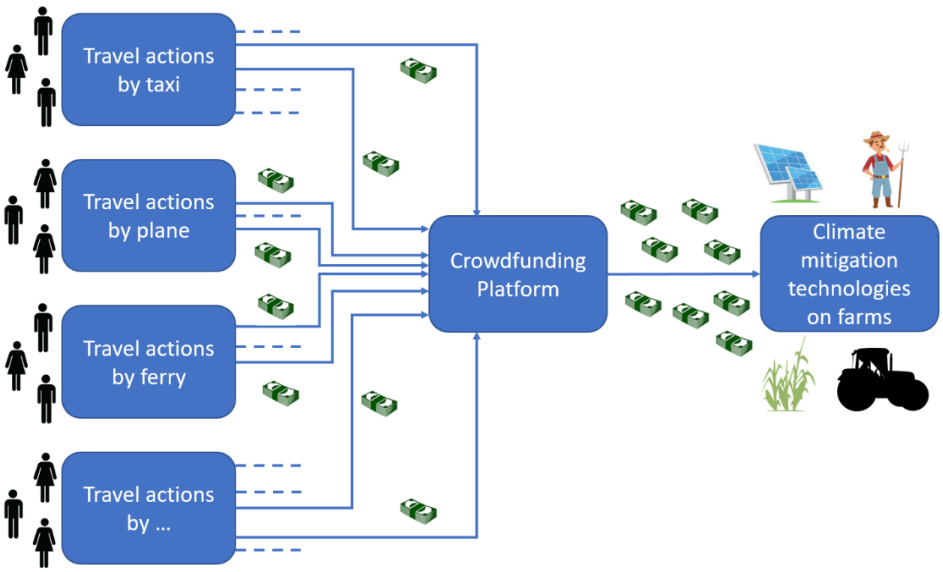

Figure 20: A geographical overview of the crude initial business model idea

This business model idea is taken as input for the business model experimentation process. By researching and experimenting, new aspects regarding the business model are learned along the way and will contribute to the process that will end with one or more final business model concepts. Therefore, the process will guide the initial crude business model idea towards a concrete business model design, implementable in Norway. Observing the initial idea, the main concept of the business model is clearly portrayed. However, many different smaller aspects, dimensions or decisions that make up the business model are not yet explored. Examples of these aspects are the type of crowdfunding model to be employed, the funders-farmer relation, the design of the crowdfunding platform or the subscription model to name a few. These aspects,

among others, will be discussed in the next section, covering the business model developments.

Business Model Developments

Through an iterative process including all the different experimentation and research activities within the project, work package 2.3 has identified eight different business model dimensions. The process leading to these eight dimensions capture the different activities identified in section 4.3 (e.g. focus groups, workshops, co-creation sessions and discussions, organized with farmers, the general public, stakeholders and researchers). These dimensions are shown in figure 21 below and consist of the type of crowdfunding model employed, the targeted backers in the business model, the organization and management of the crowdfunding platform, the collaboration among farmers, whether or not to create a crowdfunding fund, possible co-financing, the climate mitigation technology employed, and finally the subscription model. In the process of working toward the proof of concept for the research project, the different options within these dimensions are explored and validated through the experimentation process. Subsequently, these different dimensions are discussed including the provisional decisions regarding the options within these dimensions.

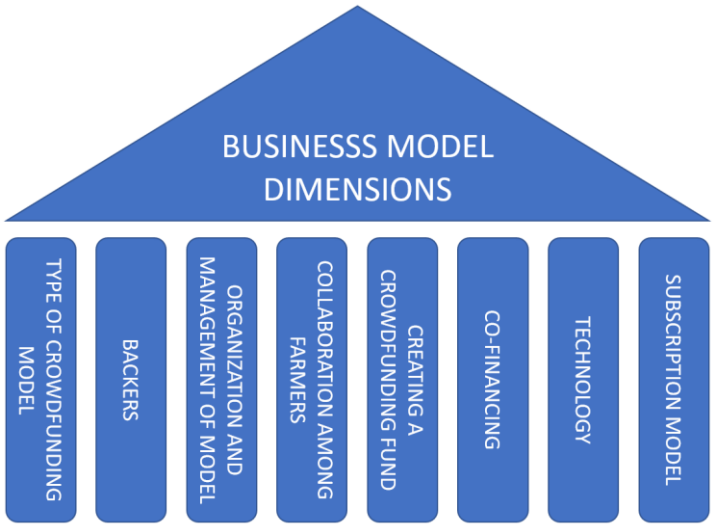

Figure 21: The identified eight business model dimensions

Crowdfunding Model

There are four different crowdfunding types considered within the business model. These are, as explained earlier in section 2.3, donation, reward, loan and equity-based crowdfunding. Relatively early in the process, it was decided to eliminate equity-based crowdfunding as an option to be considered. Although equity-based crowdfunding could potentially bring in more funding compared to the other crowdfunding types, there are valid reasons to exclude this option. First and foremost, the platform

facilitating equity crowdfunding needs an expensive license in order to be able to operate, which is not realistic to acquire given this context. Furthermore, it raised a lot more responsibilities towards investors and expertise within the crowdfunding platform as required by Norwegian legislation, as explained during the guest lecture from AROUND, a Norwegian equity crowdfunding platform. Secondly, from group discussions with farmers it has become clear that they are not eager to dilute the ownership of their company. The appropriate legal framework is missing in Norway to facilitate equity crowdfunding. Therefore, it was chosen to focus on donation, reward and loan-based crowdfunding. From the survey sent to the Norwegian farmers, it has become clear that farmers prefer the donation-based model. Additionally, they have also expressed the willingness to facilitate a reward-based model, where the rewards take the form of for example open farm visits or own-grown products to be picked up at the farm (Otte, Zahl-Thanem, Hansen, & Maehle, 2019).

Backers

Two different type of backers have been identified as options to include within the business model, namely individual travelers and companies. Although these options do not exclude each other, they do need a totally different approach. For example, from focus groups it was identified that individuals require a 'personal story' regarding the farmer in order to be willing to invest. This is in conflict with most of the farmers' preferences, as 49% state that they prefer not to be presented publicly in a crowdfunding campaign (Otte et al., 2019). This might be not necessarily a requirement for a company. Furthermore, farmers have also expressed great interest in favor of including companies in the funding model compared to individuals. However, making deals with companies in order to offset their carbon emissions related to travelling could end up being difficult and time consuming, while this is not the case for individual people. An additional focus group with companies still have to be organized to gain more insight in their willingness to participate and is scheduled in October 2019.

Organization and Management of Crowdfunding Platform

The third business model dimension is related to the organization and management of the crowdfunding platform. There are multiple options regarding which party will eventually be responsible for hosting the crowdfunding campaigns. An important factor in this is the trust among farmers in the different parties, as they are the first stakeholder that needs to adopt the new financing method in order to be able to implement it. The respective parties identified as possibilities to run the platform are farmers' organization, agriculture advisory services, research institutes, crowdfunding

platforms and banks. It has been identified that farmers have a low level of trust in banks (Otte et al., 2019), which are therefore excluded. An option could be to host the platform by both agriculture advisory services and crowdfunding platforms, as they complement each other in different aspects. However, no final decisions have been made regarding this aspect. The advisory services benefit from high trust levels of the farmers (Otte et al., 2019) and have in-house knowledge on the assessment calculations, while the crowdfunding platforms contribute with their crowdfunding expertise and their relation with individual the general public. However, it has been identified that additional research has to be done in the form of focus groups to see how the hosting organization can be sustained in the long run.

Collaboration among Farmers

The fourth business model dimension relates to the degree of collaboration among farmers related to climate mitigation technologies. This could range from no actual collaboration to the pooling of resources for a collaborate project. Examples could be collective solar energy systems or shared technologies related to their daily operations. Although this would be more complex to organize and manage, there are certainly benefits in the form of risk-spreading/sharing, possible stronger relations between local farmers, and a diminished need for every farmer to be visible to the public and share their story. The results from the farmers' survey indicate that the farmers that take a positive stance towards crowdfunding are also positively inclined towards collaboration with other farmers. It has been indicated that both options are possible to implement.

Creating a Crowdfunding Fund

Another identified option is to collect all the funds from the individual backers into a fund, after which the fund distributes the recourses to the farmers. Farmers have indicated that this would be their preference. There are multiple reasons to account for this. Firstly, it would not be necessary for them to carry out their own campaign. Furthermore, it would guarantee their privacy and would require less of their time. However, the direct connection between the farmer and investor would be lost. This contradiction of interests was also brought forward during the interviews, where one researcher stated that "*farmers are eager for a common fund, to where they could apply for money*" (interviewee wp2.2, 2019). Focus groups with the general public clearly showed that the connection with the farmer is a very important reason for people to invest. They require a personal story. Another interview (work package 3) also brought these conflicting interests to the attention, however also identified that farmers living away from their farm have less problems sharing their personal story to

the public compared to farmers living at their farm. Moreover, in case of a fund the funders lose their input in selecting to which project their funding goes. Therefore, during the experimentation process it has been decided not to further pursue a crowdfunding fund as a feasible option within the business model.

Co-Financing

The sixth identified business model dimension introduces the possibility to co-finance projects. This could be done through multiple parties, which represent the different options within this dimension. Identified co-financing options could either come in the form of own (farmer's) capital, the government, and banks. Options to be considered for the final business model(s) are no co-financing, own capital and governmental co-financing. The latter two options give the possibility to increase trust in potential investors, while governmental co-financing could also act as a reason for people not to invest, as they could ask themselves the question why the government does not bring in all the required money for the project. The results of the survey indicate that farmers do not prefer bank co-financing, and is therefore excluded from the options.

Technology

The seventh identified business model option relates to the possible climate mitigation technologies being installed on the farms. Initially, a large group of climate measures was identified through a desk study. Analyzing and discussing these options, both internally in the project and with the farmers through focus groups, led to narrowing down the options to two clearly distinctive technologies: solar panels and drag hose with dribble bars for manure spraying. The survey results indicated that farmers are most interested in solar panels as a preferred climate mitigation technology. Drag hose with dribble bars for manure spraying presents another option with the possibility to be shared among farmers. Another reason for selecting this technology is its unfamiliarity to the public, this to the contrary of solar panels. This enables the presentation of two different scenarios to public in a prototype crowdfunding campaign, which could lead to additional insights regarding the desirable climate mitigation measures to be employed.

Subscription Model

Two different options are present regarding the subscription or revenue model. Either a one-time subscription model per project or an annual subscription model. Travelers make a small contribution each time they travel. These contributions are based on the number of kilometers travelled, given a certain mode or type of transport (e.g. plane, bus or taxi). The former option will have a lower for investors to participate, while the

latter will require a higher level of commitment and will lead to a more constant cash flow. No definite decision has yet been made regarding this business model dimension.

5. Conclusion and Discussion

5.1 Conclusion

The overall aim of this report was to map the business model experimentation process within the Coolcrowd research project. In order to do so, an answer was sought to the following research questions:

- What underlying activities and processes can be identified in experimenting and designing Coolcrowd's sustainable business models?
- How have Coolcrowd's business models developed over time?

In the report, these questions have been considered in order to characterize the business model experimentation process within Coolcrowd, thereby answering the main research question: How can the business model experimentation process for Coolcrowd be characterized?

After analyzing the secondary data sources in combination with data obtained from interviews, an overview of the underlying activities and structure of the business model experimentation process was made to address the first research question. This experimentation process was made possible through the cooperation of 9 research institutes in the form of an international research consortium, including institutes from Norway, Australia, New Zealand and the Netherlands. Additionally, various stakeholders in the form of for example transportation companies or crowdfunding platforms were incorporated in the experimentation process with the goal to guarantee the implement ability of the proof of concept study delivered by this research project. An overview was made of all research and experimentation activities within the project taking place from the start of proposal writing in the summer of 2016 to the latest project meeting in Bergen in March 2019. Many different types of research or experimentation practices were identified in the form of focus groups, interviews, co-creation sessions, surveys, business model mapping sessions, digital prototyping, brainstorming sessions, literature studies, desk studies, guest lectures, student research or thesis projects, group discussions, visiting seminars and conferences, collaboration with university courses, and choice experiments. It was identified that along the progression of the timeline, the research or experimentation practices moved from a more explorative nature towards increasingly in-depth research.

The experimentation process could be described as highly iterative. Research findings from one research practice within a work package almost always fed into other

research practices within other work packages and vice versa. This required proper collaboration within the research project between the different work packages and the individual researchers with the support of a proactive project leader. These findings are in line with the results from Bocken et al. (2018), who found through studying eight different circular business model experimentation cases that the *"experimentation processes are iterative and require regular learning and sustainability checks"* (p.91). Additionally, as the business model experimentation process within this research context can be described as highly iterative, including different experimentation and research practices running parallel to each other, it has not been possible to completely identify all eight process steps as proposed by Lund et al. (2017) accordingly in the same order within the Coolcrowd research project.

During the business model experimentation process, emphasis was placed on collaboration among different work packages and researchers. The research project explicitly aims to integrate activities, which foster extensive collaboration. Examples of these activities are project meetings, stakeholder meetings, research visits, joint writing sessions, video conference (project) meetings and co-creation sessions. Project meetings play an important role in discussing new developments within the project and aligning different research findings across the work packages. However, it is clearly observable that collaboration does not stop at these scheduled reoccurring meetings. Researchers took initiative to collaborate all year round in the form of regular and more extensive research visits, joint writing sessions and consistent contact trough video conference meetings, phone calls and emails.

Focusing on the second research question, the business model developments were evaluated. The business model was captured inside eight different identified business model dimensions. The process leading to these dimensions consist of the different experimentation practices identified earlier. The dimensions consist of the type of crowdfunding model employed, the targeted backers in the business model, the organization and management of the crowdfunding platform, the collaboration among farmers, whether or not to create a crowdfunding fund, possible co-financing, the climate mitigation technology employed, and finally the subscription model. The different research and experimentations activities have focused on defining these business model dimensions and making educated decisions on the possible design options within these business model dimensions.

5.2 Theoretical and practical contributions

The contribution of this report is twofold. Firstly, it acts to shed light on the business model experimentation process within Coolcrowd, and gives an overview of the business model developments. It shows the progress to date, the different research and experimentation practices executed and the aspects of the business model experimentation process where further advancement is desirable.

Secondly, the report acts as a contribution to the literature on business experimentation for sustainability (BES). In their call for papers regarding a special volume of the Journal of Cleaner Production on business experimentation for sustainability, Bocken et al. (2018) identified four themes regarding this topic that need further elaboration in scientific literature. The first theme centralizes around the tools, approaches and impact assessment of business experimentation for sustainability. The second theme focusses on the business experimentation for sustainability across organizational contexts. The third theme covers the best practices and case studies of the experimentation process while the fourth theme deals with the policy implications. This report has the aim to contribute to the second and third theme in order to the advance the insights in the business experimentation for sustainability. The second theme aims to describe the experimentation process across different organizations. This deviates from the most commonly described cases found in start-ups and businesses. Coolcrowd is a clear example of a business experimentation process for sustainability across an organizational context, within an international research consortium. In this report, it has been described and evaluated how 9 different research institutes with the input of multiple (business) stakeholders are experimenting towards innovative business models. Specifically, it can give insight into the question how businesses and research organizations collaborate in the BES process. Furthermore, it covers how the sustainable business model experimentation process could take place jointly with stakeholders. Lastly, this report acts as a case study of business experimentation for sustainability, of which not many are present in literature (Bocken et al., 2018).

5.3 Insights and future directions for Coolcrowd

Within the research and experimentation process to date, Coolcrowd has mainly been focusing on market research, the degree of acceptance of the innovative business model for the involved end-users and the respective value created for the different stakeholders. During the next phase of the project, it would be possible to go more in

depth to further develop the operational aspects of the proof of concept or Coolcrowd's business models. It is assumed that this would require to shift more from a research perspective to a business development perspective. To facilitate this, additional use of business mapping tools, as described in section 2.6 of this report could be employed. It is suggested that additional sessions could be organized where both researchers and stakeholders from the industry further concretize different aspects of Coolcrowd's business models, thereby considering the research and experimentation results to date.

5.4 Limitations

There are several limitations to the findings in this report. First, the research covers a case study. However, this does not imply that the report cannot contribute to the scientific development. In this case, it does limit the generalizability of the research findings. Therefore, the report and its findings should be read in context of the business model experimentation process within the Coolcrowd research project. Future research is needed to further verify and expand the current research findings in other sectors and geographical contexts.

Secondly, as the report covers the business model experimentation process within a scientific context, the implementation of the proof of concept or business models are not within the scope of this research project. Due to this fact, a complete validation of the business model in the real world is missing. After all, the most comprehensive validation of a designed business model is to put it to the test and implement it in reality.

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Appendices

Appendix A: Interview Guide Business Model Experimentation Process

Note: Not all parts of this interview guide may be relevant for every interviewee. The aim is to scan initially on what aspects the interviewee can contribute information/knowledge, and proceed to explore these topics during the interview (and leave others out).

- Introduce myself. Ask for permission to record the interview.

- Introduce research purpose within Coolcrowd
    - **Introduction research purpose**:
      One of the aims of Coolcrowd is to develop one or multiple business models to achieve the projects goal (see above), also taking into account farmers' needs, the public's needs, fit in with socio-cultural and legal frameworks, and deliver climate reductions from the agricultural sector while improving the local sustainability of agriculture.
      This aim of this interview is to get a clearer picture of the development process and the lessons learned within the project which have implications for Coolcrowd's business model.

- *Explanation interests in mapping Coolcrowd's business model and research process, want to set out the context for the interview. If interviewee was not present (Will not ask many explicit questions regarding the BM, but will try to translate questions to BM implications later on):*

- *Two parts in interview:*
    a. *Lessons/experiments: During the interview, we will mostly focus on the research activities you have carried out within Coolcrowd or have knowledge of, and the (preliminary) results from these activities.*
    b. *Questions on the process of the research and experiments. How was this conducted/designed?*

1.Start Questions

1) General questions

- Could you shortly tell me something about your background? Expertise? Research interests?
- What is your role within the Coolcrowd project?
- For how long have you been involved in the project? From beginning, or joined later on? (needed to see when in the development process researcher was active)

2.Questions on Research/Experiments/Lessons learned

Idea to go from beginning of project to now.

2) How would you describe the goal of your specific research within Coolcrowd? What is the objective?

3) What research **activities or experiments** have you carried out or have been involved with in order to reach that research goal?
   a. Is it possible to sketch a short timeline of the activities together? Which steps have been taken?
   b. What were the main lessons learned from these experiments? (that you would think are important for this research).
   c. Are there any (important) decisions that have been made regarding the business model given the input from the work package you operate in?

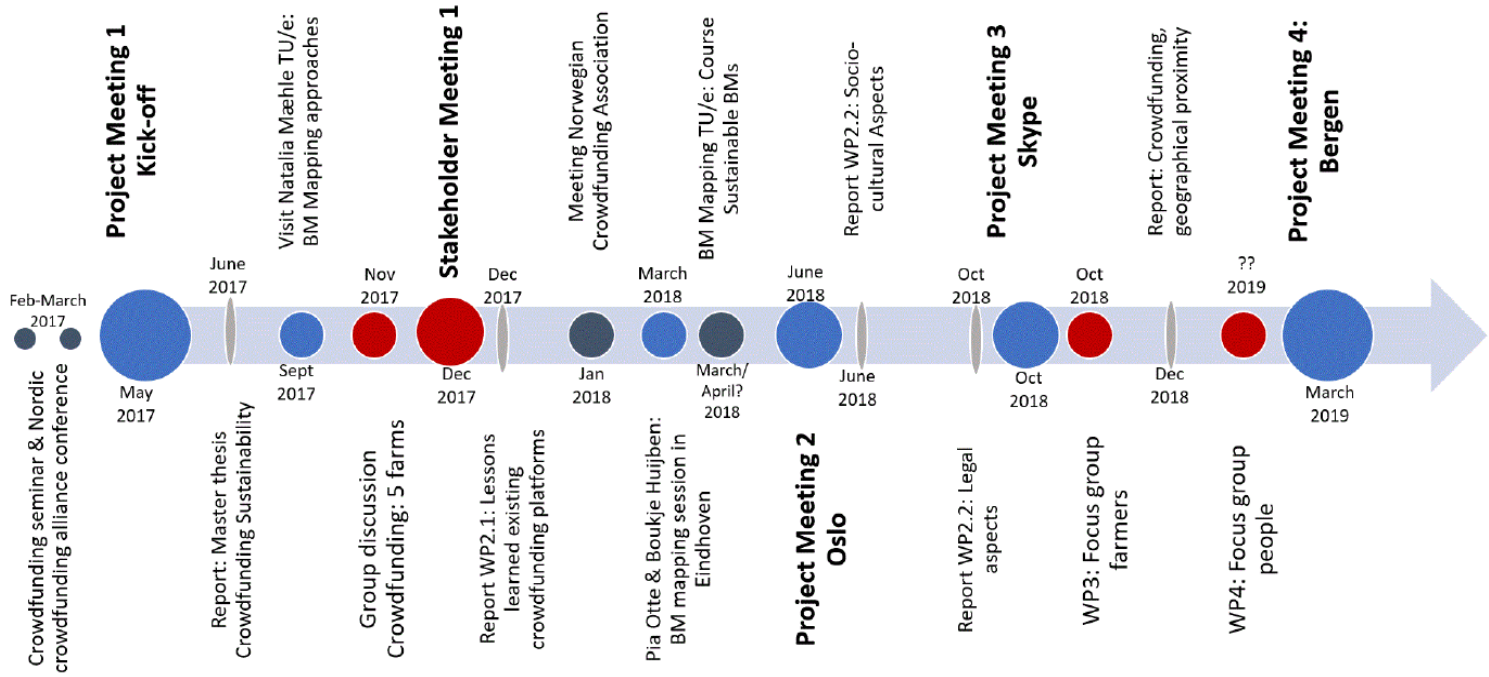


Figure 22: initial timeline of relevant project activities to aid in interview

4) Discuss view on stakeholders from demand and supply side of crowdfunding campaign, depending on expertise/research activities (Norwegian farmers, the general public).

   What has been learned regarding this specific stakeholder up to now? Have there been specific experiments carried out with these stakeholders? What has been learned from them?

   - Farmers
   - Funders: the general public (companies?)
   - Transportation companies

   Has there been lessons learned on which specific groups (segments) to include or target in relation to a crowdfunding campaign (type of farmers/people/companies)? If so, what are their characteristics?

5) What is/are the most important hypothesis regarding your research that you could validate or are still open to validate? (E.g. one example of a basic hypothesis is that Norwegian people want to contribute to crowdfunding climate mitigation measures.)

6) Have any experiments or research which you have been part of had influence on the decision or evaluation on what crowdfunding type best to use?
   a. Donation based, reward based, lending based, and equity based. Combinations?
   b. Which have been or are considered at this moment? Any type discarded? Why?

7) Have any other research output/experiments/lessons you were active in gained insight in aspects of Coolcrowds Business Model? For example, in the following aspects (ask questions that implicitly answer or help in mapping business model aspects):
   a. Segment: Type of farmers/people/transportation companies/etc. best to target within the project? All farmers? Focus on a particular segment? Young/old? All Norwegian citizens, or a particular segment? I.e. demographics.

b. In what way to collect money on the supply side (of funders)? Through platform, through billing service, small % through debit card payments for travelling?
c. According to you, what value does stakeholder X,Y,Z get out of it? Participating in Coolcrowd's designed crowdfunding platform.
d. How would the relationship and communication between 'stakeholder x,y,z' and the platform look like? Would stakeholders also be connected directly with each other? Why, or why not?
e. How will the platform generate money (to cover its costs)?
f. Who will handle or organize the platform? How will projects be evaluated?
g. What will according to you be the main costs for the platform?

3. Processes/research design/Integration

Coolcrowd is quite a unique setting regarding the development or experimentation process of a business model, as it is an (international) research consortium. Many business model design or experimentation processes take place within companies, or (more rarely) research institution-company co-creations. Therefore, to learn more about this unique setting, I would be interested in how the specific process have been taking place within Coolcrowd over the last years.

8) How would you describe the research process you experience within Coolcrowd? Is it similar compared to what you are used to? Or totally different? How so?

9) How would you describe the cooperation between the different researchers and work packages within Coolcrowd? With whom have you worked together actively?

10) How have, according to you, the different lessons or results from different work packages been integrated within the project? Name examples if necessary:
    a. Meetings?
    b. Individual contact with researchers, or only within project meetings?
    c. Co-creation session?

11) Are there aspects you found in your research that collided or did not fit together with findings from other work packages? In the sense that different research findings had to be carefully balanced? How did that unfold? Was there a certain process behind it to resolve this?
(E.g. between WP3 & WP4. Or (initial) business model design socio-cultural or legal aspects which were not possible to integrate? What has been done in that case?)

12) How have you disseminated your findings or knowledge throughout the project, and worked together with other researchers/WPs? If necessary, name some of the following examples:
    a. Project meetings?
    b. Send updates?
    c. Presentations?
    d. Visits?
    e. Mail/Skype?
    f. Regular contact, no regular contact?

13) Finalization
    a. Are there any other aspects we did not go through? Do you have any other final remarks or suggestions?
    b. Thanking interviewee for their time.

Appendix B: Overview of conducted interviews

Table 1: Sources primary data - list of interviewees

Researcher	Work package	Organization	Interviewed
Person 1	Work package 1	Ruralis	Combined interview Individual interview
Person 2	Work package 2.1 & 2.3	TU/e	Combined interview
Person 3	Work package 2.1 & 2.3	HVL	Combined interview
Person 4	Work package 4	BI Oslo	Individual interview
Person 5	Work package 3	Norsok	Individual interview
Person 6	Work package 2.2 (socio-cultural)	Ruralis	Individual interview

Appendix C: Overview of secondary data sources

Table 2: Overview of secondary data sources.

Type Data Source	Item	Date
Project Deliverables		
	Master Thesis: Crowdfunding sustainability. How do entrepreneurs of sustainability projects utilise the potential of crowdfunding for fundraising?	May 2017
	Deliverable WP2.1: Lessons learned from existing climate crowdfunded projects	December 2017
	Deliverable WP2.2: Socio cultural factors: opportunities and challenges for crowdfunding of climate measures in Norwegian agriculture	June 2018
	Deliverable WP2.2: Legal Mapping Summary and Report Coolcrowd WP2.2	October 2018
	Student report: The effect of geographical proximity on the success of crowdfunding campaigns	December 2018
	Master Thesis: Message framing & narratives in green technology crowdfunding	March 2019
Presentation		
	Presentations from all work packages presented during the kickoff meeting	May 2017
	Presentations from all work packages presented during the research project meeting in Oslo	June 2018
	Business models workshop June 2018 (Project meeting). Powerpoint presentation covering the results of the business model mapping session during the research project meeting in Oslo.	June 2018
	BM-stakeholder-meeting-04-02-2019	February 2019
Coolcrowd Website		

	https://coolcrowd.no/en/ Sub-webpages describing the project: “Background”, “Project Goal”, “Researchers”, “Partners”	May 2017 – April 2019
	https://coolcrowd.no/en/news/ News articles regarding the Coolcrowd project	May 2017 – April 2019
	https://coolcrowd.no/en/work-packages/ Description of the different work packages within the project.	May 2017 – April 2019
News Articles		
	Pia Otte (Ruralis). “Lokal folkefinansiering av klimatiltak i norsk landbruk”. Pengevirke Nr.4 Cultura Bank 2018. (Norwegian) https://www.cultura.no/wp-content/uploads/2018/12/Pengevirke-2018-4-V3.pdf	April 2018
	Lisa Sunde. “Vil la folk finansiere klimatiltak på gården”. Bondebladet. (Norwegian) https://www.bondebladet.no/article/vil-la-folk-finansiere-klimatiltak-pa-garden/	November 2018
	Natalia Mæhle (HVL) and Ingeborg Kleppe (NHH). “Folkefinansiering kan gi penger til grønt skifte”. DN. (Norwegian) https://www.dn.no/innlegg/folkefinansiering/innlegg-folkefinansiering-kan-gi-penger-til-gront-skifte/2-1-409555	October 2018
Meeting Notes		
	“Group discussions on crowdfunding with 5 farms at Tingvoll/Norsøk” Meeting notes of a meeting in which the different types of crowdfunding models were discussed with five farms.	November 2017
	“Stakeholdermøte_diskusjon” Notes of a stakeholder meeting in which the relevant up and downsides regarding the different crowdfunding models are discussed.	December 2017
	“Project meeting 05.10.18” Meeting notes of the Skype project meeting.	July 2018

	"11-03-2019 Bergen Project Meeting Notes First Day" Meeting notes of the first day of the project meeting in Bergen.	March 2019
	"12-03-2019 Bergen Project Meeting Notes Second Day" Meeting notes of the second day of the project meeting in Bergen.	March 2019
Other (Project) Documents		
	Research Proposal document, as submitted to the Research Council of Norway.	Project start
	Eindhoven University of Technology. Deliverables for the course *Green Business Models*: Three student reports	April 2018
	"BM Design Choices Bergen"	March 2019
	"Overview-deliverables-Coolcrowd" A list of number and type of deliverables defined per work package.	August 2018
	"Overview-writing-plans" Overview of specific papers or reports planned to be written.	December 2019

Appendix D: Coding categories regarding the business model content

Table 3: The different coding categories used in translating interviews to business model components.

Coding category	Example of relevant coding terms or statements
Value Proposition	"Value", "Customer's (farmers/peoples/etc.) problems", "Solves the problem", "satisfying needs", "Offering", "Benefits".
Key Activities	"Activities", "Include in platform", "Outsourcing", "Important/core activities", "What key activities do our value proposition require?"
Key Resources	"Resources", "Types of resources", "Physical, intellectual, financial, human recourses", "What key resources do our value proposition (platform/activities/…) require?"
Key Partners	"Partners", "Suppliers", "Stakeholders", "External companies or suppliers", "Alliance", "Who are key partners/stakeholders/suppliers?"
Customer Relationships	"Relationships", "contact", "Expectations", "Interaction", "Reaching", "Assistance", "Community", "What type of relationship does each customer (stakeholder/farmer/people/citizen) expect/prefer?"
Customer Segments	"Segment", "Type of farmer/people/…", "Important customers", "Demographics", "Specific group", "For whom is value created?", "Who are the most important customers?"
Channels	"Channels", "Reaching", "Physical (channels)", "Virtual channels", "Creating awareness/publicity through …", "purchase through …", "Delivery", "How are … reached?", "How do … & … want to be reached?"
Cost Structure	"Costs", "Costs of platform", "Costs of resources", "Costs of activities", "Cost drivers", "Expenses", "Important costs inherent to business model"
Revenue Streams	"Payment", "Fees", "Money", "Percentage of revenues", "How are … paying?", "Who is paying?", "How would … prefer to pay?", "Covering the costs".

Appendix E: Presentation as preparation for interviews

Mapping of Business Model Experimentation Process for Coolcrowd

Gordon Haring
Master Student
Innovation Management
Eindhoven University of Technology

Supervisors
Bouke Huijben & Pia Otte

Brief Introduction

My background
- From the Netherlands
- Master student
- Bachelor in Electrical Engineering, TU/e
- Currently studying Innovation Management (Industrial Engineering Master)

Passionate about sustainability and the environment

Coolcrowd great opportunity to combine master with these interests

Objective of Coolcrowd

Proof of concept study

To assess the potential for a locally crowdfunded system that enables Norwegian farmers to install climate-friendly technologies and the Norwegian public to invest in local climate mitigation measures

Secondary objective

To develop alternative business models for a locally crowdfunded climate program (WP2.3)

Research Goal

Mapping of the business model experimentation process for Coolcrowd.

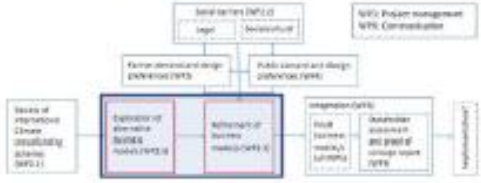
Taking two perspectives

- Content: Mapping business model changes over time

- Process: How did BM innovation process take place within Coolcrowd?

Relevance to Coolcrowd

- Deliverable within Coolcrowd project
  - Situated within work package 2.3
- Integrates knowledge flows from different work packages
- Acts as an input for work package 5 where the final business models for proof of concept study are defined



Before I continue, first some ...

Theory

Theory I: What is a Business Model (BM)?

Many different conceptualizations & definitions in scientific literature

A business model can be defined by "the content, structure, and governance of transactions designed so as to create **value** through the exploitation of business opportunities" (Zott & Amit, 2010)

Richardson (2008) organized the BM framework around the concept of value, defining 4 BM components:

- Value proposition
- Value creation
- Value delivery
- Value capture

Theory II: Sustainable BM (SBM)

How does a sustainable BM differentiate from an 'ordinary' BM?

Multiple definitions, usually taking different theoretical starting points

Points of consensus:

- SBM include **broader range of value, e.g:**
  - Triple bottom line (People, Planet, Profit)
- Usually take a multi-stakeholder perspective → sustainable value proposition

Definition most relevant to Coolcrowd

"[A] sustainable business model can be defined as a business model that creates, delivers, and captures value for all its stakeholders without depleting the natural, economic, and social capital it relies on." (Breuer & Lüdeke-Freund, 2014)

Theory III: Crowdfunding

"The practice of funding a project or venture by raising money from a large number of people who each contribute a relatively small amount, typically via the Internet."

Crowdfunding briefly discussed due to central role in all business models Coolcrowd

Four types of crowdfunding

- Donation based crowdfunding
- Loan-based crowdfunding
- Reward-based crowdfunding
- Equity based crowdfunding

Implications for

- Overall business model design
- BM complexity varies for different crowdfunding types

Why focus on Business Models? I

Transition from current situation to a low-emission society (Norwegian Ministry of Climate and Environment, 2017)

Important to make a shift from individual climate-friendly technologies to creating whole new [clean] systems (Johnson & Suskewicz, 2009)

Implementing new (clean) technologies in old systems with conventional BM's has shown to be ineffective in the past

Business model as framework for systematic change

Example: Edison Lightbulb.

- Many inventors focused on inventing best possible light bulb
- Edison: systems perspective. Realized that shift from kerosene to electricity was necessary
- Lightbulb with high resistance, individually not efficient → however, made power distribution from centralized source economically viable
- Enabled the new system to overthrow or replace the old system
- Similarities to current situation?

Why focus on Business Models? II

BMs and transitions

- Existing BMs can hinder transitions by reinforcing current system's stability
- New BMs are able to drive new transformations
- BM enable set-up or creation of regime or new system without relying only on technological innovations

(Robinson & Kraig, 2017)

↓

Need for new business models

↓

Many different variables relevant to the success of new models not known

↓

Experimentation in discovering & developing these new BMs is key (McGrath, 2010)

Therefore, discovery driven approach is necessary instead of analytical approach

Relevance to Science

A research gap exist regarding sustainable business model experimentation → Coolcrowd could aid in closing that gap

Experiments can create lessons about sustainability challenges society faces → evidence-based actionable knowledge (Caniglia et al., 2018)

SBM experimentation can aid in learning about aspects of novel sustainable value generation with limited risks and resources (Weissbrod and Bocken, 2017).

BM innovation within unique setting: International research consortium 'Usual' or 'normal' setting: company or research-company combination.

- Scientific focus
- Longer development time possible

Methodology

Methodology I: BM Mapping

Different BM mapping tools exist, BM Canvas by Osterwalder & Pigneur (2011) well-known, mapped from perspective of one focal-organization

- However, lacks sustainability perspective, sustainability adoption by Bocken et al. (2018) → People, Planet, Profit

Mapping tools which take a stakeholder perspective. Value mapping tool (Bocken et al., 2013) & Ecosystem Pie Model (Talmar, Walrave, Podoynitsyna, Holmström, & Romme, 2018)

Flow models, mapping underlying structure of BM & content of value transfers between stakeholders

Business Model Connect (Brehmer, Podoynitsyna & Langerak, 2018)

Methodology II: Data Collection

Collecting both secondary & primary data for process and BM mapping purposes

Secondary data

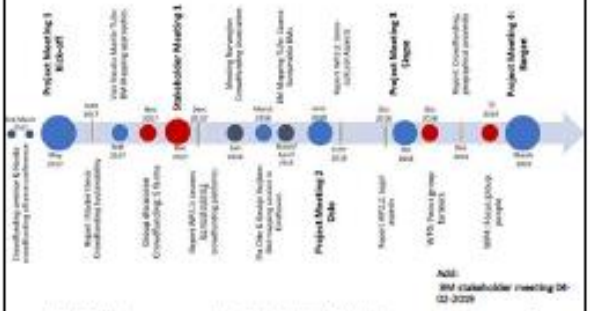
- Coolcrowd reports
- Coolcrowd website
- Presentations
- News articles
- Meeting notes
- Thesis reports

Primary data

- Semi-structured interviews
- This is the point where I need your help!
- Interviews with different researchers, from different work packages
- Relating info to aspects of the BM

Goal: timeline that shows BM developments over time and describes BM experimentation process

Methodology III: Timeline



BM Mapping tools employed

Combination of two tools

- Not more due to time constraints
- One static & one flow model to complement each other

Internal project requirement: Visualization of business model

'Static models'

Flow model: BM Connect

Which would complement each other best, most suitable for this project? Other considerations, such as mapping tools used throughout project.

Thanks for your attention

Questions or suggestions?

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