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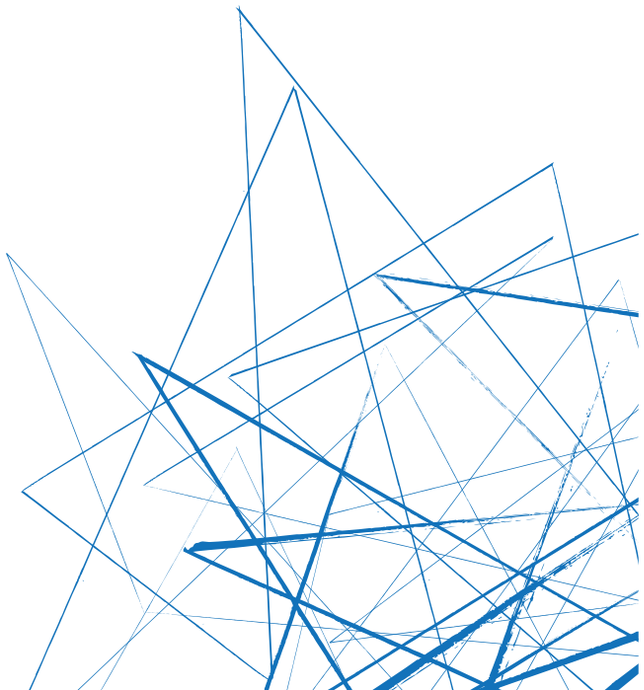

CROWDFUNDING FOR SUSTAINABILITY: A STUDY ON THE POTENTIAL OF REWARD-BASED CROWDFUNDING IN SUPPORTING SUSTAINABLE ENTREPRENEURSHIP PhD Series 35-2017

Kristian Roed Nielsen

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Doctoral School of Organisation and Management Studies | **PhD Series 35.2017**

CBS COPENHAGEN BUSINESS SCHOOL
HANDELSHØJSKOLEN

Crowdfunding for Sustainability

A study on the potential of reward-based crowdfunding in supporting sustainable entrepreneurship

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The Doctoral School of Organisation and Management Studies (OMS) is an interdisciplinary research environment at Copenhagen Business School for PhD students working on theoretical and empirical themes related to the organisation and management of private, public and voluntary organizations.

Foreword

One of the first things I received when starting as a Ph.D. student at my department was an orchid. It was a beautiful thing full of life with two white flowers and four or five healthy dark leaves. That orchid is now nearly dead despite the myriad of advice given to me on how to take care of it. I should have listened better and taken the time. Instead what you have in front of you is what occupied my time and is a product of what happens when you listen to and are supported by a loving wife, two great supervisors, brilliant colleagues, and not least family and friends, who, while not understanding what I was talking or writing about, were always there for me. I am genuinely proud of what I have achieved and am humbled by the fact that I have been lucky enough to find so many people who cared enough about me to help me through the downs and celebrate the ups.

Firstly, to my wife Charlotte, thank you for pushing me to pursue my dream and catching me when I stumbled. To my friends, thank you for pulling me out of the office and out of my head and not least for looking somewhat attentive when I tried to describe what my Ph.D. was about. To my parents, thank you for always being there for me no matter what. And to my family, you are stuck with me and for that I am sorry. To my two supervisors Lucia Reisch and Marcel Bogers, thank you for the support, inspiration, and not least patience. Lucia, I will be forever grateful to you for giving me a chance and not least giving me the opportunity to be paid to learn.

I would also like to thank everyone from he EU-InnovatE project for three wonderful years of pan-European research collaboration and celebratory drinks. Not least thank you to Rosina, Christine, Hugh, and Emma from Cranfield School of Management and Gemma, Louise, and Corina from Forum for the Future for everything. I will miss our times together and hope that we will find new ways to work together, even in a post-Brexit world. Finally, to my many colleagues at the Department of Management, Society, and Communication who took the time to listen, guide, and offer feedback to an aspiring Ph.D., my heartfelt thanks. Most especially to my close colleagues at the Consumer Behavior Research Group – Kristian, Jan, Tina, Wencke, and Lucia – I am indebted to you for all the times you have helped me along the way. Our

weekly meetings have become a bedrock on which I could build my otherwise cluttered week around.

If not for the help of all these kind souls and numerous others, what you see in front of you would not have been possible and while the mistakes and successes of my Ph.D. are mine, it would have been impossible without their support.

English Abstract

The dissertation sets out to explore the often ignored role of the consumer (end-user) within sustainable innovation by examining the potential of reward-based crowdfunding in enabling sustainable entrepreneurship. It explores under which conditions and to what extent reward-based crowdfunding could benefit entrepreneurs with social and/or environmentally-oriented products. The dissertation employs four articles in order to explore this. The first sets the stage by systematically reviewing the various roles that end-users can adopt within sustainable innovation process. The second serves to present a conceptual understanding of how the process of crowdfunding is organized. Finally papers three and four respectively present the dissertation's empirical evidence. Paper three focuses on uncovering the distributive qualities of reward-based crowdfunding in terms of its ability to increase innovation finance access, while paper four introduces the experimental evidence on the role of individual and product details in shaping pledging behavior as it relates to a diversity of (un)sustainable campaigns.

Empirically the dissertation finds that reward-based crowdfunding is neither a silver-bullet that will suddenly enable a great number of sustainable entrepreneurs to receive funding, nor is it an adverse or hostile setting. Instead certain characteristics are associated with crowdfunding success while others with failure. This is exemplified by the fact that experienced crowdfunding teams (for example with past success) within certain contexts (for example urban areas with high median income and social capital) and specific budgets (around 8,000 US$) are particularly well-placed to receive support, especially if their respective sustainable products are consumer goods that are not directly related to personal style. Conversely sustainable entrepreneurs who have failed in the past to receive funding, who are located in poorer rural areas, and who pursue consumer goods relating to personal style targeting funding range well-past 8,000 US$ (€7,400) face an uphill battle. It has also been found that crowdfunder pledges, rather than following a specific path of either sustainable or unsustainable behavior instead oscillate between the two. Where individuals are in certain circumstances enticed by sustainable messages while others are motivated by egocentric messages often depending on the product. This is complicated further by the fact that individuals also respond differently depending on whether the message is focused on social (for example fair wages) or environmental (for example recycled materials)

sustainability. Rather than correlating as commonly expected these dimensions more commonly result in different pledging behavior. In some respects, reward-based crowdfunding therefore appears to correlate with current market pressures and consumer demand which, at the moment, are far from sustainable. Reward-based crowdfunding thus represents a potentially significant source of innovation finance for many forms of entrepreneurship. However, as a source of finance for green growth, reward-based crowdfunding in and of itself does not change demand. Thus while there is a significant potential for it to be exploited to promote sustainable entrepreneurship, reward-based crowdfunding faces many of the same hurdles as those who seek to alter consumer behavior towards more sustainable consumption.

The dissertation contributes to literature in various capacities. Firstly, it provides a taxonomic framework for understanding the various roles that end-users can have within the sustainable innovation process. In addition to systematizing the various literature streams within the field identifying the various barriers and enablers of this type of sustainable end-user driven innovation. Secondly, it provides a conceptual model of the crowdfunding process that represents, to the best of my knowledge, the first systematic attempt to theorize how it is organized. Finally, and by using a multiple quantitative method it provides empirical evidence on both the ability of reward-based crowdfunding to enable new actors, as well as insights into the causal relationship between crowdfunding and sustainability.

Danish Abstract

Denne afhandling tager udgangspunkt i brugerdrevet innovation med henblik på at udforske den ofte ignorerede rolle, som forbrugeren (slutbrugeren) spiller i at fremme bæredygtig innovation. Dette vil gøres ved at undersøge, hvilket potentiale belønningsbaseret crowdfunding har for at muliggøre bæredygtig iværksætteri. Det specifikke formål hermed er således at undersøge, under hvilke omstændigheder og i hvilket omfang belønningsbaseret crowdfunding kan være en nyttig, alternativ finansieringskilde for iværksættere med sociale og/eller miljøorienterede produkter. Afhandlingen består af fire artikler, som belyser dette emnefelt: Artikel nr. et består af en systematisk litteraturgennemgang, der fremhæver de forskellige roller, som slutbrugerne kan påtage sig i den bæredygtige innovationsproces. Artikel nr. to tjener det formål at præsentere en konceptuel forståelse af crowdfundingprocessens organisering. Endelig fremligger artikel nr. tre og fire afhandlingens empiriske materiale. Artikel nr. tre fokuserer på at afdække hvilke personer og områder, som drager fordele af den innovationsfinansiering, der skabes ved belønningsbaseret crowdfunding. Artikel nr. fire fremlæger resultaterne fra et eksperimentelt studie, der observerer, at de udbudte produkter og deres individuelle karakteristika har en signifikant effekt på, hvorvidt bæredygtige eller ikke-bæredygtige kampagner tiltrækker investering.

Afhandlingen afslører, at belønningsbaseret crowdfunding, som finansieringskilde, hverken vil medføre en pludselig gevinst for bæredygtige iværksættere eller vil medføre negative konsekvenser herfor. Afhandlingen viser i stedet, at der er visse karakteristika ved belønningsbaseret crowdfunding, som er afgørende for en crowdfundingkampagnes succes eller mangel herpå. Erfarne crowdfundingteams, der tidligere har opnået finansiering, som er bosiddende i bestemte områder (f.eks. byområder med høj medianindkomst og social kapital) og som søger omkring $8.000 (ca. 53.000 DKK) i investering har, eksempelvis, størst sandsynlighed for at modtage støtte. Dette er især gældende, hvis det givne produkt er en forbrugsvare, som ikke er direkte relateret til personlig stil og udseende. Ligeledes er bæredygtige iværksættere dårligt stillet, hvis de tidligere er mislykkes med at søge finansiering, er bosiddende i fattige landdistrikter og søger et højere beløb end $8.000 til finansiering af produkter relateret til personlig stil.

Afhandlingen observerer endvidere, at individer besidder både bæredygtige og ikke-bæredygtige præferencer: Under visse omstændigheder kan enkeltpersoner foretage køb (eller investeringer) på baggrund af bæredygtige værdier og budskaber, mens de selvsamme mennesker i andre situationer kan være motiverede af mere egoistiske værdier og budskaber. Afhandlingen viser, at denne oscillerende adfærd ofte afhænger af det givne produkt, som personen anskuer. Denne adfærd kompliceres yderligere af det faktum, at individers præferencer ligeledes afhænger af, hvorvidt produktets formidlede budskab er fokuseret på social bæredygtighed (f.eks. fair arbejdsvilkår) eller miljømæssig bæredygtighed (f.eks. genanvendelige materialer). Til forskel for almen opfattelse fandt denne afhandling, at disse beslægtede budskaber reelt resulterer i forskellig investeringsadfærd.

Belønningsbaseret crowdfunding synes derfor ofte at følge den eksisterende forbrugsefterspørgsel, som i skrivende stund er præget af stor ubæredygtighed, fremfor at skabe et mere bæredygtigt marked. Denne crowdfundingmodel er således en væsentlig, potentiel finansieringskilde for mange typer af iværksætteri og innovation, men som finansieringskilde til grøn vækst vil belønningsbaseret crowdfunding i selv ikke ændre markedsefterspørgslen betydeligt. Afhandlingen observerer således, at selvom der er et betydeligt potentiale for at anvende denne finansieringskilde til at fremme bæredygtigt iværksætteri, så medfører det en række udfordringer, som folk, der ønsker at ændre nutidens forbrugeradfærd i en mere bæredygtig retning, ligeledes står overfor.

Afhandlingen bidrager til en række forskningsområder ved bl.a. at tilvejebringe en taksonomisk skematisering af de forskellige roller, som slutbrugerne kan påtage sig i fremmelsen af bæredygtig innovation. Denne skematisering identificerer desuden forskellige barrierer og katalysatorer, som gør sig gældende i denne type bæredygtig, slutbrugerdrevet innovation. Derudover fremægger afhandlingen en konceptuel model af crowdfundingprocessen, som – efter min bedste overbevisning – er det første systematiske forsøg på at teoretisere crowdfundingprocessens organisering. Dertil fremlægger afhandlingen en række indsigter i gevinstfordelingen ved belønningsbaseret crowdfunding på baggrund af en række anvendte, kvantitative metoder. Sidst men ikke mindst viser afhandlingen, hvordan investeringsadfærd gennem belønningsbaseret crowdfunding relaterer sig til bæredygtighed.

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Glossary of Key Terms

Crowdfunding is an open call, essentially through the Internet, for the provision of financial resources, ameliorated by the successful "interaction between a facilitating organization (or *platform)*, a variety of *founder campaigns* by people who seek financial support for their ideas and ventures, and a large dispersed "crowd" of individuals ('*crowdfunders*') who are enticed to invest, pledge, lend or donate to these ideas and ventures." (Lambert & Schwienbacher 2010; Nielsen 2016, p.1).

End-user(s) represents the end-consumer (or groups of consumers) of a given product or service (von Hippel 2005).

Niche innovation is a protected space in which radical solutions that compromise the logic of incumbent regimes are being developed (Geels 2002).

Socio-technical system is "a configuration of technologies, services and infrastructures, regulations and actors (for example, producers, suppliers, policymakers and users) that fulfils a societal function such as energy provision. These elements are aligned and fine-tuned to each other, forming a system" (Schot et al. 2016, p.2).

Socio-technical regime is "a shared, stable and aligned set of rules or routines that guide the behavior of actors on how to produce, regulate and use energy, transportation, food production or communication technologies. These rules are embedded in the various elements of a socio-technical system" (Schot et al. 2016, p.2).

Sustainability is "a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations" (Brundtland Commission 1987, p.43).

Sustainable entrepreneur(s) is an individual or group individuals who have recognized, developed, and exploited an opportunity to "bring into existence a future goods and services with economic, social and ecological gains" (Belz & Binder 2017, p.2). These product or service ideas emerge either through invention by users based on own needs or by individuals recognizing a product or service opportunity to solve either an ecological and/or social problem.

Sustainable end-user innovation is defined as an individual or group of consumers (users of consumer goods), who engage in the sustainable innovative process. That engage either via the integration of end-users into a facilitated innovation process or via independent end-user action (Nielsen et al. 2014).

Sustainable innovation is understood as the advance in a product, service, or process system that offers an improved or the same economic performance with lesser externalities in the form of social and environmental hazards (Halme & Laurila 2009; Bos-Brouwers 2010).

Transitions are "large-scale and long-term (50–100-year) shifts from one socio-technical regime and system to another, involving interactions between landscapes, regimes and niche dynamics. Examples include the shifts from sailing ships to steamships or from horse-drawn carriages to automobiles." (Schot et al. 2016, p.2)

User innovation refers to an innovation process driven by either *intermediate users* or *consumer users* (commonly labelled end-user), rather than by traditional suppliers (producers and manufacturers): *Intermediate users* representing for example a firm that utilizes equipment and components from other producers to produce further products and services, while *consumer users* represent one or more consumers who use, adapt and alter existing products to suit their specific needs (von Hippel 2005).

Pledge is a set amount of money spent by the consumer in reward-based crowdfunding with the expectation that if the given project is successfully funded, they will receive a tangible (but non-financial) reward, product or service. If unsuccessful, the amount will typically be refunded depending on the platform and type of crowdfunding.

PART I

Chapter 1 | Introduction

Crowdfunding represents a growing source of alternative finance for a variety of both for- and non-profit ventures that is changing "how, why, and which ideas are brought into existence" (Gerber & Hui 2013, p.1). The process itself has been characterized by the successful "interaction between a facilitating organization (or *platform)*, a variety of *founder campaigns* who seek financial support for their ideas and ventures, and a large dispersed "crowd" of individuals ("*crowdfunders*") who are enticed to invest, pledge, lend or donate to these ideas and ventures" (Nielsen 2016, p.1). For crowdfunding to be successful as an alternative source of finance, it then therefore requires that strangers are willing support strangers for causes, products, or services that have not yet been realized and of which they have little direct oversight or control. Despite this, crowdfunding has emerged as an increasingly common source of finance for entrepreneurial (and other) projects seeking capital (Sorenson et al. 2016). In 2013/14, about €2.3billion were raised in the EU alone; filling a funding gap that is especially prevalent with entrepreneurs when seeking seed capital for an idea/inception or proof of concept/prototyping (World Bank 2013; European Commission 2015; Sorenson et al. 2016).

The success of this phenomenon has also led to a steady stream of academic research seeking to unravel the dynamics of crowdfunding in general as well as the antecedents of successful and unsuccessful initiatives (see Burtch et al. 2013; Mollick 2014; Belleflamme et al. 2014; Manning & Bejarano 2016). Interest in crowdfunding has been especially sparked by observations that it appears to increase access to innovation finance (Sorenson et al. 2016), helps to overcome geographic barriers faced by other forms of finance (Agrawal et al. 2015) and in general enables a wider spectra of ideas and projects as compared to traditional sources of financing such as venture capital (Lehner 2013; Lehner & Nicholls 2014). The potential of crowdfunding in supporting sustainable innovation[1] and more specifically sustainable entrepreneurs[2] is therefore gaining both popular and academic interest as well (see Calic and

[1] **Sustainable innovation** is understood as an advance in a product, service, or process system that offers an improved or the same economic performance with lesser externalities in the form of social and environmental hazards (Halme & Laurila 2009; Bos-Brouwers 2010).

[2] **Sustainable entrepreneur(s)** is an individual or group of individuals who have recognized, developed, and exploited an opportunity to "bring into existence a future goods and services with economic, social and ecological gains" (Belz & Binder 2017, p.2). These product or service ideas emerging either through invention by users based

Mosakowski 2016; Hörisch 2015). These sources of literature are driven by a desire to understand the differences that emerge when the financiers of a given product or service innovation are no longer institutional or professional investors, but rather ordinary citizens; crowdfunders.

The dissertation is especially interested in opportunities presented by crowdfunding for sustainable entrepreneurs as these actors are increasingly recognized as fundamental for changing our current consumptive and productive patterns, which continue to challenge the planetary boundaries of our planet (Rockström et al. 2009; IPCC 2014). Challenges like climate change, loss of biodiversity, and interference with the nitrogen cycles have already crossed their "safe operating space" (see Rockström et al. 2009) and thus require "factor 10 or more improvements in environmental performance, which can only be realized by deep-structural changes in transport, energy, agri-food and other systems" (Geels 2011). Incremental improvements in technology are thus seen as insufficient in alleviating these systematic issues and the sustainability literature is increasingly calling for larger "socio-technical" changes to tackle the threats posed to our planet's ecological boundaries (Tukker et al. 2008; Geels 2010; IPCC 2014). These larger shifts in the "socio-technical" regime are spearheaded not by incumbents, but by niche innovators, who develop novel ideas and innovations that challenge the status-quo (Kemp & Rotmans 2004; Geels 2010; 2011). These sustainable niche innovators are individuals, sustainable entrepreneurs, and small start-ups who act as agents of change that operate in "protected spaces" in which users have special demands and are therefore willing to support emerging innovations (Geels 2011). Niche innovators are thus more likely to work on radical innovations that deviate from the "locked-in" nature of the current regime (Unruh 2000; Geels 2010). If crowdfunding could thus enable more niche innovation actors like sustainable entrepreneurs it would be a welcome development.

Given the novelty of the research on crowdfunding, however, the exact differences among crowdfunders – as compared to, for example, professional investors – remain arguably only largely unexplored, which is also reflected in the diversity of insights emerging from the

on own needs or by individuals recognizing a product or service opportunity to solve either an ecological and/or social problem.

literature relating to sustainability[3] and crowdfunding success. For example, Calic and Mosakowski (2016) found that the sustainability orientation of campaigns is positively associated with its funding success on reward-based platforms[4], while Hörisch (2015) finds that environmentally-oriented campaigns are not better placed to receive funding as compared to other campaign types. These competing insights are also present when looking at lending-based crowdfunding platforms such as Kiva.org, where two papers (Allison et al. 2015; Moss et al. 2015) both utilizing a Computer-aided Text Analysis (CATA) studied the narratives associated with funding success, but came to conflicting conclusions: Allison et al. (2015) found that narratives where the venture is framed as an opportunity to help others perform significantly better than frames focusing on the business opportunity. In contrast, Moss et al. (2015) found that campaigns that signal narratives of conscientiousness, courage, empathy, and warmth are less likely to receive funding as compared to those signaling autonomy, competitive aggressiveness, and risk-taking. Hence while a number of academic articles on this nascent field suggest that sustainable entrepreneurs are well-placed to receive financing from consumer-driven financial initiatives like crowdfunding, dissenting voices question whether crowdfunding will truly become an expanded source of finance for sustainable entrepreneurs. This has led to the following guiding research question (RQ) of this disseration:

Under which conditions and to what extent can sustainable entrepreneurs with social and/or environmentally-oriented products draw benefit from reward-based crowdfunding?

In order to explore the RQ, the dissertation employs four distinct but interdependent papers that form the core of this doctoral dissertation. As detailed as follows, Papers 1 and 2 serve as the

[3] **Sustainability** is "a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations" (Brundtland Commission 1987). From an innovation or entrepreneurial perspective sustainability thus refers to models that view growth from a "triple bottom line" perspective reflected in an equitable focus on economic, social and environmental issues (Elkington 1997).

[4] Following Cholakova & Clarysse (2015), crowdfunding is broadly subdivided into four ideal typical models – Donation, reward, equity, and lending-based crowdfunding. **Donation-based crowdfunding:** The individual donates towards a specific project with no expectation of financial or material returns. | **Reward-based crowdfunding:** The individual "pledges" an amount of money with the expectation that if successfully funded they will receive a tangible (but non-financial) reward, product or service. | **Equity-based crowdfunding:** The individual makes a small investment in a project in return for an incremental stock in the respective business. | **Lending-based crowdfunding:** The individual lends a small amount of money to a specific platform, project, or person with the expectation of being paid back with interests.

foundation of the dissertation positioning and conceptualizing its field of study, while Papers 3 and 4 serve to answer the RQ.

1. Paper one serves to position the RQ within the larger literature utilizing a systematic literature review method - reviewing the literature at the intersection between sustainability, innovation and consumer (end-user) behavior later defined as sustainable end-user innovation (SEI). The review finds that the literature within these intersecting fields is growing rapidly but also that it remains widely distributed and disjointed. The field thus requires a more focused approach to uncovering the various roles end-users can adopt in driving sustainability. Furthermore, such approaches should seek to be grounded in theory to a much greater extent.
2. Paper two serves to classify and describe the crowdfunding process before tackling it empirically. The article finds that crowdfunding could be conceived of as a "co-dependent organization" in which the reliance of the central organizing agent (the platforms') on external actors (founder campaigns and crowdfunders) has become so embedded, that they may no longer be organizationally discerned as separate.
3. Having established a vocabulary for understanding the phenomenon, Paper 3 empirically examines who benefits from reward-based crowdfunding and whether or not it enables the emergence of new beneficiaries. Its finding is in line with past research: That crowdfunding does appear to increase access to innovation finance and thereby provides room for new actors to emerge but also observes increasing signs of a concentration of finance around certain geographic areas and groups.
4. Paper four seeks to causally observe whether this increased access to innovation finance through reward-based crowdfunding could prove supportive of sustainable entrepreneurship. This is done by examining what motivates crowdfunders to pledge towards certain campaigns. The paper thus empirically examines the causation between individual investment behavior and the (un)sustainability-orientation of crowdfunding campaigns. It finds that a mono-causal conclusion on whether crowdfunding is an attractive proposition for sustainable entrepreneurship is misplaced. Instead the paper concludes that personal characteristics, value orientations and most importantly product specific details play a significant role in determining whether crowdfunders support a (un)sustainable project campaign.

In combination, these four papers serve to address the RQ in a linear co-dependent fashion. The first paper identifies "where" the dissertation is positioned within the broader literature and thereby creates a foundation upon which the three other papers are grounded. The second paper provides a vocabulary of "what" crowdfunding, is so that a subsequent empirical analysis is based on a coherent and conceptual understanding of the phenomenon. The third paper seeks to uncover "who" benefits from reward-based crowdfunding while finally the fourth paper sets out to uncover "when" reward-based crowdfunding may benefit sustainable entrepreneurs in particular. It is important to note that the aim of the RQ is not to uncover whether reward-based crowdfunding results in net-positive or net-neutral sustainability. Rather, the goal is to observe whether sustainable entrepreneurs with social and/or environmentally-oriented products may benefit from this alternative source or finance. Table 1 provides an overview of the respective research questions and methods employed by the four papers, in addition to their individual roles in answering the RQ of the dissertation.

Table 1. Overview of the role of the four papers within the dissertation

Overall RQ: Under which conditions and to what extent can sustainable entrepreneurs with social and/or environmentally-oriented products draw benefit from reward-based crowdfunding?		
Paper 1	RQ	What role do end-users play in fostering sustainable innovation and which barriers and drivers do they face in this capacity?
	Role	Firstly, to identify an area of research worth pursuing and secondly to position the dissertation within the broader literature.
	Method	Systematic literature review coupled with a second round snowball sampling.
Paper 2	RQ	How can we conceptualize the organization of crowdfunding process?
	Role	To conceptualize the research phenomenon and thus to provide a vocabulary for subsequent empirical analysis.
	Method	Employed the conceptual vocabulary derived from the literature on partial organizations in order to structure the crowdfunding process literature.
Paper 3	RQ	How have the finances derived from the reward-based crowdfunding platform IndieGoGo been distributed and evolved longitudinally?
	Role	To identify whether reward-based crowdfunding enables the emergence of new actors by increasing access to innovation finance.
	Method	Employed a longitudinal dataset and geocoding. Analyzed utilizing OLS and Logit
Paper 4	RQ	To what extent and under which conditions do crowdfunders invest in sustainable products?
	Role	To identify under which circumstances reward-based crowdfunding could benefit sustainable entrepreneurs.
	Method	Employed a between groups cross-sectional web-based experiment. Analyzed utilizing multilevel mixed-effects linear regression

In pursuing this overall RQ the dissertation is structured in two parts. Part I is the so-called frame of the dissertation, which serves to create an overarching structure including theoretical background and overview (Chapter 2), research methodology (Chapter 3), the research scope and focus (Chapter 4), and finally an overview of the four papers (Chapter 5). Part II includes the four papers on which the dissertation is based, after which the dissertation will discuss, conclude and summarize the core contributions to practice and research as well as offer suggestions for future research.

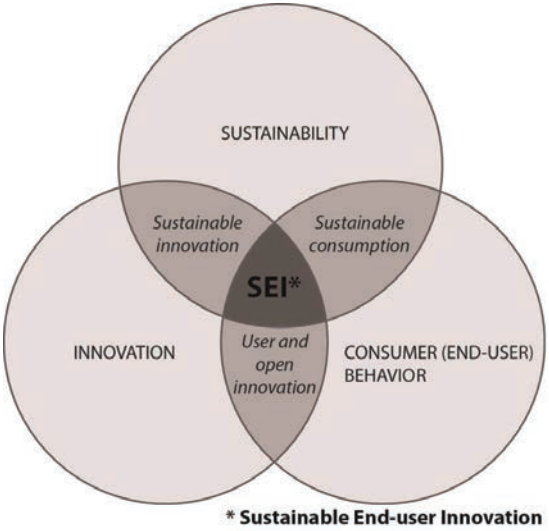
Chapter 2 | Background

The EU-InnovatE project – in which this doctoral dissertation was embedded – was tasked with investigating "the creative, innovative and entrepreneurial roles of users in developing novel sustainable products, services, and systems (Sustainable Lifestyles 2.0)" (EU-InnovatE 2017). The foundations for this research based on what was later identified as "triple disconnect" between the perceived role (or lack thereof) of the user with respect to practice and policy within the domains of sustainability, innovation, and entrepreneurship (Watson et al. 2017). Within sustainability, for example, practice and policy remains largely focused on changing the behavior of large corporates (Taylor et al. 2013) and the consumptive behavior of consumers (Ölander & Thøgersen 1995). In turn practice and policy within innovation are also primarily concerned with incumbent industries, corporates, and SMEs and specifically on how one can encourage research and development (R&D) (Henkel & von Hippel, 2005; von Hippel, 2005). Finally, while entrepreneurship policy and practice focuses on encouraging niche innovators (see Audretsch & Link 2012) the link to creating social or environmental value remains largely ignored. Hence while scholars increasingly recognize and highlight the role of niche innovators in driving "socio-technical" change (Kemp & Rotmans 2004; Geels 2010; 2011), it remains largely underexplored how exactly this process takes place, under which conditions these innovators become successful, and how these agents may drive larger "socio-technical" change. EU-InnovatE thus proposed to: "investigate the active roles of end-users in shaping sustainable lifestyles and the transition to a green economy in Europe ("Sustainable Lifestyles 2.0"). More specifically, we want to look at the role of end-users in the process of sustainability innovations" (EU-InnovatE 2013, p. 5).

Theoretically the dissertation is therefore also placed within a larger conversation, which is placed at the intersection between the literature on sustainability, innovation and consumer (end-user) behavior; bodies of literature which are each too extensive to offer any broad overview in a satisfactory manner. Instead the present chapter (as illustrated in Figure 1) offers a cursory overview of each of the three domains as they specifically relate to the dissertation. The chapter will also adress their respective overlaps before proceeding to introduce and define the

crosscutting phenomenon of sustainable end-user innovation (SEI), which was identified through a systematic literature review (Paper 1) (Nielsen et al. 2016).

Figure 1. Theoretical positioning and background literature



2.1 | Sustainability and Innovation

The notion that our planet has certain boundaries that are being challenged by our consumptive and productive patterns has become a scientific fact (see Rockström et al. 2009; IPCC 2014) and while there is still a significant number of people unwilling to accept the science behind, for example, climate change, there is overwhelming evidence that the Earth's planetary boundaries are under significant strain. An increasing number of actors are therefore calling for a greater focus on sustainability in order to insure that the "needs of the present [are met] without compromising the ability of future generations to meet their own needs" (Brundtland Commission 1987). Sustainability is therefore defined as "a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations" (Brundtland Commission 1987). The subsequent popularity of the concept has resulted in a vast growth and diversity of definitions that total at least 300 (Johnston et al. 2007). A subsequent debate has therefore also emerged regarding the

diversity of definition between those who want a more limited number of definitions and those who view it as a strength (Farley & Smith 2014; Ramsey 2015).

Building on the work of Basiago (1995) the dissertation views that these many definitions of sustainability are domain dependent with their own methods of definition. As the dissertation is focused on the role of entrepreneurs in driving sustainable innovation the dissertation is subsequently delimited to only the subfield focused on sustainable innovation. That is understood as an advance in a product, service, or process system that offers an improved or the same economic performance with lesser externalities in the form of social and environmental hazards (Halme & Laurila 2009; Bos-Brouwers 2010). The difference is then that while sustainability reflects a long-term process of change, sustainable innovation refers to a comparably short-term process by which a good or service that ideally helps enable the transition towards sustainability is developed.

2.2 | Sustainability and Consumer (or end-user) Behavior

Consumers (or end-users) engage in consumption for a great many reasons from meeting basic needs to "identity formation, social distinction and identification, meaning creation and hedonic 'dreaming'. Some authors [even] argue that these processes are driven by evolutionary imperatives of status and sexual selection" (Jackson 2005, p.v). The literature on consumption covers a range of academic fields including marketing, economics, psychology, sociology, and anthropology and is therefore "clearly not an easy or malleable literature" (Jackson 2005, p.17). This academic diversity has also resulted in the emergence of a number of approaches employed in order to understand consumer behavior. This dissertation employs a number of consumer behavior models in effect to understand consumer (or end-user) behavior.

Consumer behavior models all seek to explain consumer behavior, its antecedents, how it is influenced, shaped and constrained by applying a set of conceptual premises that in turn construct causal relationships between dependent and independent variables (see Sanne 2002; Thøgersen 2005). For example, the rational choice model on consumer behavior would contend that consumers seek to maximize their expected net benefits by calculating the costs and benefits of different courses of action before making a decision (Gilboa 2010). This model

building upon a number of key assumptions including (Jackson & Michaelis 2003; Jackson 2005):

- That consumer preferences are exogenous to the model; that they are taken as a given without further through as to their origins or antecedents;
- That individual self-interest guides human behavior;
- That rational behavior results from the process of cognitive deliberation.

Consumer behavior models in general thus provide a heuristic device for exploring the nature of a specific behavior and "provide a conceptual and theoretical framework for carrying out detailed empirical research on the structure of specific behaviors and the role of interventions in influencing those behaviors" (Jackson 2005, p.23). For the dissertation, these consumer behavior models thereby serve to conceptually and theoretically ground the research and to offer validated methods for measuring behavior.

Inherent within the tradition of modelling consumer behavior there exist two primary tensions that typically delimitate the applicability of the given model: the tension between internal and external variables included in the model, and simplicity versus complexity of the model. The tension between the "internalist" versus "externalist" model is built on whether it is focused on explaining behavior by focusing on characteristics and processes internal to the individual – i.e. attitudes, values, habits, and personal norms – or external to the individual – i.e. fiscal and regulatory incentives, institutional constraints, and social norms. The tension is somewhat comparable to the standing debate within social science on structure versus agency (Barker 2005). Newer and arguably more complex models, however, seek to capture both internalist and externalist dimensions as exemplified by the Motivation-Ability-Opportunity-Behavior (MOAB) model by Ölander and Thøgersen (1995).

The growth of these more complex models for understanding consumer behavior creates empirical issues as beyond "a certain degree of complexity, it becomes virtually impossible to establish meaningful correlations between variables or to identify causal influences on choice" (Jackson 2005, p.23). Hence while simpler models run the risk of oversimplifying or missing out on key causal influences on a decision, complex models run the risk of becoming analytically inadequate as they cannot be employed empirically. Jackson (2005) therefore argues that various

models should be employed selectively based on the research aims of the specific study; complex models aiding conceptual understanding, while less complex models may aid empirical quantification. The dissertation draws on consumer behavior models that have been specifically designed and employed to understand sustainable consumer behavior by building on the review by Jackson (2005). The dissertation for example employs the more complex MOAB-model as a conceptual tool for the systematic literature review (Paper 1), while the Value-Belief-Norm theory is employed by the dissertation's web-based experiment (Paper 4) as it provides a simplified consumer model for understanding the antecedents for predicting environmentally significant behavior (Stern et al. 1999; Stern 2000).

Due to the size of the field, the dissertation does not seek to define sustainable consumer behavior. Instead it draws upon sustainable consumer models as a means to research sustainable consumer behavior.

2.3 | Consumers (end-users) Behavior and Innovation

For most of the 20th century technical and technological innovation emphasized the importance of what has been characterized as the vertically integrated model of innovation, which builds on the assumption that innovation is best created and commercialized within a single firm (Bogers & West 2012; West & Bogers 2014). Innovation is therefore seen to be driven forth by successful large corporates that in Schumpeterian (1942) terms has the capital necessary to invest in R&D of new products and services and bring them to market. Increasingly, however, diverse streams of literature have challenged this view; stating that the knowledge relevant for innovation is widely dispersed and therefore often falls outside the realm of any one person, firm or organization (von Hippel et al. 2011; West & Bogers 2014). These developments are further supported by "erosion factors" – such as increased mobility and connectivity, more capable universities, and growing access to venture capital – that create conditions by which the closed integrated model of innovation is challenged within a growing number of domains (Chesbrough et al. 2006). According to the multi-level perspective model introduced in the next chapter, this form of incumbent driven innovation is moreover perceived of as largely incremental in nature (Geels & Schot 2007). The "distributed model" of innovation has therefore emerged; providing alternative insights into how innovation may occur from other sources than large incumbents (von Hippel 1988).

As noted by Bogers and West (2012) two major research streams drive our knowledge of this alternative distributed model of innovation. The streams are derived respectively from the works of von Hippel (1976; 2005) and Chesbrough (2006; 2014). Chesbrough's work on open innovation centers on "firms co-operating across firm boundaries to create and commercialize innovations" (Bogers & West 2012, p.61), while von Hippel focuses on the roles of users in driving innovation. Each of these streams of literature builds on the vertically integrated model that characterized 20th century innovation practices (see Freeman & Soete 1997), but views it as incomplete. Table 2 provides Bogers and West's (2012) summarized overview of the differences between the vertically integrated model of innovation and the two distributed models of innovation respectively open innovation and user innovation.

Table 2. Integrated and distributed innovation research

Attribute	Vertical integration	Open innovation	User innovation
Main Research Question	How do firms control end-to-end innovation processes?	How can firms maximize innovation effectiveness?	How can users be supported to become innovators?
Key stakeholder	Firm	Firm	Users
Other stakeholders	-	Other firms in value network	Producers
Level of analysis	Firm	Firm	Innovation
Key success Measures	Profit	Profit	Quantity of (significant) innovations
Locus of innovation/ Knowledge	Within firm	Outside firm	Within users
Type of innovator	Organizational	Organizational	Individual*
Assumed Motivations	Economic (Pecuniary)	Economic (Pecuniary)	Utility
Innovation mode	Internally controlled	Best of breed	Cumulative
Norms	Managerial hierarchy	Market exchange	Co-operation
Relationship with other innovators	None	Exchange	Co-operate
Spillovers	Blocked	Paid	Free

* A limited amount of research considers innovations by user firms.

Source: Bogers and West (2012, p.64)

As Table 2 shows the literature on open innovation is typically focused on firm or organization partnerships and collaboration. However, this literature also views end-users as potential sources of knowledge within the "interactive coupled model" (Chesbrough et al. 2014), which centers on the collaboration between the end-user(s) and a given firm, organization or project.

In addition to the literature on open and user innovation there is also a range of other distributed innovation processes, which can typically be found at the intersection between users, firms, and other stakeholders. Examples hereof include cumulative innovation (Nuvolari 2004), community and social production (Franke & Shah 2003; Benkler 2006), and co-creation (Prahalad & Ramaswamy 2004). There is therefore a multiplicity of terms associated with distributed innovation processes and not least within the realm of sustainability that has started to develop its own terminology; both independently and in unison with the innovation literature, including grassroots innovation (Smith et al. 2014), co-innovation (Dogliotti et al. 2014) and bricolage (Garuda & Karnøe 2003). This development confirms the need for a systematic literature review (Paper 1) that positions the dissertation within the SEI literature; found at the intersection between sustainability, innovation, and consumer (end-user) behavior, which we defined as sustainable end-user innovation (SEI) (Nielsen et al. 2016).

2.4 | Sustainable End-user Innovation

The role of the consumer within the literature on sustainability has largely been that of a passive recipient of goods and services rather than an active agent in creating novel sustainable goods and services (Seyfang & Smith 2007). This perspective is, however, starting to shift, perhaps inspired somewhat by the field of innovation that has observed the importance of end-users within innovation (West & Bogers 2014). That the end-user can then potentially become a significant driver of innovation is therefore also an increasingly accepted position (von Hippel 1976; 2005; Chesbrough et al. 2006).

This dissertation is therefore placed within the stream of literature identified as sustainable end-user innovation (SEI), which is defined as an individual or group of consumers, who engage in the sustainable innovative process. The SEI-process is spurred on both by the integration of end-users into a facilitated innovation process and by independent user action. The role of the end-user in driving sustainable innovation and larger transition towards a more sustainable society is then conceived as one of active participation. In order to avoid repetition of the insights derived

from the literature review on SEI, the dissertation will instead in Chapter 4 focus on reviewing the literature and establishing the conceptualized role of end-user innovation in driving larger societal change (in this case towards sustainability). Firstly, however, the following chapter will introduce the research methodology of the dissertation including philosophy of science, research orientation, and finally methodological approach. It will outline the roles of the respective papers in answering the research question and will introduce the different methods and techniques employed for compiling and analyzing the collected data.

Chapter 3 | Research Methodology

Imagine the universe as having a definite structure, but exceedingly complex, so complex that no models humans can devise could ever capture more than limited aspects of the total complexity. Nevertheless, some ways of constructing models of the world do provide resources for capturing some aspects of the world more or less well than others.

Ronald N. Giere (1999, p.79)

3.1 | Philosophy of Science

The overall motivation for this dissertation was the words of Saunders et al (2009) driven forward by a "surprising fact" relating to the nature of any successful crowdfunding campaign: Namely that it in order to succeed it requires strangers to support strangers for causes, products, or services that have not yet been realized and of which they have little direct oversight or control. Nevertheless, crowdfunding is for all intents and purposes flourishing, bringing with it an emergence of new actors and potential beneficiaries (i.e. sustainable entrepreneurs). The dissertation subsequently took on an abductive approach to explore the phenomenon built upon a theory-data interplay that was driven by a "continuous dialog between the data and the research's preunderstanding" (Bryman & Bell 2015, p.27). The dissertation seeks creative insights that explore the "surprising fact" by combining deductive theory-driven logics with inductive inferences observed by moving back and forth between theory and data. The paper "Reward-based crowdfunding and sustainable entrepreneurship – A web-based experiment" was ,for example, grounded in the theory-driven logics provided by the value-belief-norm theory (Stern et al. 1999), but the approach itself and idea was driven by past and present empirical observations of the crowdfunding phenomenon (Bechara & Ven 2007).

In terms of ontological and epistemological roots of the research, the dissertation is bound within the tradition of critical realism with "an objective ontology (i.e. reality exists independent of our cognition) and a subjective epistemology" (Bechara & Ven 2007, p.37). There is therefore an objective but also exceedingly complex reality with a definitive structure, which is clouded by our individually bounded abilities, value-laden selves, and limited understandings. Our

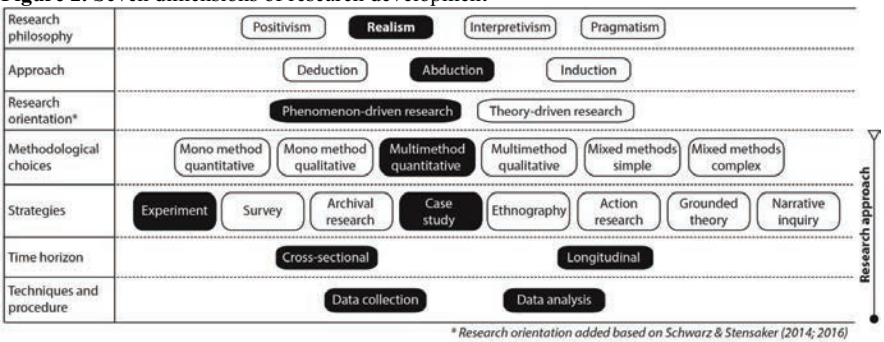
epistemology (i.e. methods for understanding reality) are therefore as imperfect as we are and there is no predefined or predetermined methodology or criteria by which to judge the veracity of our knowledge. However, this does not entail that robust knowledge growth is unachievable. Rather, it is dependent on theoretical and methodological triangulation, repetition, and "a process of blind variation and selective retention. Reality (as opposed to mere opinions) serves as an external arbitrator or common referent in editing beliefs and theories for winnowing our inferior theories" (Bechara & Ven 2007, p.61). This view derived from Campbell, who added an evolutionary view to the critical realist perspective is shared by this dissertation (Campbell & Paller 1989; Bechara & Ven 2007). Science is therefore, along the lines of Azevedo (1997), viewed as a problem solving activity where sound logical arguments and empirical evidence will ultimately succeed whereas other less convincing or empirically lacking arguments will fail. This happens through a process of error correction in line with Popper (2005) where evidence obtained from the outside world is placed within various alternative plausible models for understanding a phenomenon. "The theories and models that better fit the problems they are intended to solve are selected, whereas those that are less fit are ignored or winnowed out… [which leads to comparative selection and] … an evolutionary growth of scientific knowledge by the scholarly community" (Bechara & Ven 2007, p.62).

In practice, the dissertation has applied various models to gain empirical insights that were drawn from the real world in order to explore the RQ. An example hereof is the application of predictive thinking set-out by the theory of institutional change (see Greenwood et al. 2002) to a longitudinal dataset derived from the crowdfunding platform IndieGoGo. The paper (Paper 3) observes that while crowdfunding offers many opportunities for a diverse range of actors to engage in successful innovation finance, there are also trends which point towards increased clustering of resources around specific regions and actors. This development is currently unnoted within the relevant literature that instead primarily hails crowdfunding as a democratizing force that has resulted in expanded innovation finance access (see Sorenson et al. 2016; Mollick & Robb 2016). Instead we, in Paper 3, sought to examine whether crowdfunding followed similar trajectories to other fields that have undergone institutional change. This account would predict that, while initially, the deinstitutionalization of the field of innovation finance brought on by the emergence of crowdfunding would open niches for new players. However, we would also expect the field "reinstitutionalize" where successful practices and routines create inward pressures and eventual stabilization of the actors and areas benefiting most. This process would lead first, to

"higher-than-expected returns to groups adopting successful practices, reinforcing these groups, potentially resulting in the emergence of clusters of financial success around specific agents and regions as new routines and practices take hold" (Nielsen et al. 2017, p.2). Paper 3 observes that there are indeed signs that successful campaigns cluster around certain regions and individuals/groups.

Drawing on Saunders et al.'s (2012, p.128) six dimensions of research development the dissertation can thus begin to map the initial two of six dimensions of the dissertations research development: research philosophy (critical realism) and approach (abductive). It should be noted that the dissertation in addition to the six dimensions set out by Saunders et al. (2012) also introduces a seventh dimension namely the research orientation. The seventh dimension reflecting the research orientation that is derived by the works of Schwarz and Stensaker (2014; 2016) as will be detailed now.

Figure 2. Seven dimensions of research development



Source: Adapted from Saunders et al. (2012) and Schwarz and Stensaker (2014; 2016)

3.2 | Research Orientation

The dissertation follows the convention within the early body of crowdfunding literature stream by adopting a phenomenon-driven research (PDR) orientation (von Krogh et al. 2012; Moritz & Block 2014). PDR is characterized by being spurred by an interest in a specific phenomenon rather than a theory and emphasizes "identifying, capturing, documenting, and conceptualizing…[it]…in order to facilitate knowledge creation and advancement." (Schwarz & Stensaker 2014, p.480). Schwarz and Stensaker (2014; 2016) juxtapose PDR with theory-driven research (TDR) which they critique for having created a figurative straightjacket that

emphasizes constructing and filling theory gaps; gaps that in turn create a context where favored and established theories are advanced. "Consequently, theory becomes a legitimate means to an end: publishing, scholarship, status, and career. A straightjacket is artificially constrictive because by default it characterizes theory as filling existing, known knowledge gaps, add-to-the literature norms, and making "progress"—of development and advance" (Schwarz & Stensaker 2014, p.481). These critiques are echoed by previous researchers in different capacities (see Sutton & Staw 1995). Table 3 presents an overview of the comparative differences of TDR and PDR as seen by Schwarz and Stensaker (2014).

Table 3. How theory-driven research differs from phenomenon-driven research

	Theory-driven research	Phenomenon-driven research
Aim of research	Contribute to a specific (and often preexisting) theory	Contribute to a body of knowledge; facilitating conventional understanding
Motivation for research	Fill a theoretical gap or make a theoretical contribution; theory as knowledge	Understand a managerial or organizational phenomenon; capturing and extending knowledge
How the contribution is made	By creating or developing construct-to-construct linkages	By mapping (new) constructs onto a phenomenon
The role of theory	Using existing theory to build new theory or enhance current theories	Using empirical data to position or build theory. Eclectically drawing on and integrating multiple theories to describe and explain phenomena
Primary target audience	Academics	Academics and practitioners
Research output	Incremental advancements to existing theory	Radical advancement of current knowledge through the development of new theories or ideas. Also allows for the extension and new combinations of existing theories

Source: Schwarz and Stensaker (2014, p.486)

While the dissertation does not share the rather strawman-like characterization presented by Schwarz an Stensaker (2014) of TDR, their insights regarding the merits of PDR are accepted and echoed but also critically followed. For example, the current phenomenon-driven tradition within the crowdfunding literature is the critical departure for the second paper of the dissertation. Paper 2 critiques that in pursuing definitions and descriptions that are largely confined to the interests of the particular academic articles (e.g von Krogh et al. 2012; Moritz & Block 2014), our understanding of crowdfunding takes on an essentialist notion, where crowdfunding becomes perceived as a stable component of "things" rather than a fluid ongoing

process. This means that if we were to understand each individual actor's behavior within a specific crowdfunding context, we then cannot detangle these observations from their context. The motivations driving individual pledging/investment behavior may, for example, be different if placed within a reward, loan, or equity-based crowdfunding context. Hence each component of the crowdfunding process shapes the other; something that is lost when defining and describing behavior based on the interest of the particular article. Nonetheless the dissertation maintains that studying an emerging phenomenon can be a good starting point to discover and build knowledge (von Krogh et al. 2012; Schwarz & Stensaker 2014; Mattingly 2015); essentially contending that a "surprising fact" is enough on its own to drive a problem solving activity such as scientific inquiry (Azevedo 1997; Bechara & Ven 2007). PDR differs from similar research orientations such as problem-based research as it does not necessarily start with a significant emerging problem (Lawrence 1992).

The motivation behind PDR is neither to contribute to a specific theory nor to test it. Instead the aim is to advance our knowledge of a specific surprising or unconventional phenomenon. This surprising phenomenon could emerge because:

- because practitioners act differently than expected (e.g. Mintzberg 1978),
- because they are doing something where there is no theory or literature (e.g. Bartlett & Ghoshal 1992); or
- because of the emergence of a novel organizational occurrence.

Thus from a PDR process perspective, the phenomenon comes first and theory second, and scientific inquiry start with a broad RQ and applies various theoretical lenses in an effort to identify, describe, explain, and conceptualize it (Schwarz & Stensaker 2014; 2016). Specifically, the dissertation argues that crowdfunding (enabled via online platforms) is a novel organizational occurrence through which innovation finance has flourished; this despite – or more correctly – because of its dependence on a crowd of strangers who support other strangers in a fluid and lose organizational fashion. The novelty of crowdfunding is not that a crowd engages in financing a certain project, but rather the fashion in which it is currently organized. Present day crowdfunding significantly different from past crowd driven financing endeavors. The Statue of Liberty is one such endeavor is commonly cited as an early example of what we today would call crowdfunding. In this example Joseph Pulitzer initiated a newspaper campaign to finance granite plinth for the statue through small donations from hundreds of residents (BBC

2013). What separates crowdfunding from earlier similar initiatives is its reliance and use of online platforms and social media to organize systematically, cheaply, and repeatedly a diversity of concurrent ongoing campaigns. Consequently these online platform-driven means of organizing innovation finance have resulted in the emergence of a host of new actors and potential beneficiaries as the previously unfeasible costs of incorporating many small financiers is made possible by the connectivity of the internet (Mollick 2014; Sorenson et al. 2016). This brings us back to the question of whether crowdfunding could signal a shift in financing opportunities for specifically sustainable entrepreneurs now that citizens rather than professional investors represent prospective innovation financiers.

The application of theory in the dissertation is motivated by a desire to uncover the RQ, which in turn is driven by a desire to identify, describe, conceptualize, and explain the phenomenon of reward-based crowdfunding in relation to sustainable entrepreneurship. The dissertation does not apply or seek to place crowdfunding within one coherent theoretical narrative. Instead it utilizes suitable theories as a framework to generate new or different understandings of the phenomenon based on the empirical evidence of each paper, and in turn the dissertation applies different theoretical lenses in order to frame and narrow the specific RQs of the four papers (Schwarz & Stensaker 2016). For example, Paper 2 seeks to utilize the theory on partial and complete organization (Ahrne & Brunsson 2011; Ahrne et al. 2016) in order to describe and conceptualize crowdfunding, while Papers 3 and 4 respectively use institutional change theory and Value-Belief-Norm (VBN) theory to explain aspects of phenomenon. Paper 3 seeks to predictively explain and test empirical observations within the literature as they relate to the distributive qualities of innovation finance derived from crowdfunding platform IndieGoGo, while Paper 4 sets out to explain crowdfunders (un)sustainable pledging behavior utilizing the VBN-theory (Stern et al. 1999). Each theory stems from different research traditions that cannot be subsumed within one overarching theoretical umbrella and the dissertation does therefore not seek to "retrospectively construct gaps in existing theory…" (Schwarz & Stensaker 2014, p.489). However, this should not be confused with a lack of potential theoretical contributions that can be derived from the PDR orientation: For example the empirical observations of Paper 4 contribute to the VBN-theory by observing that products themselves are strong moderators in (un)sustainable consumer behavior and that sustainable value orientations that are assumed to correlate can diverge significantly for specific products.

In pursuing a broad research question – as inspired by the occurence of a surprising fact related to an emerging novel organizational phenomenon – the dissertation has enjoyed a greater academic freedom when utilizing the PDR approach as set out by Schwarz and Stensaker (2014; 2016). However, the PDR orientation also has a number of limitations not addressed by Schwarz and Stensaker (2014) including the noted essentialist nature the research can carry, challenges with knowledge retention, and finally the danger of cherry-picking theories.

Firstly, the essentialist view of crowdfunding as a stable component of "things" is an inherent limitation within the dissertation that while conceptually addressed in Paper 2, is not adequately accounted for. However, to address this issue was seen as unfeasible given the novelty of field and the limited scale of this dissertation. The crowdfunding literature is still puzzling out the simple mechanics of the antecedents of successful crowdfunding campaigns and therefore seeking to identify the higher order interactions was seen as premature. Nonetheless it remains a noteworthy limitation that is not addressed within the dissertation. Secondly, PDR faces potential issues with regards to knowledge retention if we conceive that theory, rather than being a straight-jacket for research, is a source for plausible models for understanding a given problem as noted by Bechara and Ven (2007). Theory then provides researchers with a common framework, language, and set of expectation that are fundamental for knowledge growth and in seeking to escape this "straight-jacket" of TDR where there is a danger that research becomes solely an empirical exercise resulting in dust-bowl empiricism[5] (Sutton & Staw 1995, p.380). In order to avoid this, theory is applied in a selective fashion, but plays a central role within each paper of dissertation, which in turn seeks to reapply the respective derived insights to theory. Finally, there is a danger of cherry-picking theories in PDR where we run the risk of post-hoc conclusions being drawn based on patterns observed after the empirical material has been collected and subsequently applied to a theory that best fit these observations. Theory then becomes a mere means to confirm empirical insights and thereby becomes inherently confirmation-oriented. In such cases it becomes increasingly difficult to weed-out inferior theories. As will be detailed in the following sections this was avoided in the dissertation by striving to have a clear theoretically-derived aim before seeking out or collecting empirics.

[5] An approach to science that consists of making empirical observations and collecting data with no theory involved at all and therefore no attempt to add to or establish a theoretical framework.

In conclusion, the dissertation therefore adopts a PDR orientation in line with prior literature as this approach offered more academic freedom to explore a surprising fact related to the novel organizational phenomenon of reward-based crowdfunding. However it also sought to confront potential issues related to this research orientation by seeking to avoid essentialist conclusions, relating the observations to theory, and letting theory drive and inform the empirical approach.

3.3 | Research Approach

In approaching the RQ the dissertation employed what can best be described as a step-wise process, where each paper in a linear fashion built on the former. The following section will outline each of the respective papers in terms of their contribution to answering the RQ. The section will also provide a summary of the different methods and techniques employed for compiling and analyzing the data collected.

Step 1: Systematic literature review (Paper 1)

The initial literature review served to delimit and position the dissertation within the larger conversation that rests at the intersection between the literature on sustainability, innovation and consumer (end-user) behavior as introduced in the previous chapter. It thereby served the academic role of positioning and scoping the field in which the dissertation was located. More importantly it also took on a personal role in providing the author with the opportunity to carve out his own research space within the larger umbrella of the EU-InnovatE project.

Following the example set out by Tranfield et al. (2003) the dissertation adopted a systematic literature review approach in order to map and assess the intellectual territory set out by the EU-InnovatE project (EU-InnovatE 2016). A systematic approach was employed rather than undertaking a traditional "narrative" review as these often "lack thoroughness, and in many cases, are not undertaken as genuine pieces of investigatory science. Consequently, they can lack a means for making sense of what the collection of studies is saying. These reviews can be biased by the researcher and often lack rigor" (Tranfield et al. 2003, p.207). Instead the systematic literature review allows for a transparent, systematic, and reproducible approach to reviewing literature that provides an audit trail on the reviewers' procedures and decisions (Cook et al. 1997). The paper takes inspiration from previous reviews; not only in terms of approach but also in identifying relevant keywords and strings of keywords associated with the

respective three fields that the review sought to cover (see Figure 1 in Chapter 1) (Adams et al. 2012; West & Bogers 2014).

However, the systematic literature review also has its flaws especially in interdisciplinary and/or nascent research fields where a common and concise terminology has yet to emerge. In these cases the reliance on keywords and Boolean search terms results in certain literature being missed. The review subsequently adopted a secondary step of snowball sampling using citation tracking as well as the references in the overall literature base. While creating issues with reproducibility this approach was deemed necessary as the primary aim of the review was to map and assess the intellectual territory the dissertation inhabits. Therefore, we opted to loosen certain methodological requirements in order to ensure that relevant literature was not lost due to the stringent requirements of systematic reviews. The study could thus insure that the range of literature within the field was identified and that a fuller picture of the intersecting fields was compiled. The in-scope literature was subsequently coded by using the Nvivo software in order to provide a further audit trail for the reviewers' procedures and decisions. The coding itself built upon a combination of descriptive nodes focused on for example the type and domain of the given innovation and analytical nodes based on the MOAB-model of consumer behavior as detailed in more depth in the Paper 1.

The systematic literature review subsequently provided a foundation on which the dissertation's RQ and focus was based. Crowdfunding was identified as an emerging but still relatively unexplored phenomenon at the intersection of sustainability, innovation, and consumer (end-user) behaviour a phenomenon with noted potential for financing sustainable initiatives and entrepreneurs.

Step 2: Conceptual paper (Paper 2)

Having identified crowdfunding as a worthwhile subject of research within the larger literature labelled sustainable end-user innovation (SEI) there was a subsequent need to classify and define the phenomenon; not least to enable an empirical approach. In order to do so the second paper within the dissertation employs the literature on respectively crowdfunding and complete and partial organization. The literature on complete and partial organizations (see Ahrne et al. 2016) provides the conceptual toolset and vocabulary for understanding how an organization (or "decided social order") is constructed and maintained through decisions, while the

crowdfunding literature itself serves as the empirical data upon which the concepts are modelled. This approach provided a conceptualized model of crowdfunding in addition to granting conceptual clarity on the different components at play in the crowdfunding process; some of which were empirically explored in papers three and four. The conceptual paper thereby provided the vocabulary necessary to conduct an empirical examination of the research question.

Step 3: Longitudinal dataset (Paper 3)

In order to explore whether reward-based crowdfunding could serve as an alternative source of innovation finance for sustainable entrepreneurs it was firstly considered worthwhile to uncover whether – as prior research suggests – crowdfunding actually increases access to innovation finance (Sorenson et al. 2016). An expansion in the access to innovation finance access creates opportunities for actors such as sustainable entrepreneurs, while conversely a lack of expansion would suggest that crowdfunding is not an avenue for more equitable finance opportunities, but rather a new source of finance for already entrenched social agents.

In order to empirically examine its distributive qualities, the dissertation employs a case specific longitudinal dataset from the crowdfunding platform IndieGoGo; investigating both the distributive qualities of reward-based crowdfunding by geographic distribution but also by the individuals/teams who seek and receive finance. The aim of the study was to uncover whether it could identify empirical evidence confirming prior literature that has argued that reward-based crowdfunding expands innovation finance access. The selection of IndieGoGo as our case study was based on the fact that it is one of the largest and most established reward-based crowdfunding platforms in addition to fact that. Furthermore – and unlike Kickstarter – it allows for data scraping of its website. Data scraping is a technique by which a machine extracts a specified set of data from an indicated website, so it can be analyzed using various regression techniques (OLS and Logit in this dissertation). In conducting these analyses the study observed that while we do see some increasing signs of a clustering of wealth around certain regions and teams/individual that has not previously been noted within the literature, the bulk of recipients of IndieGoGo funding remain newcomers. This indicates – at least on the surface – that reward-based crowdfunding could offer increased innovation finance access to a diversity of new actors and not merely benefit already entrenched social agents. In terms answering the RQ observing that reward-based crowdfunding does in certain circumstance increase access to innovation

finance motivates paper four that sets out to uncover "when" reward-based crowdfunding could specifically benefit sustainable entrepreneurs.

Step 4: Web-based experiment (Paper 4)

In order to observe under what circumstances reward-based crowdfunding could potentially enable sustainable entrepreneurship a web-based experiment was employed. This experiment mimicked a real-world crowdfunding platform and was employed on a representative (US) sample; thus, allowing the study to causally observe whether sustainability was linked with increased, decreased, or unchanged pledging behavior in individuals. The experiment thereby provides empirical insights into under what conditions reward-based crowdfunding can be seen to enable sustainable entrepreneurs and their product ideas.

The experimental method was chosen as it represents a powerful tool for disentangle complex relationships that cannot be easily teased out with other methods and thus provides a unique lens through which causality can be observed (Trochim 2001; Colquitt 2008). However, despite of this, experimental methodologies remain comparably rare; not least within the innovation and entrepreneurship literature (Aguinis & Lawal 2012). There are a number of reasons for this, including the expenses associated with experimental research and the inherent difficulties in designing and implementing high quality experiments. Firstly experiments are often critiqued for creating artificial situations, which creates concerns regarding their realism (Colquitt 2008). Secondly they are often subject to the "college sophomore problem" where an overreliance on a college sample creates reliability and external validity issues when they seek to generalize about the population at large (Reynolds 2010; Cooper et al. 2010). Finally results can be biased by order effects, social desirability biases, unsuccessful randomization, and selective attrition (Podsakoff et al. 2003; Bruhn & McKenzie 2009; Zhou & Fishbach 2016); all of which often dissuades scholars from conducting experimental research (McMullen et al. 2017).

The implementation of a web-based experiment that mimicked a real-world crowdfunding platform allowed the dissertation to overcome the two first concerns regarding artificiality and reliance on a college sample. The mimicked platform created a context similar to the one an individual would face in the real world, while also allowing it to be conducted on a large and representative sample. As will be elaborated upon in the paper four, a number of steps were

taken in order to insure a successful randomization of attributes which also controlled for selective attrition, order effects, and to a lesser degree social desirability biases.

Step 5: Summary

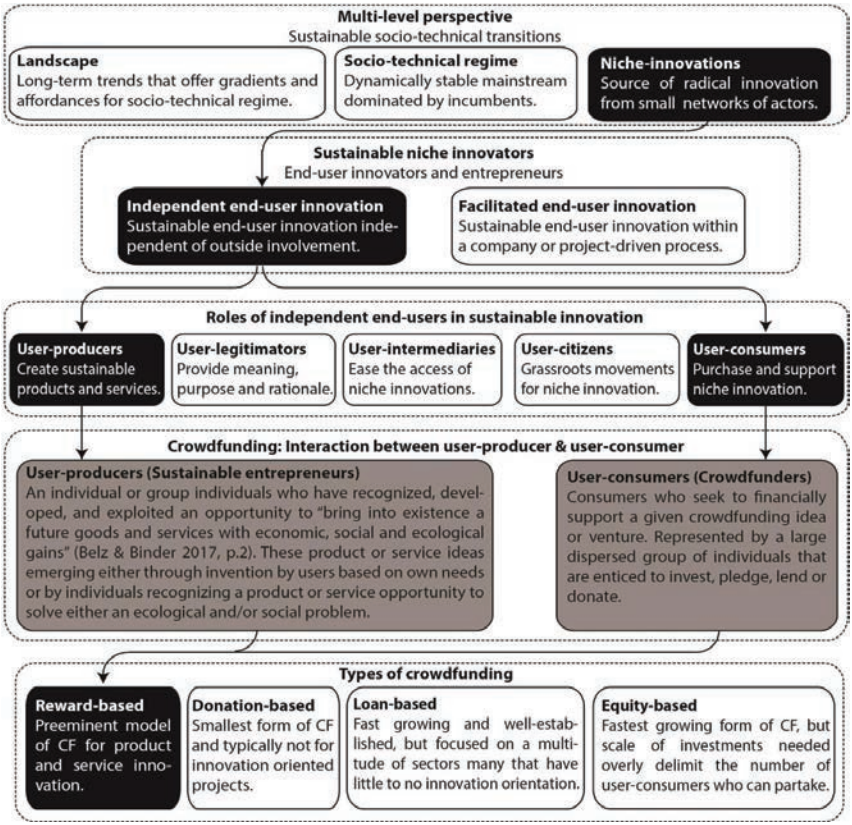
The four paper thus form the core of this doctoral dissertation; each one in a step-wise fashion allowing me to tackle the overall research question. Paper 1 positions, delimits and carves out my research focus; Paper 2 establishes a vocabulary and conceptual understanding of my research focus; Paper 3 uncovers whether and under what circumstances reward-based crowdfunding can be seen to increase access to innovation finance to new actors apart from already entrenched social agents; Paper 4 details under what circumstances the increased access to innovation finance provided by reward-based crowdfunding could be seen to enable sustainable entrepreneurs and their product ideas. Taken together this ultimately allows for the dissertation to propose a number of conditions that appear to ameliorate success relating to sustainable entrepreneurs. Furthermore the dissertation uncovered conditions that relate to funding failure, as will be detailed in Chapter 10.

Having outlined the dissertation's research methodology, the following Chapter will now address its research scope and focus. It will identify how end-users as niche innovators participate in sustainable socio-technical transitions by actively engaging in a diversity of roles from that of originator of sustainable inventions and innovation (ultimately labelled sustainable entrepreneurs) to supporters of these inventions and innovations through consumer-driven finance (labelled crowdfunding).

Chapter 4 | Scope and Focus

In order to examine the potential role of reward-based crowdfunding in financing sustainable niche innovators we must firstly scope, define and delimit the dissertation's overall focus. In the following chapter, we will move from the macro-level perceived role of niche innovators in sustainable socio-technical transitions onto a definition of these innovators, the various roles they can play, and how these roles relate specifically to reward-based crowdfunding. Figure 3 illustrates the delimitation process starting with the multi-level perspective.

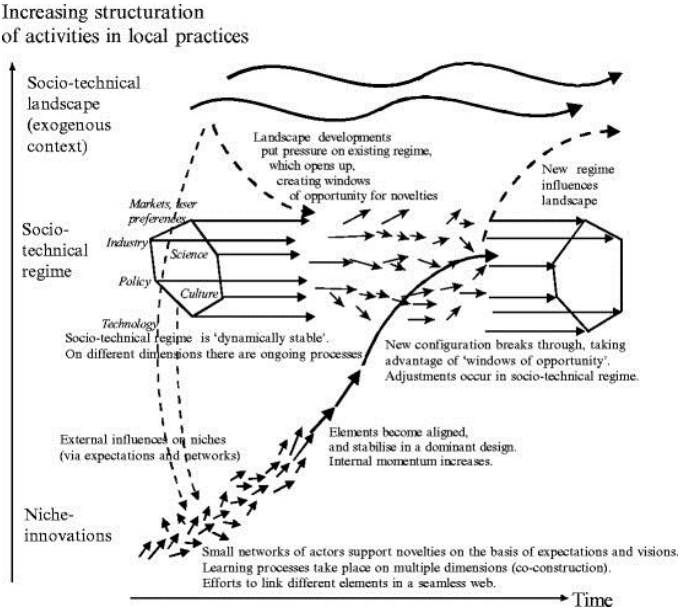
Figure 3. Dissertation research scope and focus



4.1 | Multi-level Perspective

The role of the niche innovator in driving change is derived from the multi-level perspective (MLP); a mid-range theory that conceptualizes the process of socio-technical transitions (Geels & Schot 2007) including transitions towards sustainability (see Kemp & Rotmans 2004; Verbong & Geels 2007; Nykvist & Whitmarsh 2008; Elzen et al. 2011). Socio-technical transitions are characterized not only by technological changes but also by shifts in other practices that typically act to lock-in change, including user and industrial practices, regulation, infrastructure, and symbolic meanings (Unruh 2000; Geels 2002). Figure 4 provides the conceptualized view of society as a nested hierarchy of intersecting structuring processes identified as the *niche*, *regime,* and *landscape* level as set out by the MLP.

Figure 4. Multi-level perspective on transitions



Source: Geels and Schot (2007, p.407)

The socio-technical landscape (or landscape) represents the exogenous context and is therefore characterized as the backdrop that sustains society. This includes long-term trends like demographic, political ideologies, environmental factors, and macro-economic developments. The landscape hence forms the "gradients and affordances for how to go about establishing

socio-technical configurations that serve societal needs" (Smith et al. 2010, p.441). These configurations are represented by the dynamically stable socio-technical regime and agents of change, which are found at the niche level. The regime accounts for the stability within the socio-technical system, while the niche challenges the existing regime with new expectations and visions; hoping "that their promising novelties are eventually used in the regime or even replace it" (Geels 2011, p.27). Changes within the regime are therefore seen to be incremental and path dependent because of the locked-in nature of multiple ongoing processes within science, technology, politics, markets, user preferences, and cultural meanings (Geels 2004). Radical change is subsequently dependent on niche innovations that emerge from small networks of actors, such as entrepreneurs and start-ups, who support novelties on the basis of the mentioned expectations and visions. Their innovations challenge the existing stability of the regime-level by operating in a "protected space" in which users with special demands are willing to "insulate novel ideas and prototypes against the dominant socio-technical regime and tolerate uncertainty and initial low product performance levels" (Nielsen et al. 2016, p.66). Sustainable entrepreneurs often depend for instance, on certain users' willingness to – at least in the short term – accept one of the above in return for a more sustainable product or service. In doing so, however, they also enter a precarious state as their idea, product, or service challenges many of the inherent lock-ins within the regime. For example, localized community energy production initiatives face a number of barriers including specific user practices, the existing infrastructure, and not least legal restriction when it comes to power production (Blanchet 2015).

Nonetheless these niche innovators do, at times, succeed in successfully challenging the embedded practices at regime level, which may result in a socio-technical transition. These transitions follow similar dynamic processes: (i.) niche-innovations gather internal momentum, (ii.) changes in the landscape create pressures on the regime, and if (iii.) there are certain destabilisations within the regime, this creates windows of opportunity for niche-innovations. Hence, while the different hierarchies with the MLP connect and reinforce each other the niche is considered the primary driver of socio-technical regime change through their novel idea, products, and services. The niche innovator is therefore assumed to be of key importance if we are to achieve a systematic transition towards a more sustainable means of production and consumption (Tukker et al. 2008; Schot & Geels 2008; Geels 2011).

While one can critically appraise this dichotomy – in which the regime acts as stabilizing, while the niche acts as the driver of radical innovation – the MLP is a useful approach to conceptualizing the value and role of sustainable niche innovators such as end-users, entrepreneurs, and start-ups in driving sustainable innovation. In conclusion, the dissertation builds on concept of the MLP and accepts the assumption that niche innovators are critical for any successful sustainable socio-technical transition.

4.2 | Niche Innovator

Having established the central role of niche innovators in driving sustainable socio-technical transitions, we shall now seek to expand on who these niche innovators are. Firstly, these niche innovators are – in line with the innovation literature and most especially Eric von Hippel (1976; 2005) – defined as end-user(s) and thus "the end-consumer (or groups of consumers) of a given product or service" (Nielsen et al. 2016, p.66). The general conception of the role of the end-user within innovation having undergone the noted shift from that of nearly passive recipients of producer-made products and services to an active participant in the entire innovation process (von Hippel 2005; Bogers et al. 2010). End-users innovate based on their experiences with a given product or service: The mountain bike was, for example, invented by biking enthusiasts (end-users) who started tinkering with existing commercial bikes that were otherwise not suited for rough off-road use (Lüthje et al. 2005).

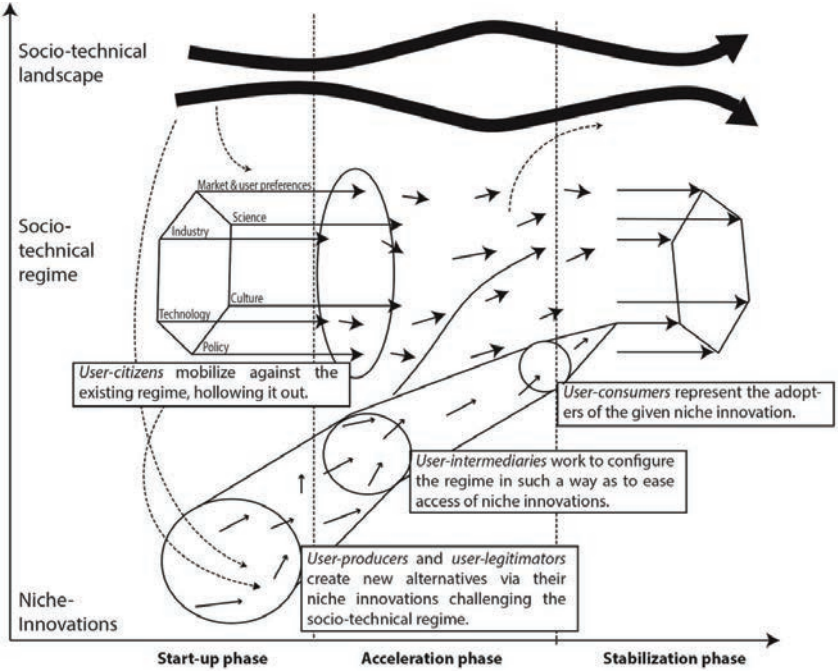
Driven forth by advances in technology (von Hippel et al. 2011), an increasingly capable and educated citizen body (von Hippel et al. 2011; Baldwin & von Hippel 2011), and not least changing socio-economic "erosion factors" (Chesbrough 2003; Chesbrough et al. 2014) the end-users' role within innovation is increasingly acknowledged as key innovation actor. Both in their own right, but also within company and project-led initiatives (Bogers et al. 2010; West & Bogers 2014). The advent of Web 2.0, the continuously decreasing cost of communication, the rise of multiple types of freeware, and the knowledge and tools available for end-user innovation have also increased dramatically. Furthermore with the rise of 3D-printing (and other open workshops), digital end-user generated content is also increasingly seen as being translated into real world product and service innovation (von Hippel et al. 2011; de Jong & de Bruijn 2012).

As noted previously the end-user can thus play an active role in driving sustainable innovation within two broad categorical capacities: An independent and a facilitated capacity. Where "facilitated end-user innovation is characterized by the integration of the end-user into a company or project-driven sustainable innovation process… [while] …independent end-user innovation reflects innovation by the end-user, which is not facilitated by outside involvement" (Nielsen et al. 2016, p.66). Based on this categorical subdivision, the dissertation focuses specifically on sustainability-oriented innovation driven by independent end-users.

4.3 | Role of Independent End-users in Sustainable Innovation

The end-user in independently driving sustainable innovation can take on a number of capacities, which Schot et al. (2016) have categorized as user-producers, user-legitimators, user-intermediaries, user-citizens and user-consumers. Each of these categorized end-users play separate but connected roles in driving a niche innovation into the regime; ultimately replacing the regimes' technology, rules, and practices from the early start-up phase through acceleration and finally the stabilization phase. Figure 5 illustrates each of these categorized roles derived from earlier literature, which Schot et al., (2016) have synthesized into a systematic typology across approaches (see Truffer 2003; Ornetzeder & Rohracher 2006; Stewart & Hyysalo 2008).

Figure 5. MLP and the role of the user



Source: Adapted from Schot et al. (2016)

The start-up phase is brought on by a destabilization of the socio-technical regime that results in a shift in landscape pressures, for example, climate change. These pressures from the landscape level undermine elements within the socio-technical regime, which in turn stimulates

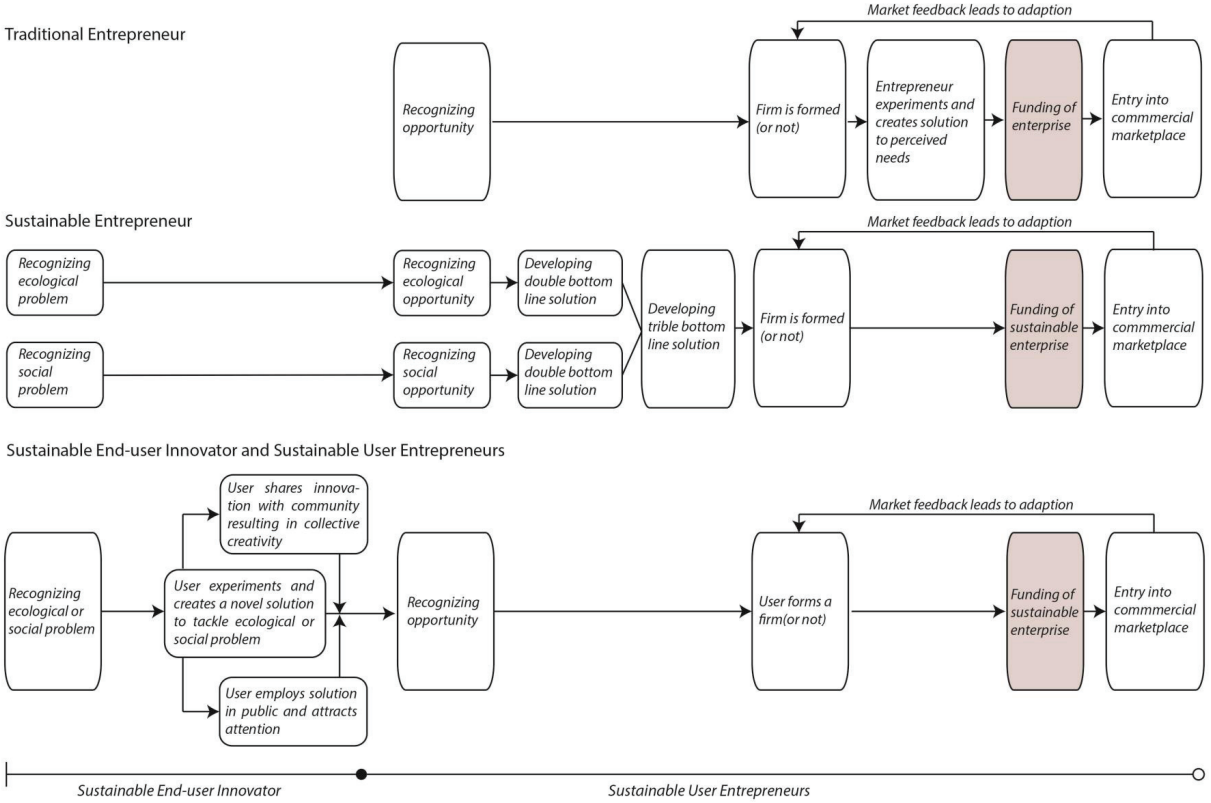
experimentation and invention by user-producers. Alongside these user-producers, a number of user-legitimators act by providing meaning, purpose, and rationale for these activities. “For example, from the 1970s the limits-to-growth narrative has provided meaning to the development of renewables and helped to shape expectations about their future” (Schot et al. 2016, p.4). The user-producers or users-turned-entrepreneurs thus provide possible alternative product and service solutions brought on by a shift at landscape level, whereas user-legitimators act to create a common narrative within the niche while simultaneously questioning the socio-technical regime’s ability to deal with these challenges (for example climate change). During the acceleration phase user-intermediaries and user-citizens act to create a space in which niche innovation can take hold. User-intermediaries – representing national or regional organizations aimed at promoting sustainable causes – work to configure the socio-technical regime and emergent technologies in such a way, that they ease the access of the niche innovations into the regime. User-intermediaries align themselves with likeminded firms, governments, NGOs, and individual user-citizens in efforts to achieve their goals. The user-citizen is, in turn, represented by grassroots movements which “engage in regime-shift politics, lobbying for a particular niche and against the regime (or other niches)” (Schot et al. 2016, p.4); effectively acting as mainstream niches in the eyes of user-consumers. Finally, user-consumers represent the adopters of the given niche innovation by accepting and embedding niche innovation into their lifestyles as means of expressing their status and identity; thus, assigning symbolic meaning to these new products or services. Ideally, as the niche innovation is increasingly adopted and further developed, it slowly replaces the previous socio-technical system and creates a new stabilized socio-technical regime context. The transition from wind- to steam-powered shipping is an example of such a transition process, as it began with steam-powered ships operating only in niche areas to then increasingly replacing their wind-powered cousins within a growing number of domains (Geels 2002).

In utilizing Schot et al.’s (2016) user typology, the dissertation – with its focus on reward-based crowdfunding – is specifically interested in the interaction between user-producers and user-consumers. The user-producers represent the archetypical entrepreneur (campaign founders) who seek financial support from a diverse range of user-consumers (crowdfunders).

4.4 | Interaction Between User-producer and User-consumer

The user-producers (or users-turned-entrepreneurs) represent the individual or groups of individuals who develop novel sustainable innovations. User-producers are "inventing, experimenting, and tinkering with radical technologies, creating new technical and organizational solutions, articulating new user preferences and enabling new routines to emerge" (Schot et al. 2016, p.4). They therefore operate at the intersection between what is classically distinguished as end-user innovators, user entrepreneurs, and traditional entrepreneurs (von Hippel 2005; Shah & Tripsas 2007). End-user innovations represent individual inventions that have not yet been commercialised, while both user and traditional entrepreneurs strive for commercialization of their inventions, but the process towards achieving this are distinct: "First, for a user the entrepreneurial process is typically emergent, meaning that the user entrepreneur takes a number of steps towards starting a firm, such as developing a product for personal use, without any formal acknowledgment or evaluation of a commercial opportunity. In contrast, only after a potential opportunity has been identified would a typical entrepreneur take action such as developing prototypes. Second, when users are embedded in user communities, the community can play a significant role in the development and diffusion of the innovation. While existing research emphasizes feedback and adaptation, it is focused on change that occurs after firm formation. User entrepreneurs obtain feedback and adapt prior to firm formation" (Shah & Tripsas 2007, p.129). In the case of SEI users innovate on the basis of personal experiences and needs as with end-user innovation, but do "so (also) for the benefit of others to improve the environmental, social or health condition of a community or larger society." (Nielsen et al. 2016, p.67). Traditional entrepreneurs and sustainable entrepreneurs are respectively distinguished, where Shah and Tripas (2007) note that the traditional entrepreneurs are driven by a recognition of a business opportunity, while Belz and Binder (2017) note that sustainable entrepreneurs firstly recognize an ecological or social problem and then develop and exploit it by bringing into existence a good or service that solves not only an environmental or social problem but also has an economic return. Finally, SEIs and sustainable user entrepreneurs reflect similar dynamics as the noted literature focused on the difference between end-user innovators and user entrepreneurs. Where certain (sustainable) end-user innovators recognize the demand for their individual inventions decide to commercialize thus becoming sustainable user entrepreneurs. Figure 6 illustrates the conceptualised distinction between these types of end-user driven innovation.

Figure 6. Model of archetypical invention and innovation by user-producers



Source: Revised figures based on Shah and Tripas (2007) and Belz and Binder (2017)

The figure above illustrates the archetypical ideal types for end-user driven invention and innovation seeking to capture the broad nuances between the various innovation. Von Hippel (2005) would, for example, note that there are significant differences between user innovators who innovate for themselves based on personal needs and traditional entrepreneurs who do so because of the recognition of a business opportunity. However, in practice and especially within the realm of sustainability it is arguably less easy to discern the boundaries between the different archetypical ideal types. Especially as sustainable end-user invention, entrepreneurship (and even organizations) often function because of their hybrid identities (see Battilana & Dorado 2010; Wry & York 2015; York et al. 2016). End-user innovators may, for intance, continue to use the community to improve on a given design or sustainable entrepreneurs may form their firm before having fully developed a triple bottom line solution. The process illustrated in Figure 6 is thus often mixed and iterative rather than separate and linear. This dissertation argues, however, that common for all the archetypical actors illustrated in Figure 6 is that they all require funding at some point in order to succeed commercially. Commercialization – in line with common practice within innovation literature (see Schumpeter 1934; Freeman & Soete 1997) – is seen as the fundamental prerequisite that differentiates a technical component (invention) from an innovation (Bogers & West 2012). The dissertation is therefore focused on any end-user actor who seeks to commercialize a sustainable product or service and therefore requires funding. The dissertation simply refers to these end-user actors as sustainable entrepreneurs, which is defined as an individual or group of individuals who have recognized, developed, and exploited an opportunity to "bring into existence a future goods and services with economic, social and ecological gains" (Belz & Binder 2017, p.2). These product or service ideas emerge either through invention by users based on their own needs or by individuals recognizing a product or service opportunity to solve either an ecological and/or social problem.

The aim of commercializing a product or service therefore differentiates sustainable entrepreneurs from for example sustainable end-user innovators, who have not commercialized their idea either because they have yet to recognize the need or simply because they do not wish to do so. The dissertation explores under which conditions and to what extent reward-based crowdfunding can be used by these actors to help finance their initiatives.

The user-consumers within crowdfunding play a central role: Apart from purely adopting user-producer innovations they "actively engage in enabling product or service innovation instead of the more passive role of purchasing existing products or services. This active role thus requires that the individual crowdfunder not only has interest in the given product or service, but is also willing to trust that campaign founders can and will deliver. From a business cycle perspective the consumer is therefore in the CF-process active and fundamental to the development of the product or service, while in traditional business model the product or service would have been realized without consumer engagement" (Nielsen 2016, p.10). The example of crowdfunding thus shows that the user-consumer's role within any transition process is not only within the stabilization phase as proposed by Schot et al., (2016), but is also at play in the initial start-up phase. Paper 2 illustrates that the role distinction between user-producers seeking finance and user-consumers providing funding is not mutually exclusive. User-producers who host crowdfunding campaigns are, for instance, often also crowdfunders themselves. Hence end-users may adopt multiple roles. The distinction between the two is therefore more conceptual than practical, as one individual end-user can take on different roles. Nonetheless the dissertation is interested in user-consumers who engage in the process of crowdfunding and will thus – for the sake of conceptual clarity – define these user-consumers as crowdfunder(s).

4.5 | Sustainable Entrepreneurship and Crowdfunding

Sustainable entrepreneurs face a myriad of challenges not least the locked-in nature of the current regime which they intend to change this especially as they often go against existing user and industrial practices, regulations, infrastructures, and symbolic meanings (Unruh 2000; Geels 2002). The lock-ins at regime level also translate into constrained funding opportunities for these entrepreneurs, especially in the early "seed funding" stage. Sustainable entrepreneurs with their social and environmental goals are thus perceived as a less attractive investments compared to traditional entrepreneurial ventures (Choi & Gray 2008). They are thus often relegated to a relatively narrow set of funding opportunities. In such cases crowdfunding – and especially reward-based crowdfunding, as introduced in the following section – may fill the funding gaps that are especially prevalent for entrepreneurs when seeking seed finance (World Bank 2013; Sorenson et al. 2016).

The dissertation delimits itself to only focus on reward-based crowdfunding as it to date remains the preeminent model of crowdfunding for product and service innovation in terms of both scale and breadth (Cholakova & Clarysse 2015; European Commission 2015). Table 4 illustrates the typical distinctions between the four models of crowdfunding.

Table 4. The four models of crowdfunding

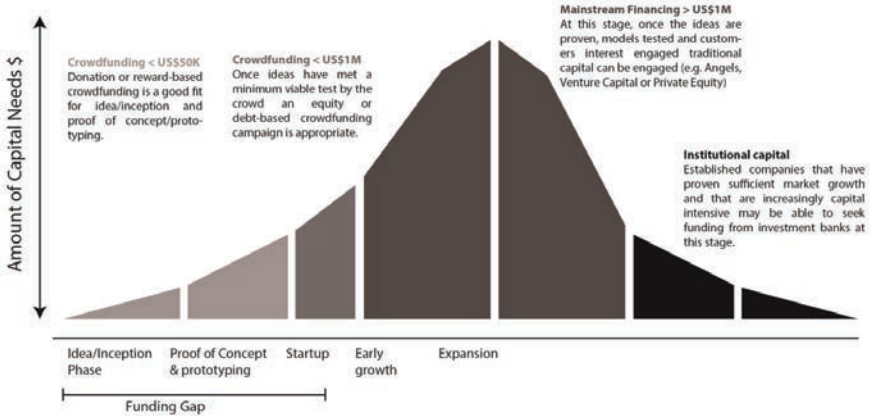
Crowdfunding Model	Definition
Donation-based	Donation towards a specific project with no expectations of financial or material returns.
Reward-based	Individuals invest a pre-defined amount of money with the expectation that if successfully funded, they will receive a tangible (but non-financial) reward, product or service.
Equity-based	Small investments in crowdfunding project in return for an incremental stock in the respective business.
Lending-based	In the lending-based model the crowdfunder lends a small amount of money to a specific platform, project or person.

Source: Adapted from Zhang et al. (2014) and Cholakova and Clarysse (2015)

In the reward-based crowdfunding model, individuals pledge a specific sum of money "with the expectation that, if the campaign is successfully funded, they will receive a tangible (but non-financial) reward, product or service. While reward-based crowdfunding typically represents a form of pre-purchasing or a yet-to-be-realized product or service, individuals can also be rewarded with other forms of non-financial rewards (for example t-shirt, coffee mug). As with other models of crowdfunding there are three broad actor categories central to the process: the crowdfounders, crowdfunders (or investors), and platforms. Here the crowdfounders (or founders) are the entrepreneurs initiating the campaign. Crowdfunders (or funders) are the target audiences of the open call, or campaign, who are enticed to invest. And finally the platform represents the mechanism facilitating contact between the crowdfounders and crowdfunders" (Nielsen et al. 2017, p.3).

The choice to focus on reward-based crowdfunding was furthermore due to its relevance in financing entrepreneurial product and service innovations. Moreover, it was seen as the natural first step for exploring the potential role of user-consumers in financing sustainable entrepreneurs, as opposed to the other models of crowdfunding. Firstly, donation-based crowdfunding was rejected as it is the smallest and slowest growing form of crowdfunding despite having grown by 61 pct. in terms of accumulated finance between 2013 and 2014 (European Commission 2015). It was delimited because the primary beneficiaries are commonly non-profit organizations which typically do not seek commercialized goals, but rather pursue civic improvements, cultural events, and development (Zhang et al. 2014). It would therefore largely fall outside the focus of the dissertation with regards to the role of user-consumers in financing sustainable entrepreneurs. Secondly, loan-based crowdfunding could have been explored as it remains the largest form of crowdfunding in terms of capital raised in the EU; however, the benefitting sectors are also much more diverse in terms of the campaigns receiving support (European Commission 2015). Specifically, while the vast majority of reward-based crowdfunding goes towards product and service innovations, this is not necessarily so with loan-based crowdfunding that covers a range of loans towards, for example, debt consolidation, home improvements, auto or vehicle purchase, baby adoption, special occasions, and small business loans. Reward-based crowdfunding was therefore again seen as the most relevant. Finally, the dissertation could have focused on equity-based crowdfunding – which is the most rapidly growing mode of crowdfunding (Collins & Pierrakis 2012; Zhang et al. 2014); however, here the scale of investments needed in order to partake in the crowdfunding process greatly limited the number of user-consumers able to partake. As shown in Figure 7 reward-based crowdfunding is also argued to be able to fill an important funding gap within the current innovation funding lifecycle (World Bank 2013).

Figure 7. Where crowdfunding fits on the innovation funding lifecycle



Source: Revised figure based World Bank (2013, p.16)

It should be noted that while respectively donation- and reward-based crowdfunding and loan- and equity-based crowdfunding are placed within the same respective two categories by the World Bank report "Crowdfunding's Potential for the Developing World" (World Bank 2013), they are significantly different in terms of average amount of money raised. On average, successful donation-based campaigns raise €2,938, while our work (Nielsen et al. 2017) along with the work by Mollick (2014) find that successful reward-based campaigns on average make close to $8,000 US (approx. €7,400). Lastly, successful loan-based campaign raises between €7,082 and €79,132 depending on whether they are business or individual loans and whether they are secured or unsecured. In comparison successful equity-based campaigns raise on average 504,832 € (European Commission 2015).

Reward-based crowdfunding was therefore identified as the most relevant model of crowdfunding for exploring the potential of user-consumer driven finance in supporting sustainable entrepreneurs for the three reasons: It fills an identified funding gap for entrepreneurs; it is relevant in terms of driving product and service innovation; and finally it is accessible to a large segment of user-consumers.

4.6 | Research Aims and Questions

In exploring the overall RQ the dissertation is delimited to an empirical examination of the antecedents of both successful and unsuccessful crowdfunding campaigns based on their ability to achieve funding. The ability of crowdfunding campaigns to successfully acquire funding is thus seen as the fundamental prerequisite to answering the RQ. The dissertation itself is, as previously mentioned, based on four papers; three of which center on the phenomenon of crowdfunding, while the first paper is a systematic literature review of the intersecting fields of sustainability, innovation and consumer (end-user) behavior aiming at locating and defining the scope of the dissertation.

The dissertation seeks to explore and to some degree answer the RQ, but does not provide unequivocal unanimous answers. Rather it proposes preliminary insights that must be replicated and tested through alternative means and theories in order to insure their validity as per critical realist tradition. Nevertheless, by combining different research methods and theories the dissertation does shed some light on which conditions and to what extent reward-based crowdfunding may be seen to enable sustainable entrepreneurship. This dissertation reveals, for instance, reasons why crowdfunder may choose to invest in one project rather than another; knowledge that may prove relevant for practitioners of crowdfunding in order to improve their chances of receiving funding. In addition, the dissertation can offer insights for policy makers seeking ideas on how to tap into the power of "the crowd" when seeking to promote the public good. Within academia my dissertation provides an empirical examination and analysis of reward-based crowdfunding, thus contributing to the scholarly literature on crowdfunding (by mapping a range of antecedents which enable funding success), sustainable innovation (by relating these observations to sustainable entrepreneurship and financing), and innovation in general (by illustrating the diversity of roles consumers or end-users can take on with regards to supporting innovation).

Chapter 5 | Overview of the Papers

As first introduced in Figure 2 (Chapter 3) the dissertation applied what Saunders et al. (2012) would call a multimethod quantitative methodology in order to explore the phenomenon-driven RQ. The RQ was inductively framed with a goal of uncovering whether observation regarding the potential of reward-based crowdfunding for sustainable entrepreneurs could be confirmed. However, the RQ was deductively explored by utilizing a number of theories in order to insure that the dissertation did not succumb to dust-bowl empiricism. Having already outlined the dissertation's overall scope and focus, a detailed examination of the insights of each paper shall be provided in this chapter starting with the systematic literature review outlined in Table 5.

Table 5. Sustainable user innovation from a policy perspective: A systematic literature review (Paper 1)

	Content
Purpose	To garner insights on the role of the end-user within sustainable innovation utilizing a systematic literature review approach.
Background	A growing number of diverse fields are studying the active role of the end-user within sustainable innovation, which has in turn resulted in the emergence of various research "silos".
Methodology	Systematic literature review coupled with a second round of snowball sampling.
Findings	The literature on sustainable end-user innovation (SEI) is growing rapidly but is also characterized as diverse, disjointed, and largely case-based. The field is in addition heavily empirical with paucity of theory.
Main contribution	The paper contributes to the field of sustainable innovation by synthesizing the compartmentalized literature focusing on the active role of end-users within sustainable innovation. Contributing also with an overview of key barriers and drivers to SEI, while also highlighting areas for potential future research.
Limitations	A lack of concise terminology and the diversity of fields studying SEI could result in missed articles given the systematic and structured approach to reviewing the literature. A secondary snowballing approach was therefore employed using citation tracking as well as the references in the overall paper base from the systematic review in order catch out-of-scope literature. This, however, in turn creates issues with the replicability of the literature review.
Implications	The growing literature on SEI indicates that end-users do play a significant role in sustainable innovation. However, it is widely distributed and disjointed and requires a more focused approach through a grounded in theory approach.

The literature review provided grounding for the dissertation based on the observed literature found at the intersection between sustainability, innovation, and consumer (end-user) behavior: later defined as SEI. This allowed for a structured delimitation of the dissertation from the broad SEI literature to sustainable crowdfunding. In order to tackle the lack of both adequate definitions and conceptual understanding of this phenomenon (see Mollick 2014), the dissertation then set out to conceptualize the process of crowdfunding from an organization perspective (see Table 6).

Table 6. Organizing the crowdfunding process: The co-dependent organization (Paper 2)

	Content
Purpose	To define and conceptualize the process of crowdfunding from an organizational perspective.
Background	The phenomenon-driven and often article dependent approach to crowdfunding has resulted in a paucity of theory and overall definitions on what crowdfunding is and how it functions.
Methodology	Conceptual arguments drawing on the literature on respectively crowdfunding and complete and partial organization
Findings	Crowdfunding could be conceived of as a "co-dependent organization" where the central organizing agent's (the platforms') reliance on external actors (founder campaigns and crowdfunders) has become so embedded that you can no longer organizationally discern them as separate.
Main contribution	To conceptualize and define crowdfunding within a larger theoretical discourse. To observe how organizational theory can be utilized to explain emergent and fluid forms of organizing. To observe how a disparate crowd can be mobilized to carry out core organizational competences.
Limitations	The paper is dependent on theory derived concepts and applies them to the phenomenon of crowdfunding in order to gauge its organization. It therefore lacks empirical foundation to support the conceptualized propositions.
Implications	The current phenomenon-driven approach to crowdfunding ignores the fluid co-dependencies inherent in the process and instead presents it as a stable collection of "things". The "co-dependent" perspective, however, proposes that we must eventually ascertain how each component of the crowdfunding process shapes the other, if we are to better understand it.

Having delimited the focus of the dissertation and sought to conceptualize and define the process of crowdfunding from an organizational perspective, the dissertation then adopted the noted multimethod quantitative approach. It employed in Paper 3 a case study analysis of a longitudinal dataset (acquired on the reward-based crowdfunding platform IndieGoGo), while Paper 4 was a web-based experiment run in late 2016 that recreated a hypothetical crowdfunding

scenario. The case study dataset assumed a longitudinal time horizon in order to observe the distributive qualities of the innovation finance derived from the platform, while the web-based experiment was a between groups cross-sectional study of the US. Paper 3 is outlined in Table 7.

Table 7. Crowdfunding and institutional change: Towards re-institutionalization? (Paper 3)

	Content
Purpose	To investigate the distributive qualities of crowdfunding in terms of access to innovation finance.
Background	Proponents of crowdfunding often argue that it has led to an expansion of innovation finance available to entrepreneurs enabling a broader range of persons and regions to benefit. The study explores this proposition longitudinally building on institutional change theory.
Methodology	Quantitative – Longitudinal dataset – Geocoding – OLS and Logit
Findings	Crowdfunding enables a diversity of actors and regions by offering increased access to innovation finance. However, there are also trends pointing towards increased clustering of resources around specific regions and actors.
Main contribution	The study finds that crowdfunding is enabling increased access to innovation finance. However it also observes an increased concentration of finance around certain geographic areas. It also shows that prior experience and success, team size, local affluence, and local social capital are strong predictors of campaign success.
Limitations	The study is limited to only IndieGoGo. While a significant reward-based crowdfunding platform, the study is therefore in no way representative. In addition the observations are broad characterizations, where campaign specific details and variations are lost.
Implications	If these dynamics of clustering around regions and individuals continue over time it could lead to a rich-get-richer dynamic, as the lion's share of funding recipients come to be garnered by more professionalized campaigns in particular areas.

The case study of IndieGoGo was done in efforts to establish a macro-level descriptive understanding of the crowdfunding phenomenon and how it has evolved. Moreover the case study sought to identify some general antecedents of successful reward-based crowdfunding campaigns. The paper observes – in line with previous literature – that crowdfunding does appear to expand innovation finance access (see Agrawal et al. 2015; Sorenson et al. 2016), but it also revealed trends that point towards a (re)concentration of innovation finance, which has not been observed in the prior literature. Nonetheless there are some good indications that crowdfunding does enable new actors to gain access to innovation finance and hence at least in this regard offer some potential for sustainable entrepreneurship.

Having observed that crowdfunding does in some capacities result in an expanded access to innovation finance the final paper of the dissertation sought to explore the motivations of consumers to pledge towards specific campaigns. It explores how randomly assigned value frames embedded within product campaign descriptions influenced individual pledging behavior. Specifically the paper uncovers whether consumers are attracted to campaigns that highlight a product's egocentric values (what is in it for me), altruistic values (what is in it for others), or biospheric values (what is in it for the environment).

Table 8. Reward-based crowdfunding and sustainable entrepreneurship (Paper 4)

	Content
Purpose	To empirically examine the causation between individual investment behavior and the (un)sustainability-orientation of the crowdfunding product campaign.
Background	A diversity of papers has sought to explore the correlation between the sustainability-orientation of the given campaign and subsequent chances of achieving funding success reaching competing conclusions. All of which indicates a need for new methods to be adopted that can effectively at observe causality.
Methodology	Quantitative – Between groups cross-sectional study – Web-based experiment – Multilevel mixed-effects linear regression
Findings	All three value frame orientations (egocentric, altruistic, biospheric) have a significant but entangled effects on pledges. Personal values in certain circumstances significantly impact pledging behavior. Product specifics are significant predictors of which value frame orientations influence pledges; thus disentangling the prior entangled effects. While altruistic and biospheric value frames do correlate as generally assumed, there are also examples where they diverge.
Main contribution	The paper observes that mono-causal conclusions on whether crowdfunding is an attractive proposition for sustainable entrepreneurs are misplaced. Instead it concludes that competing motivations, value orientations and most importantly product specific details play significant roles in determining whether crowdfunders are attracted to pledge in a sustainably-oriented campaign.
Limitations	The web-based experiment was hypothetical in nature and there may therefore be a component of social desirability that emerges from the data. The sample is not 100 pct. representative of the US population. Individual value orientations were collected on a one-dimensional Likert scale and therefore the possible trade-offs and opportunity costs which are typically associated with acting or choosing in an egocentric/altruistic/biospheric fashion may have been lost.
Implications	Crowdfunding appears for certain types of campaigns as an enabler of sustainable product and service innovation, while in other circumstances it appears to support hedonistically (or egocentrically) oriented campaigns.

In exploring the RQ – *Under which conditions and to what extent can sustainable entrepreneurs with social and/or environmentally-oriented products draw benefit from reward-based crowdfunding?* – each paper serves an individual standalone role with the larger dissertation, given its paper-based nature. The literature review serves to pace the dissertation within a larger stream of literature; the conceptual paper in turn serves to create a common language when addressing the phenomenon; and finally the two quantitative papers use this understanding as a means to take the first steps towards answering the RQ. However – and as noted in this chapter – each paper is limited both by the author's(s') own constraints and by the constraints of the theories and methods applied. Therefore an in line with the dissertation's critical realist research philosophy these, insights are only initial ones that need to be replicated and tested using alternative theories and methods. Chapter 10 of the dissertation outlines areas considered worthwhile for future research.

PART II

Chapter 6 | Paper 1

Sustainable user innovation from a policy perspective: A systematic literature review

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Abstract: Sustainable innovation is typically viewed through the lens of the producer innovator, whereas end-users (or consumers) are perceived to play only a peripheral role in the development of sustainable products and services. A growing literature stream, however, sharply departs from this view by suggesting that end-users often play a critical role with regard to sustainable innovation. To further consolidate this field, the purpose of this paper is threefold. First, the paper summarizes and synthesizes key insights within the field based on 84 papers published from 1992 to 2015. Second, we offer a framework to understand the current observed barriers and drivers to this innovation process, suggesting two distinct end-user innovation types: independent and facilitated. The end-users' motivation, ability and opportunity to innovate serve as the deductive analytical tool utilized for discerning these drivers and barriers. Third, the paper suggests how this form of innovation may be ameliorated from a policy perspective. The paper reveals that the literature on end-user innovation within sustainability is both diverse and compartmentalized. Hence, policy mechanisms designed to support this type of innovation process need to be tailored to the independent or facilitated framework in which the end-user resides and to take into account how each framework is necessitated by a different actor logic and motivation, resulting in the pursuit of different innovation types. It is concluded that the literature focusing on independent end-user innovation typically highlights policy aimed at enabling end-users with the necessary skills and resources to innovate, whereas literature focusing on facilitated end-user innovation typically emphasizes creating platforms that enable the effective introduction of end-user knowledge into an already existing framework.

1. INTRODUCTION

The importance of end-users within innovation is an increasing mainstay within the traditional innovation literature, identified both independently and in a facilitated fashion as a major source of innovation (von Hippel 2005; Chesbrough et al. 2006). However, in contrast, within the sustainable innovation literature, the involvement of the end-user remains a "neglected site of innovation for sustainability" (Seyfang and Smith, 2007, p. 585), whereas producer-led innovation remains "the mainstay of both empirical research and theoretical development" (Hargreaves et al. 2013, p. 869). The end-user's role within sustainable innovation is often relegated to that of a passive recipient of innovation (Belz 2013). Nonetheless, an increasing number of articles within sustainable innovation research challenge this conception (Feola & Nunes 2014) and although diverse, compartmentalized and typically single-case based illustrate the multitude of ways in which end-users innovate for sustainability ends (Hoffmann 2007; Hyysalo et al. 2013b). These end-user innovators represent a type of niche innovation actor who insulates novel ideas and prototypes against the dominant socio-technical regime and tolerates uncertainty and initial low product performance levels (Geels, 2002; Kemp and Rotmans, 2004).

The purpose of the present paper is to garner the insights of this research utilizing a systematic literature review method. The primary goal is to summarize and synthesize the state of knowledge of this nascent research field that we label "Sustainable End-User Innovation" (SEI) (Nielsen et al. 2014). A second goal is to develop recommendations on how innovation policy, which is currently primarily aimed at producer-led innovation (Henkel & von Hippel 2005), may be adapted to better meet the needs of end-user innovators. Hence, the paper's dual contribution is to provide an overview of the key identified barriers and drivers to this form of innovation process and to propose a policy framework and toolset for fostering and facilitating this promising type of sustainable innovation.

To conceptualize and delimit the scope of the review, the following subsection introduces the background literature for the review, drawing especially on literature on user and open innovation. Section 2 introduces the research method for the literature review, and Section 3 presents some key descriptive observations derived from the identified literature. Section 4 introduces the deductive categories for the qualitative content analysis of the literature. Finally,

Sections 5 and 6 present the results and discussion of the qualitative content analysis of the literature, respectively.

1.1 Conceptualization and Demarcation

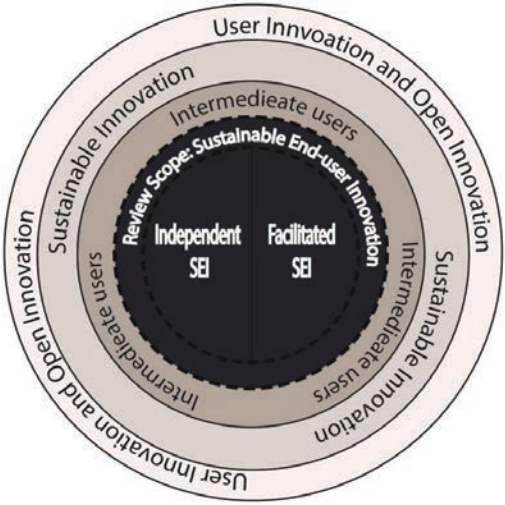
The fields of user innovation and open innovation are well-developed within the innovation literature, where it has been observed that the knowledge relevant for innovation is widely dispersed and hence often falls outside the realm of any one individual person, firm or organization (West & Bogers 2014). External sources of knowledge are therefore often employed to ameliorate the innovation process which end-users are regarded as one such potential source. However, the two research fields diverge on their actor-focused vantage point, with open innovation typically focused on firms and other organizations, whereas user innovation focuses on individual users (von Hippel 1988; Chesbrough 2003).

In conceptualizing the term "user", the present study draws upon the work of Eric von Hippel (2005), who distinguishes between two ideal types of users: intermediate users and end-users. An intermediate user typically represents a firm that utilizes equipment and components from other producers (i.e., upstream products) to produce further products and services, whereas an end-user represents the end-consumer (or groups of consumers) of a given product or service. The present study is deliberately focused on and limited to end-users. Additionally, from an open innovation perspective, the focus is on the so-called "interactive coupled model" (Chesbrough et al. 2014), which conceptualizes innovation as a collaborative activity between the end-user(s) and a given firm, organization or project. In this model view, end-users partake in all or multiple phases of the innovation process rather than purely in the refinement phase (Weber 2003). The paper therefore seeks to uncover not only how end-users themselves innovate but also how they may be co-opted and involved in a firm or project-driven sustainable innovation process.

Against this backcloth, the present study characterizes the role of the end-user within sustainable innovation as either facilitated or independent in nature. Facilitated end-user innovation is characterized by the integration of the end-user into a company or project-driven sustainable innovation process. Independent end-user innovation conversely reflects innovation by the end-user, which is not facilitated by outside involvement (Nielsen et al. 2014).

Sustainable innovation is understood as an advance in a product, service, or process system that offers an improved or the same economic performance with less externalities in the form of social and environmental hazards (Halme & Laurila 2009; Bos-Brouwers 2010). Following Smith et al. (2014, p.115) sustainable end-user innovation processes should not be seen "as a blueprint for the future, but rather as a resource for debating and constructing different pathways to sustainable futures." This is what the present study intends to nourish. Fig. 1 below illustrates the demarcation of this literature review.

Fig. 1. Demarcation of the literature review.



It should be noted that many of the innovations reported in the literature have not been diffused beyond the end-user or a small community of end-users and should hence more correctly be labeled inventions rather than innovations (Schumpeter 1942). This lack of diffusion might be due to the limited capabilities of (small groups of) end-users to commercialize and disseminate their inventions, but perhaps also sometimes due to uneasiness amongst end-user inventors about the thought of commercializing their ideas. Be that as it may, following the practice in most of the reviewed literature, the present paper does not distinguish between inventions and

innovations. Limiting the focus to only research dealing with commercialized SEIs - i.e., innovations in the narrow sense would have greatly hampered the study's ability to reach its goals, especially because the dissemination and commercialization of end-user inventions has been identified as one of the main barriers for this type of innovation in general (Hienerth & Lettl 2011).

The present paper argues that SEI systematically differs from traditional users and open innovation in two key characteristics: the goal and the tasks. The goal of end-user innovators is to innovate for themselves based on their experience with a given product or service (von Hippel 2005). Uniquely for SEI, however, is that although users innovate on the basis of personal experiences and needs, they do so (also) for the benefit of others to improve the environmental, social or health condition of a community or larger society. The level of focus is therefore not only personal wants and needs, but potentially also the needs of others (Belz & Binder 2017), including social and environmental concerns (Elkington 1997). When pursuing a triple bottom line[6] of sustainability, the end-user arguably needs to tackle more complicated tasks because products and services must live up to not only economic criteria but also social and environmental criteria as well (Choi & Gray 2008). This has consequences for the tools of effective policy making to foster sustainable innovation led by end-users.

[6] Conceptualized as “Planet, People and Profit” or “Environment, Social and Economic Dimension”.

2. METHOD

The literature on sustainable innovation has been characterized as disjointed, distributed and skewed (Adams et al. 2012). To expedite an orderly and reproducible review, the present study adopted a systematic literature review approach, as increasingly applied in management research (Tranfield et al. 2003). First, a systematic review method was applied to identify relevant articles from the EBSCO databases, and second, the Scopus and Web of Science (WoS) databases[7] were searched to identify relevant articles that might have been missed by our initial data collection. As noted in Section 1, the extant SEI research to date has not been approached systematically (Feola & Nunes 2014).

2.1 Systematic Literature Review

A systematic literature review is a structured approach to reviewing published academic research, as opposed to the more common narrative-based review (Tranfield et al., 2003). The systematic literature review approach allows other researchers to replicate the literature review for the sake of revisions and updates, thus providing an audit trail on the reviewers' procedures and (Cook et al. 1997). In the present study, the first stage of the systematic literature review was an initial scoping exercise: an iterative process of defining, clarifying and refining the literature search parameters. The iterative process included contacting recognized experts within the field for their insights and scoping their recommended readings. A number of initial scoping literature searches were also conducted to identify search strings (i.e., combinations of keywords) that would adequately capture relevant peer-reviewed articles.

The initial scoping exercise focused on the keywords “user innovation” AND “sustain*”, which resulted in nine hits in EBSCO, of which only two were within the scope of this review (Date: 25.07.2014). In subsequent attempts to maintain this narrow band of keywords, the number of databases was expanded; however, search results remained too low to start an analysis (e.g., 8 from WoS and 22 from Scopus). These results may be due to the subsequently observed multiplicity of research streams studying this phenomenon resulting in a lack of one overarching terminology for SEI. The limited search keywords failed to capture this diverse and

[7] EBSCO Database: http://web.b.ebscohost.com.esc-web.lib.cbs.dk/ehost/search/ basic?sid¼156a9332-b6ee-4609-ae0d-0988346183f6% 40sessionmgr115&vid¼0&hid¼123; Scopus Database: http://www-scopus-com. esc-web.lib.cbs.dk/; Web of Science Database: http://apps.webofknowledge.com. esc-web.lib.cbs.dk/

compartmentalized literature. Widening the search to full-text rather than title, abstract and author-supplied keywords increased the number of hits but did not yield significantly more articles within the scope of this review[8]. Following Adams et al.'s (2012) systematic review on innovation for sustainability, the search parameters were therefore broadened in the next round, resulting in the addition of multiple keywords associated with end-user innovation, sustainability and policy for our review. Like Adams et al. (2012),we also delimited the time period of the review to 1992 to the present (incl. articles in press),[9] primarily because of the significance of the year in terms of sustainability due to the United Nations Conference on Environment and Development in Rio de Janeiro (the "Rio Summit") (Table 1).

Table 1. Keywords and search strings for the systematic literature review.

Search string themes	Keywords (Synonyms and alternatives)
End-user innovation	innov* AND (user OR "end-user" OR "user-centered" OR "lead user" OR customer OR consumer OR participat* OR collaborat*) OR co-innovat* OR co-design* OR co-produc* OR co-creat* OR prosumer OR "do-it-yourself"
Sustainability	sustain* OR environment* OR "eco-innovation" OR green OR renewable* OR "triple bottom line" OR eco-efficien* OR eco-effectiv* OR "cradle to cradle" OR biomimicry OR frugal OR ecolog* OR "circular economy"
Policy	governance OR policy OR "policy instrument" OR incentiv* OR regulat* OR "choice architecture" OR nudge OR "behavioural policy" OR patent* OR toolkit

This approach resulted in more relevant articles being identified but also considerably increased the number of captured articles that fell outside the scope of this research. When searching the full text, this resulted in an unmanageable number of hits, and the search criteria were therefore limited to the title, abstract and author-supplied keywords. In addition, the search was initially limited to a single database Business Source Complete by EBSCO which was chosen for three reasons: First, the broad search parameters necessitated a narrowing of databases to keep the number of articles collected to a manageable size. Second, the EBSCO database includes a large range of relevant journals such as the Journal of Cleaner Production, Ecological Economics and

[8] E.g., 195 in EBSCO, of which 7 were within the scope of our review (Date: 31.07.2014).
[9] Articles in press at the time of the final review of the paper: 17 October 2015.

Research Policy. Third, many databases limit the number of hits that can be shown and exported, whereas EBSCO does not; this is a major advantage regarding the technical and practical handling of large datasets stemming from a systematic literature review. Table 2 below provides the full criteria of the initial literature search.

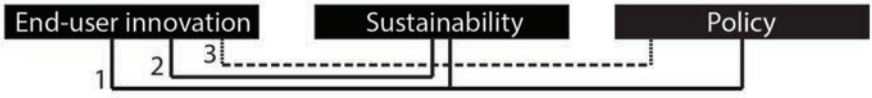
Table 2. The criteria for the literature search - the inclusion and exclusion parameters.

Criterion	Inclusion	Exclusion
Review scope	EBSCO – Business Source Premier	Other databases
Source	Peer reviewed journal articles	Any other source
Empirical approach	No restrictions	
Time period[a]	1992 to present (incl. articles in press)	Any source before 1992
Search parameters	Keywords appearing in the: title, abstract and author-supplied keywords	Keywords appearing in other parts of the article[b]
Language	English	Any other language
Relevance	Literature focused on sustainable innovation and end user(s)	

[a] Following Adams et al. (2012), we fixed the start date for this systematic literature review as 1992, the year of the United Nations Conference on Environment and Development in Rio de Janeiro ("Rio Summit").
[b] Keywords appearing in the full article text were rejected as it resulted in an unmanageable number of search results (also due to the broad search parameters adopted).

The application of the keywords to the EBCSO database was conducted utilizing three search string combinations, as illustrated in Fig. 2. This variation in the combination of search strings was applied to obtain a fuller overview of the literature.

Fig. 2. The search string combinations of keywords.



The initial database search, utilizing the three separate search strings, led to 1471 hits for Search string 1, 4805 hits for Search string 2, and 5121 hits for Search string 3. Of these 11,397 hits, 2973 overlapped, reducing the number to 8424 potentially relevant articles. Recognizing the challenge of working with this number of articles, a designated reference manager program (RefWorks) was used to sort the articles, rather than doing so on the EBSCO platform itself. The

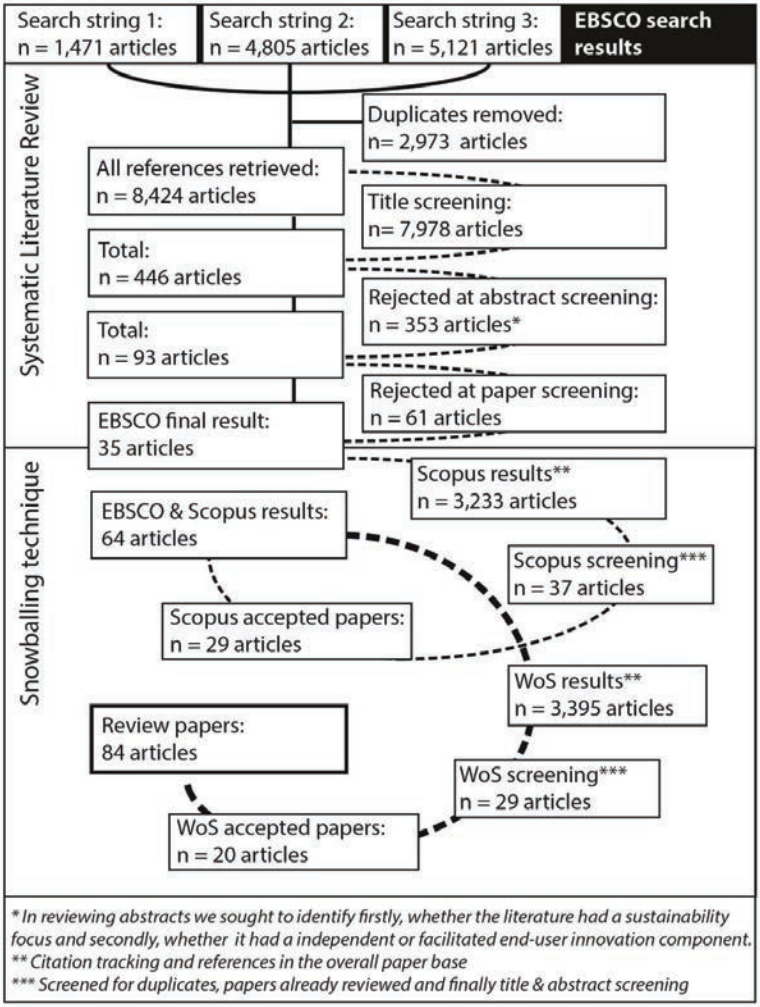
review process itself consisted of an initial title screening followed by an abstract and finally a full text review to narrow down the search results to include only articles within the scope of this study. In case of doubt, the article was kept in the dataset for subsequent more thorough (abstract and/or full-text) screening (e.g. Jones, 2004). The initial title screening narrowed the number of possibly relevant articles to 446, whereas the subsequent screening of the abstracts resulted in a further reduction to 93 articles. The abstract review focused first on the sustainability component of the innovation process and second on whether these remaining articles had either an independent or facilitated end-user innovation component. Finally, the full-text screening reduced the number of articles to 35 that are within the scope of this systematic literature review. Fig. 3 below offers an overview of the review process.

2.2 Snowball Sampling

Given the lack of a concise terminology and the diversity of fields studying SEI as well as the limited success at grasping the relevant studies even with broad search parameters,[10] an additional step was introduced next: The 35 articles identified in the first round were subjected to "snowball sampling" using citation tracking as well as the references in the overall paper base. The initial search for citations in Scopus resulted in a total of 3233 papers. These 3233 papers were first screened for duplicates and papers already reviewed in the previous systematic review stage. A subsequent title and abstract screening further narrowed the number of possibly relevant articles to 37 papers, of which 29 proved to be within the scope of this literature review when reviewed in full. A second search for citations in Web of Science based on the now 64 in scope articles resulted in 3395 papers. Similarly, duplicates and already reviewed papers from the previous systematic review stage and the Scopus reviewstage were first removed. Next, a title and abstract screening narrowed the number of possibly relevant articles to 29, of which 20 proved to be within the scope of the review again when reviewed in full. The final 84 articles represent the core of the review (see Fig. 3).

[10] For example: In the field of community currencies, a subcategory of SEI, many different terms are used such as local currencies, alternative currencies, parallel currencies, community currencies or complementary currencies (see Michel and Hudon, 2015, p. 160).

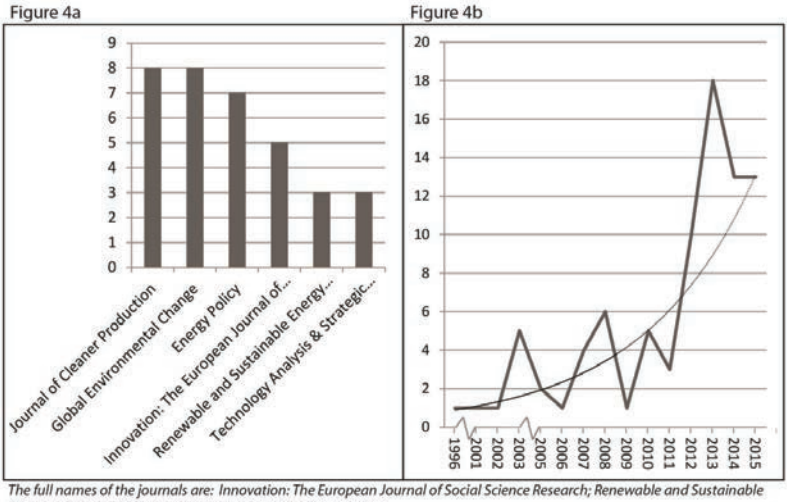
Fig. 3. An overview of the literature review process.



3. DESCRIPTIVE ANALYSES

The descriptive characteristics of the final literature sample reflect the diversity of this research field, with a total of 50 different journals represented in the review. However, as Fig. 4a illustrates, three journals are particularly prominent in this research field, accounting for nearly one-third of the total literature base on SEI: the Journal of Cleaner Production (8 articles), Global Environmental Change (8 articles) and Energy Policy (7 articles). Also apparent from Fig. 4b is that the field is growing rapidly, especially within the last five years (2010 - 2015), during which 62 out of the total 84 articles were published.

Fig. 4. (a and b) Overview of the core journals and a distribution of publications per year across the period studied.



The full names of the journals are: Innovation: The European Journal of Social Science Research; Renewable and Sustainable Energy Reviews; Technology Analysis & Strategic Management.

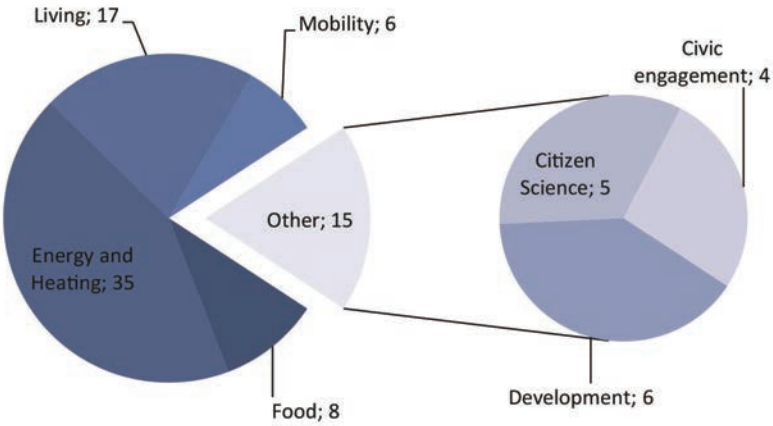
The descriptive analysis also confirms the observation by Feola and Nunes (2014) that the literature on SEI is predominantly case-based. Of the 84 identified articles, 56 in one form or another build on a case-based approach. These empirical cases draw on a varying number of cases, which also vary in both scale and focus, including, for example, a specific user innovation (Juntunen & Hyysalo 2015a), a specific user innovation locality or neighborhood (Yalçın-Riollet et al. 2014), and several end-user driven grassroots innovation movements (Seyfang & Haxeltine

2012). This diversity creates a multiplicity of narratives, and although there have been attempts to place some of these cases in an overall theoretical framework e.g., strategic niche management (Hargreaves et al., 2013) this research field remains arguably empirically rich but theory poor. In the next step, major areas of SEI as presented in the literature were identified. Based on Tukker and Jensen's (Tukker & Jansen 2006) Environmental Impact of Products (EIPRO) approach, SEIwas grouped into different product and service fields with a high environmental impact: food, energy and heating, living[11] and mobility. Moreover, three subcategories discerned fromthe literature that fell outside this general product-centric characterization were added: citizen science, development and civic engagement. Citizen science is research on how end-users' abilities are utilized to collect observations, study natural phenomena and, in the example of Cornwell and Campbell (2012), even assist in the documentation and conservation efforts of endangered species. Development refers to research on end-user innovation within the fields of sustainable development, for example, through co-innovation of knowledge between scientists and farmers to increase the productive capabilities of the respective farms and improve their sustainability (Dogliotti et al. 2014). Civic engagement refers to research on end-user innovation and howthis results in individual and communal behavior and value shifts. Fig. 5 illustrates the distribution of the literature based on these subcategories the numbers for each subcategory referring to the number of articles on topics in this subcategory[12].

[11] "Living" refers to products and services utilized in residential homes apart from electricity and heat production, e.g., kitchenware.

[12] Certain articles touch upon multiple subcategories and are hence represented more than once in the figure above e e.g., Ornetzeder and Rohracher (2013) focus on solar collectors, wind power, and car sharing and hence qualify as a paper focused both on 'Energy and Heating' and 'Mobility' e however, overall, the degree of overlapwas minimal, with only a small portion of articles focusing on more than one of the mentioned subcategories.

Fig. 5. Overview of the major subcategories of the SEI literature.



The strong focus on end-user innovation within the field of energy and heating the largest share of all illustrates the potential innovativeness of end-users even within fields often characterized as complex and top-down from both an institutional and technical perspective.

4. CATEGORIES FOR ANALYSIS

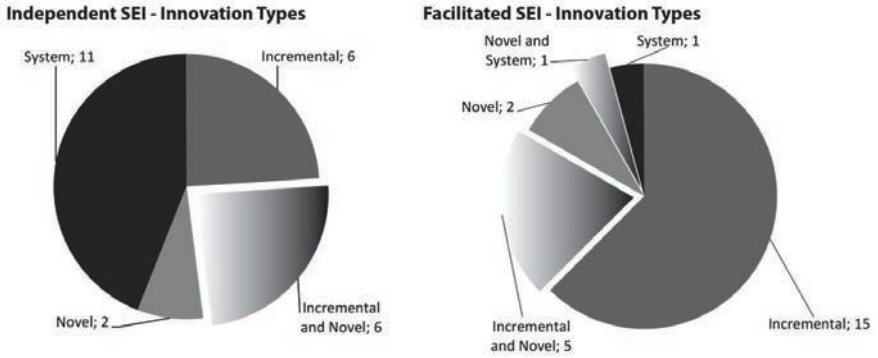
Drivers for and barriers of SEI are discussed in the framework of Ölander and Thøgersen's (1995) Motivation-Ability-Opportunity-Behavior (MOAB) model. The MOAB model conceptualizes the determinants of consumer behavior in relation to sustainability, and although not particularly tailored for understanding SEI, the model is well suited for studying SEI. First, the MOAB model has a broadly applicable coding tool for identifying potential drivers and barriers to end-user behavior that also accounts for the observed attitude-intention behavior gap, not adequately covered by most other behavioral models (Zanna & Fazio 1982; Devinney et al. 2010). Second, the MOAB model focuses on the end-user and has previously been effectively applied to studying sustainable consumption, production and investment behavior, as well as policy design (Jackson & Michaelis 2003). In the present study, the MOAB model served as the initial deductive coding scheme for classifying key barriers and drivers of SEI identified in the reviewed articles. Additionally, the key variables, motivation, ability and opportunity allowed for

stylized coding to identify how and where policy instruments can be implemented to facilitate SEI. The three coding variables are defined as follows:

- Motivation represents the underlying reason(s) for a given action that drive(s) the individual's recognition of wants and the subsequent action to satisfy them.
- Ability captures the individuals' personal competences and resources and thus includes elements such as end-user knowledge, the ability to carry out this knowledge in practice and access to resources.
- Opportunity captures the external conditions supporting or impeding intended action and the connection between intent and action.

Given the lack of an innovation component within the MOAB model and the need to later link to potential effective innovation policies, the coding scheme was extended with three additional innovation specific variables: first, and as already illustrated, the environmentally most relevant product and service fields (Tukker & Jansen 2006); second, the original driver of the innovation process (facilitated or independent SEI); and third, the type of innovation pursued (incremental, novel or system) based on work by Carrillo-Hermosilla et al. (2010). Incremental end-user innovation refers to any improvement on existing products/services (e.g., improving energy efficiency). Novel end-user innovations are novel products or services, including reorienting an existing product/ service in a new direction (e.g., car sharing service, electric bicycles). System end-user innovations are novel products or services that alter an established sociotechnical regime (e.g., localized food system, community power production). Grounded in the case-based literature (n = 56), Fig. 6 below illustrates that the original driver of the innovation process appears to influence the type of innovation pursued. The numbers for each subset of the two pie-figures refer to the number of case-based articles covering each.

Fig. 6. Overview of the innovation pursued by independent and facilitated SEI.



Based on the case-based literature, it appears that although system innovation dominates in independent SEI literature (n = 11), incremental innovation appears to be the norm within facilitated SEI literature (n = 15). Although this may be due to biases in the source literature itself, it is also consistent with earlier observations by Seyfang and Smith (2007) when studying grassroots innovation. They suggested that bottom-up initiatives operating outside a market-based framework pursue more radical system innovation, whereas market-based initiatives pursue more incremental market-fit oriented innovation. Hence, it seems relevant to make a distinction between independent and facilitated SEI when considering policy barriers and drivers.

5. RESULTS

The initial descriptive analysis of the literature suggests that end-users in many cases engage actively in sustainable innovation, in multiple capacities and within a diversity of fields, contributing with novel and technically sophisticated designs (Mattinen et al. 2015). Research aiming to map the extent of user innovation suggests that up to eight percent of end-users engage in some type of innovation (Flowers et al. 2010; de Jong & von Hippel 2013); and it is highly likely that some of this activity is in the field of sustainability innovations. Hence, it seems safe to assume that end-users are important innovating actors, also with regard to sustainable innovation, and that it is worth designing policies that specifically foster and facilitate these innovation processes.

5.1. Drivers and Barriers to SEI

Using the categorization tools presented in Section 4, key barriers and drivers to SEI from both an independent and a facilitated perspective have been distilled. Table 3 illustrates the initial observations structured according to the MOAB model. It is important to note that the variables of the model should not be perceived as isolated from one another but rather as interdependent. An increased ability to perform a certain task, for example, often also positively influences the motivations to do so (Thøgersen 2005).

Table 3. The drivers and barriers to independent and facilitated SEI.

		Driver(s)	Barrier(s)
Independent SEI	Motivation	- Personal investment in project. - Project has a visible impact. - Collaboration with others (social component). - Community support (real world or internet enabled). - Effective and dynamic leader or group of individuals.	- Feeling of disenfranchisement from the "system". - Lack of necessary skills leads to a feeling of impotence. - Frustration with innovation process and feeling of isolation. - Dissemination of the innovation is perceived to contradict the innovator's ideals.
	Ability	- Having enough resources (time, skills, money and materials) and information to carry out the project idea. - Knowledge partnerships with others. - Early access to finance and other resources.	- Lack of technical know-how resulting in stalled or uninitiated projects. - Trouble identifying technical experts willing to help. - Innovation and/or modifying existing products are too expensive for end-users.
	Opportunity	- Open source platforms and online communities. - Support from an NGO, cooperative or other external intermediary. - Access to volunteer help (especially "expert" volunteers with either technical skill or an understanding of economic management)	- Complex grant scheme(s), bureaucracy surrounding grants, and the fluidity of the external funding landscape. - Failure to fit into classical funding criteria and confusion regarding eligibility. - Loss of warranty and insurance on products or services modified. - Lack of specialized tools required to alter products. - Dependence on unstable volunteer base undermines small projects.
Facilitated SEI	Motivation	- Clear specification of expectations and goals. - Seeing that ideas and feedback result in actual adjustment and changes. - Feeling that insights are valued and not ridiculed or taken for granted. - Interactive group meetings.	- Skepticism from the firm or project managers regarding end-user knowledge and intentions - Some view end-users as troublemakers.
	Ability	- Users experience needs that producers may not be aware of.	- End-user and expert opinion may diverge due to information gaps.
	Opportunity	- Users offer multiple testing sites for the given product or service.	- Many tools for incorporating end-users into the innovation process remain novel and untested. - Projects focused on end-user innovation require flexibility on behalf of funding regimes that is currently not offered.

As revealed in the user innovation literature (von Hippel 1976), end-users primarily innovate for personal reasons and only secondarily, if at all, for commercial gains (Gabbott & Hogg 1999; Lettl 2007). Therefore, the general perception is that many end-user innovators have no intentions to achieve commercial success and only do so by accident, along the way (Shah & Tripsas 2007)). The key characteristics shared with user innovation in general therefore include innovating due to the personal enjoyment of the process (Hertel et al. 2003; Jalas et al. 2014), the social capital gained by doing so (Ornetzeder & Rohracher 2013; Seyfang & Longhurst 2013) and, in certain circumstances, the financial element at stake (Ross et al. 2012). As opposed to traditional user innovation, however, end-users involved in SEI innovate (also) for others as opposed to (only) for themselves. Independent SEI is therefore often characterized as being driven not by market forces but rather by personal interests, passion and idealism (Seyfang & Smith 2007; Seyfang & Haxeltine 2012).

The "historical disenfranchisement of lay people from centralized systems" (Jalas et al. 2014, p.90) seems to be a central motivational barrier to independent SEI. End-users often perceive themselves as incapable of causing change or as lacking the necessary skills to do so (Ross et al. 2012; Jalas et al. 2014). This is also translated into a sense of frustration faced by a significant number of independent SEI due, for example, to a sense of isolation and failure to obtain funding from overly complex and shifting funding regimes (Kirwan et al. 2013; Hargreaves et al. 2013; Feola & Nunes 2014). Furthermore, the often idealistic (or even activist) approach to sustainable innovation characterizing many independent SEI also creates issues with regard to the diffusion of the innovation(s) (Seyfang & Haxeltine 2012). Often, independent SEIs want to create their project as a counterpoint to the mainstream and therefore do not wish to "integrate" it into the dominant regime (Seyfang & Smith 2007). This internal dynamic, although understandable, can act as a barrier to the dissemination of especially system innovations because any step towards the mainstream could be conceived of as "selling out".

From a facilitated SEI perspective, end-users are often highly motivated to take part in an innovation process, provided that their role in the process is clear and that they feel that their views are taken seriously (Rohracher 2003; Hoffmann 2007). A lack of motivation by the end-user seems to be a less important barrier for end-user integration than skepticism by the

facilitators regarding the competences of the end-users involved (Rohracher & Ornetzeder 2002; Cornwell & Campbell 2012). Rohracher (2003) notes that some experts view end-users as "troublemakers" or "irrational" in their comments. This divergence between expert and end-user opinions has also been observed in citizen-led conservation, where local knowledge can be in conflict with expert knowledge (Cornwell & Campbell 2012). Hence, the major challenge for facilitated SEI is to identify platforms that can bridge this gap between facilitator experts and end-users.

The major ability barriers to independent SEI identified in the literature can be broadly classified into two types: lack of end-user competences and lack of resources. The lack of competences includes a lack of technical expertise (Heiskanen et al. 2011; Jalas et al. 2014), difficulties with finding and organizing suitable collaborators (Feola & Nunes 2014), and issues concerning where and how to access potential external resources (Seyfang & Smith 2007; Ross et al. 2012). The importance of a lack of resources is, for example, highlighted in Heiskanen et al.'s (2011) case study on end-user innovation regarding heat pumps that cost up to EUR 20,000. The financial risks involved when tinkering with such an expensive system would seem to be a natural barrier to many potential end-user innovators (Hyysalo et al. 2013b). Time constraints are also a major barrier for many end-users. Maintaining micro-generation of heat and power, for example, is time consuming (Juntunen & Hyysalo 2015b). In addition, a significant number of the independent SEI reviewed in the literature depend on the labor resource of volunteers for their survival and consequently struggle to secure and maintain their access to a stable volunteer base (Hoffman & High-Pippert 2005; Seyfang & Smith 2007).

As sketched above, within facilitated SEI, expert and end-user knowledge and opinions may conflict. This could be due to the previously discussed motivational component and/or due to information gaps between end-users and experts. These gaps arise because information sharing is often hampered by the "stickiness" of information – referring to the often costly acquisition and transfer of information from one location to another (von Hippel 2005). This makes the sharing of information "highly contextual, tacit and difficult to transfer from one site to another" (Heiskanen et al. 2013, p.242). End-users often simply speak a different "language" than experts

within their respective fields. Although incorporating end-users into a facilitated SEI process is meant to ease the stickiness of information transfer, this remains an issue.

From an opportunity perspective, independent SEI remains challenged by the fact that the project is either wholly financed by their own income, and innovators therefore view the process as a personal project or reliant on shifting funding landscape (Hargreaves et al. 2013; Hyysalo et al. 2013b). Seyfang and Smith (2007) noted, with reference to Church (2005) and Wakeman (2005), that many of these initiatives spend 90% of their time simply surviving economically, thus leaving little time for their focal activity. These projects also remain enormously dependent on key individuals in the group, and when these individuals inevitably leave the project, the projects often fail to receive additional funding (Kirwan et al. 2013). Consequently, limited access to finances remains a significant opportunity barrier to the independent SEI process, driven by a number of issues. The first issue relates to the grant funding process itself, which a significant number of independent SEI note as being overly complex and therefore a source of considerable frustration (Seyfang & Smith 2007; Ross et al. 2012). This relates to identifying eligibility but also to the bureaucracy and requirements usually associated with the application process (Smith 2007; Walker 2008). In addition, some independent SEI, especially within system innovation, face issues with regard to matching the currently available grant and funding schemes, especially because they fall between "the interstices of traditional social, economic, and environmental issue boundaries" (Seyfang & Smith 2007, p. 596). The inaccessibility of some government institutions has also been noted as a barrier to independent SEI (Ross et al. 2012; Seyfang & Haxeltine 2012). Hence, the lack of opportunity for end-users to alter or change existing products or services in a simple fashion is currently a significant barrier to SEI (Hyysalo et al. 2013b). The fact that modifying a product or service often leads to an immediate loss of warranty and insurance is another external constraint on end-users' willingness to engage in user innovation (ibid). Additionally, many producers actively attempt to prevent end-users from tampering with their products by, for example, requiring specialized tools to disassemble the product (Ornetzeder & Rohracher 2006; Heiskanen & Lovio 2010). Finally, the often isolated nature of end-user innovators has been noted as greatly endangering the survivability of many projects as isolated independent SEI (Feola & Nunes 2014).

According to the reviewed literature, facilitated SEI especially faces two practical issues, one with regard to funding constraints and the other with regard to identifying methods for effectively co-opting end-users. End-user involvement and co-design requires a flexible project planning environment, and current funding regimes have been found to be too inflexible to properly facilitate end-user integration and involvement (Heiskanen et al. 2013). Most government-funded projects require detailed plans that cannot easily be altered to fit new information or end-user feedback gained during the project. Coupled with this, there is also the issue of identifying the correct tools to use to effectively integrate the end-user into different facilitated processes.

5.2 Policies Supporting Independent SEI

Despite the novelty of the field, a number of policy tools for supporting independent SEI have been identified in the literature. These include formal and informal education initiatives, supportive intermediaries, microloans and alternative finance, and data access and co-location.

Policy makers can pursue the incorporation of sustainable innovative ideas into a formal education setting (Smith 2007; Kiros-Meles & Abang 2008). An example is the introduction of organic farming techniques into the curriculum at agricultural colleges in the UK (Smith 2007), a move that not only led to increased end-user competences within the given area but also helped to increase the legitimacy of organic farming in the eyes of the general public (Ibid). Do-It-Yourself (DIY) and self-building courses and groups are other educational instruments used to overcome some of the stated barriers to independent SEI. They seem to be especially effective in building competences, empower end-user action, facilitate group creation and learning, and even aid in the dissemination of both end-user competences and the innovation itself. These groups can either be organized as real-world events (Ornetzeder & Rohracher 2006) or via online fora and websites (Hyysalo et al. 2013a).[13] In both cases, they aim to empower end-users with the necessary tools and competences to repair, alter and even build products or services. It has been observed that by integrating end-users into a group-learning process, their technical know-how

[13] Organized events include “repair cafes” (e.g., repaircafe.org), which give end-users the tools necessary to repair their products and which also have specialists at hand to assist the end-user. Websites such as IFixit (www.ifixit.com/) offer free repair guides to a variety of everyday products.

quickly increases (Hyysalo et al. 2013b). These gains in know-how and the success with the process itself often also results in increased end-user empowerment and a sense of personal fulfillment. These groups additionally establish a sense of belonging to a group and encourage social learning (Ornetzeder & Rohracher 2013; Jalas et al. 2014). The dissemination and legitimacy of a given sustainable innovation can also be strengthened by DIY and self-building groups. This could be observed, for example, with regard to the spread of solar collectors in Austria (Ornetzeder 2001). These groups and courses could both be organized at a local level, as recommended by Jalas et al. (2014), or policy makers could facilitate the creation of online forums either by supporting the running costs or by offering minor remuneration "to the moderators and key users for the voluntary helping behaviors these users already do" (Hyysalo et al. 2013b, p.499).

Intermediary actors representing "boundary organizations" engaging in "relational work" between varying independent initiatives have also been identified as important actors in supporting the overall independent SEI process (Moss 2009). These intermediary actors work between communities to support fledgling localized independent initiatives, specifically by helping to grow, consolidate and spread initiatives (Kemp & Rotmans 2004; Hargreaves et al. 2013). Intermediary actors can also help to support independent SEI achieve funding either via direct participation or by assisting in the process (Feola & Nunes 2014; Hargreaves et al. 2013; Seyfang & Smith 2007). Examples highlighted in the literature include various localized cooperatives (Ornetzeder & Rohracher 2013), national organizations such as Communities and Climate Action (Hargreaves et al. 2013) and the Transition Town movement (Seyfang & Haxeltine 2012), as well as international networks such as Ashoka (ashoka.org) (Partzsch & Ziegler 2011). In addition to potential funding support, these organizations can also facilitate pooling of resources between various smaller independent SEIs. The success of the Austrian solar collector case was facilitated, for example, by the fact that the self-building groups coordinated purchases and bought in bulk (Ornetzeder 2001, p. 109). This pooling of resources can also be seen with regard to attracting new members and sharing skills (Hoffman & High-Pippert 2005; Ornetzeder & Rohracher 2013). Finally, intermediaries can also grant end-user innovators a common voice for ensuring the continued commitment of policy makers (Ross et al. 2012; Hargreaves et al. 2013). The success of wind turbine and car sharing innovation was, for

example, partly attributed to the traditional culture of cooperatives in Denmark and Switzerland, which "gave grassroots innovations a well-proofed means of organizing action" at a local level (Ornetzeder & Rohracher 2013, p. 862). Additionally, the successful coordination of the Danish "wind meetings" allowed end-user innovators to meet with regulators and utilities and to lobby them to create a framework through which wind power could be effectively coupled to existing electrical grids (Karnøe & Garud 2012).

Despite the near unanimous observation that current funding regimes need to be improved, there is a surprising lack of recommendations on how exactly they could be improved. Ross et al. (2012, p. 488) suggest the establishment of a "one-stop shop for advice and funding that covers all categories of innovator" for not only entrepreneurs but also end-user projects. Other possibilities include micro-grants with less labor-intensive funding schemes, as often "small amounts of money at the right time can make a huge difference to lone innovators and micros" (Ross et al. 2012, p. 487). A more open framework within grant and funding regimes has also been suggested. However, how this should be practically executed in policy remains unclear from the literature. An alternative source of funding for social and sustainable innovation noted in the literature is the emerging field of crowdfunding (Lehner & Nicholls 2014; Zhang et al. 2014). Here the aggregated power of the "crowd" is drawn upon with small contributions from a diverse number "crowd-investors" accumulating to create sufficiently large totals (Bruton et al. 2015). The scale of alternative financing, like crowdfunding, is already significant, with a few but growing number of policy entities utilizing it as a tool to engage in co-financing (Zhang et al. 2014; Greater London Authority 2015). In addition, several researchers suggest that crowdfunding could be a potentially significant financier of social and sustainable innovation. For example, Lehner and Nicholls (2014) note that crowd investors are often driven to invest by the idea, core values and legitimacy of the product or service, as opposed to its business plan. This is in unison with the fact that crowdfunding, which typically draws on many small investments or donations rather than larger single actor investments, could facilitate more responsibility-oriented investments (Idelchik & Kogan 2012; Lehner & Nicholls 2014).

Finally, increasing free access to enabling data, such as public transit timetables, geographical data and pricing, has been suggested as a means to support independent SEI. This is especially

relevant for the design of "smart green" travel apps[14] because the availability of travel data permits end-users to make their own public transit apps (Ross et al. 2012). Policy initiatives that have attempted to accomplish this include the UK Midata initiative (Gov.UK 2011) and the US data.gov project (US Data.Gov 2014). However, many government datasets remain compartmentalized and non-standardized, creating hurdles for independent SEI. Data availability and standardization are therefore important tools for supporting these types of initiatives. Additionally, co-locating independent SEI among other start-ups has also been noted as an external opportunity facilitator. In co-locating various entrepreneurs and independent SEI, a number of spill-over opportunities arise. These include networking opportunities, increased access to knowledgeable people and an increased potential for collaboration (Horwitch & Mulloth 2010; Ross et al. 2012). The last opportunity is seen as particularly important because of the potential for collaboration viewed "as an essential enabler for successful innovation" (Ross et al. 2012, p.481). As a positive side effect, it becomes easier for local and national governments to host workshops and organize get-togethers because there is a present and identifiable target group.

5.3 Policies Supporting Facilitated SEI

The primary issue facing many facilitated SEI processes is ameliorating end-user and expert (project leader) motivations, expectations and divergences. Although the need for more flexible funding schemes has been noted (Heiskanen et al. 2013), the literature remains unclear on how this should be achieved. Methods for ameliorating facilitated SEI should therefore include platforms that can bridge the gap between experts and end-users. Such platforms include open source platforms, awards and competitions, crowdsourcing, toolkits, the lead user method and living labs.

Open source platforms have already been studied in depth within the open innovation literature and have shown in practice to be a successful means of facilitating innovation within a variety of sectors (Hertel et al. 2003). The basic concept is that individuals, organizations and governments make a given product design or blueprint universally available to be used freely by anyone. End-

[14] Smart green travel apps facilitate travel by public transit by offering the user easy, one-step, on-the-spot and up-to-date access to time schedules, prices and connection information.

users can subsequently utilize the given product or modify it to better suit their needs. Typically, this includes making these modifications freely available for others to mimic. As within the DIY and self-building community, end-users find a sense of joy in the process itself and the linked reputational gains (Lakhani & von Hippel 2003). The full potential of open source within sustainability remains less explored in the reviewed literature. However, examples including open source water management systems (Chen et al. 2010) and e-participation platforms within sustainable tourism (Chiabai et al. 2013) illustrate a latent potential that arguably has been far from fully exploited.

In addition, awards and competitions are effective facilitators of SEI because they trigger a number of enabling drivers, including exposure and public awareness, credibility, encouragement, and of course a financial incentive (Ornetzeder & Rohracher 2006; Füller et al. 2012). Additionally, competitions typically bring together many like-minded people as well as investors and therefore present networking opportunities and innovation spill-over prospects. Furthermore, these types of awards and competitions allow policy makers to steer the direction of sought-after innovation. Although there is a danger of discouraging innovation after losing a competition, the benefits appear to outweigh the risks (Ross et al. 2012). A key emergent type of competition available to policy makers is to utilize the interconnectivity of the Internet as a means to mobilize "crowd" knowledge and ideas. The success of the Harvard Crowd Innovation Lab and NASA Tournament Labs illustrate the complexity of problems that a "crowd" can solve. Several reviewed papers thus note that a similar process could also be utilized with regard to sustainable innovation (Füller et al. 2012; Idelchik & Kogan 2012). Füller et al. (2012) note that crowdsourcing has a strong non-monetary incentive structure from the point of view of the end-user, and therefore, it is possible to get more with less, if the aim of the SEI is legitimate in the eyes of the end-users participating in the process (Zhang et al. 2014).

The lack of opportunity for end-users to alter or change existing products or services in a simple fashion is currently a significant barrier to SEI (Hyysalo et al. 2013b). The immediate loss of warranty and insurance on modified products or services is a very real external constraint on end-users' willingness to take on user innovation (Ibid). Von Hippel (2001, p.247) proposed equip-ping end-users with toolkits as a promising way for manufacturers to permit "users real

freedom to innovate, allowing them to develop their custom product via iterative trial-and-error". Such toolkits could, for example, be tools to freely manipulate aspects of a computer game, such as Garry's Mod (garrysmod.com), allowing end-users to modify the game. Facilitating innovation via toolkits has also been proposed within the reviewed literature (Ornetzeder & Rohracher 2006; Heiskanen & Lovio 2010). Currently, however, research remains centered around traditional user innovation, most typically within IT and the service industry (von Hippel 2001; Franke & von Hippel 2003). Policy makers could encourage producers and service providers to make specific sustainability-oriented toolboxes available to consumers to help them innovate. Granting end-users easier access to modify products or services could allow project leaders to facilitate better end-user and expert learning, ideally allowing end-users to create more efficient products for themselves (Hyysalo et al. 2013b).

Finally, LivingLabs (LL) represents a systematic approach to integrating end-users into the innovation process via direct end-user involvement. Specifically, LL seeks to involve end-users not within an external context, via, for example, workshops at a university, but instead within their own everyday context. LL is therefore "a user-centric innovation milieu built on every-day practice and research, with an approach that facilitates user influence in open and distributed innovation processes engaging all relevant partners in real-life contexts, aiming to create sustainable values" (Bergvall-Kåreborn et al. 2009, p.3). The aim is not to test modules against end-user requirements but instead to bring end-user "explorational learning" to bear with regard to the creation of new ideas and insights (Ibid). Liedtke et al.'s (Liedtke et al. 2015) approach to LivingLabs, or Sustainable LivingLabs (SLL), is a real world example of how this method can be applied in practice. In utilizing the SLL method, Liedtke et al. (2012) pursue a better understanding of energy and resource efficiency within sustainable buildings, specifically by studying and incorporating the insights of end-users living in these buildings. Furthermore, Liedtke et al. (Liedtke et al. 2015) study both the technical feasibility of these buildings and also whether end-users accept the given living conditions that these technical specifications dictate to remain sustainable. The LL approach reflects an opportunity for researchers to better understand end-user behavior and to draw upon end-user insights via the approach suggested by Liedtke et al. (2015). From a policy perspective, SLL could offer policy makers and researchers the tools necessary to overcome, for example, behaviorally driven rebound affects.

6. DISCUSSION

As noted in the descriptive overview, research on SEI has grown significantly, particularly in the last five years. The compilation and synthesis of this literature has revealed its immense diversity and multiplicity, both empirically and theoretically. The review also revealed a nuanced literature with many insights and perspectives and, at the same time, an emergence of research "silos" working independently from each other, where one stream of researchers seems unaware of others covering similar topics from the same actor perspective. Although conceptual differences exist, these literature streams may still garner insights from one another. For example, the literature on grassroots innovation within community energy could draw insights from the literature on user innovation within sustainable home energy technologies and vice versa (Seyfang et al. 2013; Hyysalo et al. 2013b).

As noted, there is a paucity of theory in this research field, which can in part be explained by the novelty of this literature. Another contributing factor might be the diversity of academic disciplines contributing to the exploration of the role of end-users in the sustainable innovation process. The literature on grassroots innovation (Seyfang & Smith 2007), for example, builds on a different theoretical tradition than the literature on LivingLabs (Liedtke et al. 2015) or user-led innovation (Ornetzeder & Rohracher 2006). Indeed, even researchers studying the same phenomenon and drawing on common literature often use different terminology. For example, Staggenborg and Orgodnik (2015), studying the Transition Town movement in Pittsburgh, US, refer to it as 'new environmentalism', whereas previous studies on the Transition Town movement in the UK by Seyfang and Haxeltine (2012) refer to it as grassroots innovation. Hence, not only is the field arguably theory poor, but the theories and frameworks that are applied stem from different research traditions. In sum, a coherent theoretical perspective in this field is lacking yet needed.

The results suggest that there is a need to examine the overall role that the end-user plays within innovation because increased end-user innovation is not necessarily a dividend from a sustainable innovation perspective. In fact, more end-user innovation could result in more rather than less unsustainable practices because it leads to more niche products and services for consumption. Hence, end-user innovation is not in and of itself a solution to our current

unsustainable practices. Young end-users, for example, arguably do not typically modify their cars with fuel efficiency or sustainability in mind. In more extreme cases, end-users pursue wholly unsustainable ends, exemplified by the fad known as rolling coal or rolin' coal (Grenoble 2014). In this case, end-users modify the amount of fuel injected into the car engine combustion chamber so that the fuel is only partially combusted. The result is a highly inefficient engine, with visible black soot exuded from the exhaust. Although this is an extreme case, it illustrates that we should be wary of seeing end-user innovation as always a positive development. Understanding the motivations for SEI is at the heart of this issue, and it is therefore safe to argue that this is an area where there is an urgent need for additional research. We need to understand not only what drives an end-user to innovate, as with traditional user innovation literature (West & Bogers 2014) but also why they innovate for sustainable ends. The literature on sustainable entrepreneurship could be a point of departure for this research, in addition to current behavioral science research on pro-environmental behavior in general (Gifford & Nilsson 2014; Thøgersen 2014; van Vugt et al. 2014).

The near uniform critique of current funding regimes should also translate into research on how these regimes may be improved. One might draw on the authoritative advice of behaviorally informed public policy as the starting point for further exploration (Mullainathan & Shafir 2013; Ölander & Thøgersen 2014). In the US, for example, the simplification of college information sheets, so-called College Scorecards, offers an example of how to simplify and make more accessible complex information (Sunstein 2013). The paper proposes that a similar approach could be employed to simplify current funding schemes. However, further research is needed to explore how funding schemes can be simplified while remaining conducive to both end-user and policy maker needs. An important caveat is that, whether designing college information sheets or funding schemes, "a minimum requirement is that one takes heed of the heuristics people use when processing information" (Ölander & Thøgersen 2014, p.343). In addition, crowdfunding might be both an initial source of funding for SEI and help support the transitory step that some, primarily independent, SEI make from government sources of finance to commercial sources. This could be especially relevant for independent SEI projects that have become overly dependent on government funding schemes for their survival (Karnøe & Garud 2012). It is therefore suggested that, despite relevant discussions regarding issues of investor protection in

the US (SEC 2014) and EU (EC 2014), crowd-funding might in the future become a new and potentially large financier of sustainable innovation. One could even imagine that policy makers could draw on crowdfunding as a type of co-financing for projects via end-user involvement.[15] Understanding what motivates end-users to participate seems to be the key to tapping into this potential resource for co-financing sustainable innovation.

Overall, when reflecting on the policy options suggested in the literature to support independent SEI, it appears that these policy options are primarily aimed at enabling end-users with the necessary skills and resources to innovate. Promising approaches in this regard include tailored DIY workshops, resources, networks and knowledge access. Policies aimed at facilitated SEI appear to be primarily focused on creating platforms that enable the effective introduction of end-user knowledge into an already existing framework. This might be done, for example, through the lead user method, crowdsourcing, open source and sustainable living labs.

Finally, the results of this review confirm the observations by Ornetzeder and Rohracher (2013, p. 866) that there is a need for more research focusing "on missed opportunities and discontinued initiatives," specifically because it would enable a better understanding of how local settings and structural conditions influence the success or failure of SEI. In exploring these areas, a better understanding of the arguably growing role of the end-user within sustainable innovation and how policy can create a context more conducive for this type of innovation process may be gained.

7. CONCLUSION

The present review shares the observation with Seyfang and Smith (2007) that sustainable innovation and end-user action are in general viewed as separate issues, both from a policy and research perspective. This division inhibits sustainable innovation because end-users evidently can and do play a key role within the innovation process. In systematically reviewing the literature, this paper has aimed to summarize and synthesize this available knowledge, providing

[15] The German crowdfunding platform EcoCrowd (https://www.ecocrowd.de/en) represents an example of how policy makers could help facilitate end-user involvement in sustainable innovation. In this case, the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety co-finances the sustainable crowdfunding platform.

an evidence base for developing more effective policy tools that might facilitate SEI. The latter presents an innovation niche that at the moment remains largely ignored by policy and is hence an untapped source in a world that urgently needs smart sustainability innovations of all types.
From an academic perspective, this paper contributes to the field of sustainable innovation by synthesizing the compartmentalized literature focusing on the active role of end-users within sustainability-oriented innovation. Another important contribution is the overview of key barriers and drivers to SEI, while also highlighting areas for potential future research. Hence, the paper hopefully will act as an overview and resource for scholars interested in pursuing this line of research.

From a practitioner's perspective, the recommended policy tools offer insights into how to both encourage SEI and also bring end-user abilities to bear within an institutional framework. A good example is the mobilization of crowd-knowledge and resources to help solve and co-finance sustainability challenges. Overall, the paper suggests that end-users combined with other innovation actors represent a major resource for achieving multiple pathways towards a more sustainable future – a source that should be tapped systematically by innovation policy. This seems to be advisable particularly because radical innovation often starts in small protected niches where uncertainty and low product performance levels and efficiency are tolerated (Kemp et al. 1998; Caniëls & Romijn 2008).

The literature on end-users within sustainable innovation remains multifaceted, diverse and widely distributed with multiple terminologies and empirical cases. The rapid growth of this literature within the last five years does suggest that this phenomenon is increasingly also becoming more common within sustainable innovation. If we assume that up to eight percent of end-users innovate for themselves, as one study suggests (Flowers et al. 2010), and if just a fraction of them innovate for social or sustainable ends, the aggregated potential could be substantial.

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Chapter 7 | Paper 2

Organizing the crowdfunding process: The co-dependent organization

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Abstract: Crowdfunding (CF) has become a popular alternative source of finance for a variety of for- and non-profit activities from small local artistic projects to large ventures seeking millions of dollars in capital. Utilizing the literature on complete and partial organization, the paper proposes a more nuanced conception of what CF is compared to the current static approach. Encapsulating the process as a fluid and co-dependent interaction between various organization types, where complete and partial organizations do not emerge as separate entities each filling their own presupposed role, but do so co-dependently which consequently allow for a fluid, but also entangled organizational structure. Crowdfunding is therefore conceived of as a "co-dependent organization" where the central organizing agent's (the platforms) reliance on external actors (founder campaigns and crowdfunders) has become so embedded that you can not organizationally discern them as separate. Second, in creating this co-dependent organization, the organizational structure of the process is maintained by different actors exerting degrees of organizing depending on agent in focus. Finally, the paper seeks to introduce the notion that organizations can draw upon the organizing power of the crowd and rely on a large, diverse and shifting group of individuals to execute core organizational decisions.

1. INTRODUCTION

The emergence of crowdfunding as financier of both for- and non-profit ventures has led to a steady stream of academic research due to both the rapid growth of this phenomenon and its unique attributes (see e.g. Burtch et al. 2013; Mollick 2014; Belleflamme et al. 2014). Often perceived as a hybrid between crowdsourcing (Poetz & Schreier 2012) and micro-finance (Morduch 1999), the CF-process itself typically relies on the successful interaction between a facilitating organization (or platform), a variety of founder campaigns by people who seek financial support for their ideas and ventures, and a large dispersed "crowd" of individuals ("crowdfunders") who are interested in investing in or donating to these ideas and ventures. As a concept, crowdfunding is thus dependent on strangers supporting strangers for causes, products or services that have not yet been realized and of which they have little direct oversight or control. Although CF is still relatively small in terms of overall economic activity – at this time of writing – it is a rapidly growing organizational phenomenon, which has led to an increased attention from private enterprises and policymakers (World Bank 2013; Zhang et al. 2014). However, while crowdfunding continues to expand on a global scale, our theoretical understanding of this phenomenon is lagging behind (Mollick 2014). Moreover, the focus of the existing scholarly research on CF is largely confined to the interests of the particular papers (e.g von Krogh et al. 2012; Moritz & Block 2014) with less regard for the crowdfunding process as a whole; a process which – this paper argues – is a fluid and dynamic organizational phenomenon in its own right. Our understanding of crowdfunding can therefore be greatly enhanced by drawing on recent advancements within organizational theory, which will allow for understandings of CF as processes that occur beyond the boundaries of the "complete" organization.

The paucity of theory on this novel form of organizing is where this paper seeks to make its contribution, not due to the gap itself, but because the insights garnered serve to address the dearth of organizational theory and research that addresses new forms of organizing and organizational collectives (see Walsh et al. 2006; Kostera & Kociatkiewicz 2014). The paper proposes to study crowdfunding as a fluid organizational phenomenon by applying the theoretical concepts of "complete and partial organizations" (Ahrne & Brunsson 2011; Ahrne et al. 2016) contributing with a theoretical frame through which this budding field of study can be

understood. Furthermore, in conceptualizing the process of crowdfunding from an organization perspective, it is revealed that CF-process itself inhabits multiple organizational forms simultaneously – complete partial organization, network or online social community – and it thus becomes polymorphic in nature (see Comas et al. 2015). Rather than viewing these four organizational forms as separate entities that each fills their own presupposed role, the paper will instead show that an organization (the CF-platform) may also become so dependent on external complete and partial organizations (founder campaigns) as well as on large and loose constellations of individuals (the crowd) that they must be regarded as co-dependent. The CF-process therefore functions from the different organizational forms operating co-dependently. Unlike similar circumstances in which organizations engage with external partial organizations – by e.g. committing to an agreed upon 'standards' (Brunsson et al. 2012) or utilizing "crowd" knowledge (Afuah & Tucci 2012) – the crowdfunding platform cannot disengage from these external agents. Rather, it relies on these agents to carry out core organizational competences and thus cannot exist without these external forms of organizing. Crowdfunding is therefore conceived as co-dependent organizational structure where different degrees of organization are conducted by the CF-platform with relation to the organization itself, its relations to a number of partial and complete organizations (the founder campaigns) and a fragmented "crowd" of individuals (the funders). It is, in other words, an immensely difficult task to identify where the complete organization of crowdfunding begins and ends and one might even question whether such efforts are actually fruitful for the understanding of the organization of the CF-phenomena.

2. BACKGROUND

While we may conceive the larger phenomenon of crowdfunding (the agglomeration of all crowdfunding platforms) as an emerging marketplace, this paper proposes that by focusing on one specific platform we are able to view CF-processes as an organization. This proposal does not, however, infer that the CF-platform is to be regarded as an isolated entity in this market environment. Rather, the CF-platform actually navigates and competes against other emergent organizations within that same crowdfunding market.

Despite variation across the emerging literature, crowdfunding is at its core often conceived as an open call for investments facilitated by the internet; a call that seeks to engage interested

parties to donate to or invest in a specific project or venture (Belleflamme et al. 2014). Although feasible without intermediary support, CF is increasingly enabled by platforms, such as Indiegogo and Kickstarter, who act as facilitators of the CF-process in exchange of a commission (Mollick 2014). Hence, when seeking to characterize crowdfunding, the existing literature often subdivides the CF-process into four models depending on the nature of the funding: A differentiation based on donation, reward, equity, and lending-based approaches (Cholakova & Clarysse 2015).

Table 1. The four models of crowdfunding (Zhang et al. 2014; Cholakova & Clarysse 2015)

Crowdfunding Model	Definition
Donation-based	Donation towards a specific project with no expectations of financial or material returns.
Reward-based	Individuals invest a pre-defined amount of money with the expectation that if successfully funded, they will receive a tangible (but non-financial) reward, product or service.
Equity-based	Small investments in crowdfunding project in return for an incremental stock in the respective business.
Lending-based	In the lending-based model the crowdfunder lends a small amount of money to a specific platform, project or person.

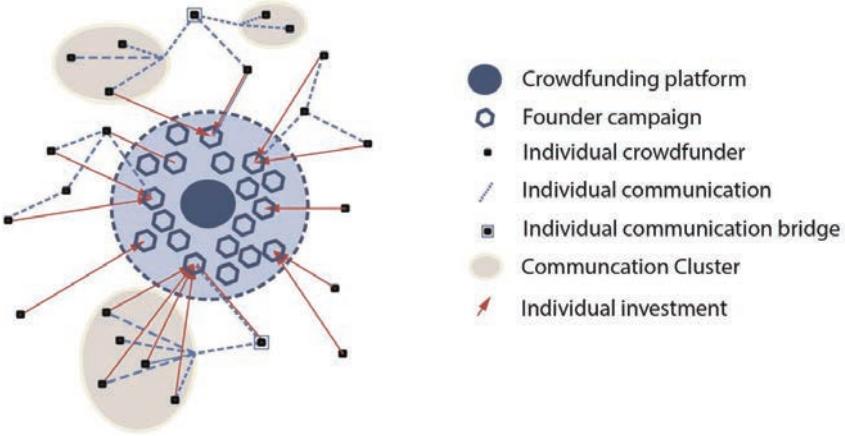
The three central "agents" of the CF-process are identified as the crowdfounders (or founders), the platform and the crowdfunders (or funders). The founders are the creators of an idea, product or service, who initiate a CF-campaign in efforts to gain "direct access to the market and [...] gather financial support from truly interested supporters" (Ordanini et al. 2011, pp.444–445). Aside from securing financial support, CF-campaigns may also be used to test market interest and to engage in potential customer feedback. CF-campaigns may also be used as part of a marketing strategy (e.g. if a CF-campaigns goes "viral", the product, idea or service will gain significant exposure before launch) (Valančienė & Jegelevičiūtė 2014).

The platform broadly serves as the central organizing agent for the CF-process by displaying a diverse number of founder campaigns, providing a categorized overview and presents the top trending or popular campaigns. CF-platforms are thus somewhat comparable to e.g. eBay or other e-commerce websites. However, what distinguishes crowdfunding from other e-commerce

websites is that each campaign represents an individual idea or project of a yet-to-be created product or service led by one or more founders. Each campaign is displayed according to the parameters set by the given CF-platform, which typically consists of a photo gallery of the product or service, a sales-pitch video by the founder, a short biography and background section, a description of the campaign, and a listing of funder benefits – the so-called "perk overview" (Gerber & Hui 2013). The CF-platform also lists the total number of funders for a given campaign, user comments, updates, financing progress and goals, etc., and displays the social media tabs for each campaign. Crowdfunders and interested or potential funders often share a given CF-campaign with their friends and network – often through social media – and thus create additional traffic to a campaign (Mollick 2014; Agrawal et al. 2015). On the campaign page, crowdfunders and other interested individuals are able to communicate with the respective founder(s) via the comments section; asking questions, offering feedback, and following up on the progress of the given campaign (Castillo et al. 2014; Zheng et al. 2014). While much of the existing literature characterizes the crowdfunders as merely the target audience and individuals who are enticed to invest, the actual role of the funders in the CF-process is more nuanced as the crowdfunding process largely depends on the external support of existing and potential funders.

On an aggregated level, the crowdfunders hold significant power; not only because their (potential) investments are the raison d'etre for the entire CF-process but also because these individuals often represent key networking hubs or bridges for disseminating the campaign content; either by inserting the original campaign pitch or by altering it to "fit" the channel of communication, e.g. a post on one's Facebook wall (Hinz et al. 2011; Mollick 2014). By linking to and sharing a CF-campaign in online groups and forums, individuals and crowdfunders create so-called "communication clusters". Interested individuals and crowdfunders can thereby play a "passive" role in the CF-process by financially supporting campaigns or they may play an "active" role by promoting, sharing, and discussing the given campaign in their networks (Gerber & Hui 2013). By assuming an active role in the CF-process, the funders and interested individuals act as a bridge between the campaign itself and other potential funders (Schwienbacher & Larralde 2012). Figure 1 illustrates the interconnected nature of the crowdfunding process by displaying a CF-platform, its founder campaigns, and the funders who are connected hereto via either the platform website or founder/funder social networks.

Figure 1. The crowdfunding process



Even though the platform and campaigns are separate from one another, they operate co-dependently as the platform depends on successful campaigns in order to operate and become profitable and the campaigns benefit from the operational support and legitimacy provided by the platform. As illustrated in Figure 1, the platform is thereby the nucleus of the CF-process, which the various campaigns coalesce around. Finally, both platforms and founders are strongly dependent on the support and engagement of the crowdfunders and given its web-based nature, crowdfunding is fundamentally reliant on communication to achieve this. Communication is thus essential; both in terms of overall legitimacy and of creating a sense of community at a platform level (Agrawal et al. 2015; Mollick 2016) but also for each respective campaign whose success largely depends on its ability to garner interest as well as the sharing and ultimately support of individuals (Lehner 2013; Colombo et al. 2014).

2.1. Organizational Challenges in Defining Crowdfunding

Given the novelty of the field, there is currently no comprehensive definition of crowdfunding and some scholars even argue that this may not even be possible (e.g. Mollick 2014). As mentioned in the introduction, the existing research has primarily been "phenomenon-driven" and has focused on "developing a definition and description as well as a differentiation to related

subjects and concepts" (Moritz & Block 2014). Given this "phenomenon-driven" approach, the current research often emphasizes a particular model of crowdfunding; centering the characteristics of a successful CF-platform or founder or the motivations of crowdfunders to support certain campaigns over others (see e.g. Mollick 2014; Xu et al. 2014; Moss et al. 2015; Lin & Viswanathan 2015). While greatly advancing our understanding of crowdfunding, such research arguably leads to an instrumental understanding of the CF-phenomena, in which crowdfunding is perceived as a stable or static component of actors and models rather than a fluid ongoing process.

However, if we reflect on crowdfunding more deeply, its fluid and interdependent nature becomes more apparent. In doing so, the challenges of conducting a broader theoretical conceptualization of the phenomenon also comes to the forefront: It is, for instance, difficult to identify the boundaries of the complete (or formal) organization of crowdfunding. While one could argue that the complete organization of crowdfunding is only the platform itself (e.g. Indiegogo), this would presuppose that the platform could function without the other agents (founder campaigns or crowdfunders) in the process something it clearly cannot do. Instead, the platform is fundamentally reliant on the founder campaigns and crowdfunders to maintain a functioning organization. The external founder campaigns create the products and services desired by crowdfunders who visit the platform and they in turn represent the financiers of these endeavors. Further separating this phenomenon from similar online markets (e.g. Ebay) is that these crowdfunders are in practice fundamental in enabling the given product or service. As opposed to other forms of e-commerce where consumers purchase already developed products, crowdfunders are asked to invest in or pre-purchase an idea. The crowdfunder thus actively engages in enabling product or service innovation instead of the more passive role of purchasing existing products or services. This active role thus requires the individual crowdfunder not only to have interest in the given product or service, but also to be willing to trust that campaign founders can and will deliver. From a business cycle perspective, the consumer is therefore in the CF-process, active and fundamental to the development of the product or service, while in a traditional business model, the product or service would have been realized without consumer engagement. The crowd, representing a disparate and largely unorganized group of individuals, is thus responsible for enabling the founder campaign ideas that in turn create a functioning

platform. The platform as organization can therefore not function without the external agents representing the founder campaigns and crowdfunders.

If we therefore conversely accept a more fluid conceptualization of organizations which includes e.g. the campaigns of the CF-platforms, then the organizational boundaries will constantly be shifting depending on the number of campaigns at a given time; something which is beyond the direct control of the CF-platform. It could furthermore be argued that by including campaigns as part of the organization, the traditional notion of organizational hierarchy and boundaries within an organization are negated, as the campaigns themselves are not the platform. Instead they represent often independent complete or partial organizations that have their own more or less formalized structure. Consequently, when applying more traditional notions of organization, crowdfunding is conceptualized as neither an organization nor a non-organization.

3. FLUIDITY AND ORGANIZATION

In recent years there has been a budding debate about what constitutes an organization. Among other things, this debate has resulted in the emergence of new forms of organizations; conceptualizations which challenge the existing notions of "fixed" organization with terms such as "fluid" (Schreyögg & Sydow 2010) or "liquid" (Kostera & Kociatkiewicz 2014) organizations. The recent literature on hacker collectives (Dobusch & Schoeneborn 2015) and online communities (Puranam et al. 2014) explores, for instance, how these organizational forms are able to exist without open boundaries or clear memberships. As a result of these and other studies, certain scholars suggest that we ought to broaden our understanding of what constitutes an "organization" to also include loose "boundaryless" social constellations (e.g. Ashkenas et al. 2002). Yet other scholars assume a more critical position towards this broadened – and arguably less clear – definition of organizations and argue that this conceptualization fails to differentiate social collectives (e.g. communities and networks) and organizations (Sillince 2010). However, and in line with the observations by Dobusch & Schoeneborn (2015), this paper argues that a split or binary classification of social collectives has emerged within the existing literature in which these social collectives are either viewed as an organization or non-organization. Similar to the academic literature focusing on new and emerging forms of organizing (e.g. Schreyögg & Sydow 2010; Kostera & Kociatkiewicz 2014), this paper argues that while conceptually useful,

this dichotomy – organization versus non-organization – creates significant issues when one seeks to understand the organizational nature of crowdfunding. In order to overcome this dichotomy, the paper instead proposes to apply the literature on "partial organizations" (Ahrne & Brunsson 2011; Ahrne et al. 2016) which allows for the conceptualization of organizational activities that occur beyond the realm of "complete" organizations.

3.1. Complete and Partial Organizations

In seeking to better understand the new and emerging forms of organizational activities, a number of scholars are increasingly working towards a broader understanding of organization that would allow for a more versatile use of the existing organizational theory (Ahrne et al. 2016). In line with this literature, organization in this paper is defined as a "decided order" which in its complete state consists of five elements: membership, hierarchy, rules, monitoring, and sanctions (Ahrne & Brunsson 2011). Building on the work of Luhmann (2003), a complete organization may therefore be regarded as a collection of elements, which – if present – create the necessary conditions for "interconnected communications of decision-making that take place on behalf of a collective" (Dobusch & Schoeneborn 2015). Ahrne and Brunsson (2011) propose the five previous mentioned elements or decisions necessary for a "decided order" to become conceived of as a complete organization (Ahrne et al. 2016):

- Decisions on Membership define who is and is not a member of the organization and thus demarks the interaction between participants as they now recognize the involved and uninvolved parties.
- Decisions on Hierarchy define the roles of the individual members in terms of who has the initiative and power within an organization (through decisions about which decisions are binding).
- Decisions on Rules are the organizationally created parameters for the members and their actions and behavior in an effort to create a shared understanding about goals, means and decisions.
- Decisions on Monitoring include e.g. financial and management accounting systems that insure compliance with commands and rules, but also measure how well members perform.

- Decisions on Sanctions (positive and negative) are enforced to reward and punish member's behaviors through e.g. promotions or salary cuts.

Partial organizations are "decided orders" and are similar to complete organizations but the important distinguishing feature is that partial organizations lack one or more of these five elements. Hence, a partial organization is organized but cannot be defined as a "complete" organization. An everyday example of a partial organization is, for instance, customer clubs, which are membership driven but otherwise lack the elements that define complete organizations. Partial organizations are typically organized activities which have been initiated by a (complete) organization in order to establish networks and thereby "obtain better control over and predictability in their contacts with people in these networks" (Ahrne & Brunsson 2011). Partial organizations thus emerge in various contexts as this organizational form does not require all five elements of complete organizations in order to function and therefore require less effort to maintain the organization as compared to complete organizations (Ahrne et al. 2016).

4. ORGANIZING CROWDFUNDING

Having proposed that crowdfunding – as viewed through an organizational lens – can be perceived as a polymorphic framework in which the CF-process itself can assume a myriad of forms of organizing depending on the prospective perspective actor in focus. In applying organizational theory, the paper seeks to expand upon this proposition by classifying each taxonomic actor within crowdfunding: platform, founder campaigns, and crowdfunders. This classification will draw on the previously noted literature and classifications of this paper; especially the five decisions for complete organizations. As such, Table 2 illustrates the insights which emerge when the five fundamental decisions for complete organizations are applied to the prospective actors of the CF-process; thus revealing how decisions which – by some scholars – are considered key to the organization are delegated to external agents to such a degree that the organizational decisions between the platform and these external agents can no longer be separated.

Table 2. The five fundamental decisions applied to the crowdfunding phenomena

	Platform	Founder campaigns	Crowdfunders
Decisions on Membership	Define parameters for membership.	Define and push the barriers of membership.	
Decisions on Hierarchy	Multiple "central decision" centers between platform and the multitude of founder campaigns.		
Decisions on Rules	In their hosting function, platforms establish the broad rule frameworks for founders and funders, but are equally pressured by those same actors.	As the producer of the products and services demanded by funders, founders holding the ability to resist and even boycott unfavorable decisions on rules from the platform.	As supporters of founder campaigns, funders also hold considerable abilities to resist and even boycott unfavorable decisions on rules from either the platform and/or founders.
Decisions on Monitoring	Monitor issues of copy-right or fraudulence claims.		Serve to monitor campaign progress and hold them accountable.
Decisions on Sanctions	Limited capacity to sanction product and service development. Rare direct involvement in sanctioning.		Positive and negative sanctions happen through peer screening and subsequent support or disapproval. Sanctions include the passive ignoring of campaigns to active monetary support or positive and negative user commentary.

4.1. Platform – A Complete Organization

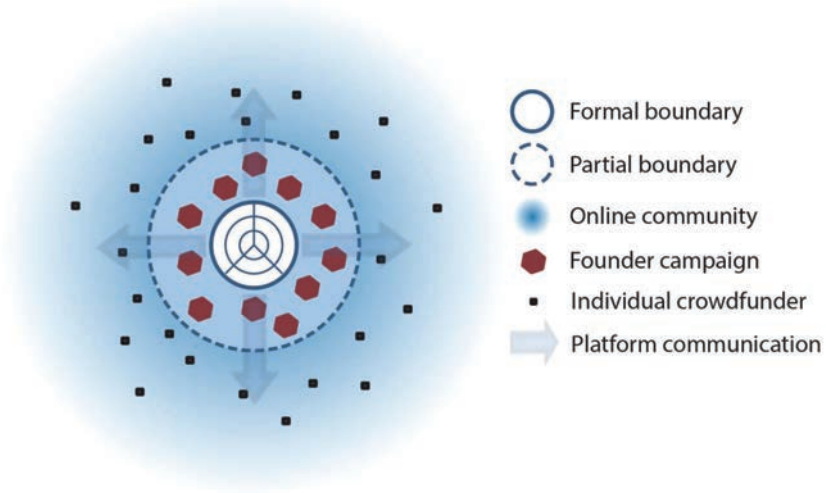
The crowdfunding platform is an increasingly common actor and is often conceived of as the facilitating agent in the process of linking founder campaigns with a diverse group of funders (Mollick 2014). While crowdfunding can take place outside these platforms – via independent website and e-mail investment drives – it is increasingly handled by platforms like Kickstarter, Indiegogo or Prosper (Castillo et al. 2014). The literature arguing that their increased prevalence can be associated to the fact that they represent reliable middlemen verifying founder identities, easing access to a diversity of campaigns presented in a standardized and comprehensive way, offering secure transactions and thereby increasing the overall legitimacy of the process in the eyes of both funders and founders (e.g. Ordanini et al. 2011; Agrawal et al. 2015). Additionally, platforms also act as marketing tools in their own right as funders of the platform and others following the given platform via social media receive regular updates on new and trending campaigns (Mollick 2016).

At first glance, CF-platforms may therefore be conceived as "profiteers" who "participate in the market organization in order further their own economic interests […] though the organization of the primary market" (Ahrne et al. 2015, p.14). Online auction houses and other platforms for organized e-commerce (e.g. eBay) are all examples of such profiteers. However, despite the clear economic interest of CF-platforms, their role is a key enabling actor and cannot be delimited to only minimizing transaction costs between "buyers" (funders) and "sellers" (founders). On an aggregated scale, these platforms have actually enabled the rise and expansion of an emergent market of founder campaigns and thus serve as an enabler of new organizations as well. As argued in section 2.1 CF-platforms are distinguished from other "profiteers" because they facilitate idea-to-product creation rather than simple sales thus establishing a functional co-dependence between platform, founder campaigns and crowdfunders. The platform, for example, requires the founder campaigns to develop the ideas that attract the crowdfunders, the founder campaigns require the platform to enable trust so that crowdfunders will actively invest in their ideas and, in addition, they require the active involvement of the crowdfunders to enable their product or service ideas. This dependence on yet to be created and to some degree imagined products and services is what differentiates the CF-platform for a "profiteer" role. Instead the

notion of co-dependence – rather than simply facilitation – better captures the phenomenon as will be expanded upon.

When viewing platforms solely from an organization perspective, they appear as complete organizations due to their clear decisions on membership, hierarchy, rules, monitoring and sanctions (Ahrne & Brunsson 2011). The crowdfunding platform Indiegogo has, for instance, a distinct office space with a clearly demarcated boundary in which membership (i.e. employment) is defined by legal contracts. This includes a clear hierarchy with both junior and senior positions and defined rules on goals, means, and parameters for individual decision making and appropriate conduct. Finally, platforms such as Indiegogo have mechanisms in place in order to monitor a range of employee specificities (such as output and employee satisfaction) as well as a range of sanctioning possibilities available. However, despite the platform's complete organizational nature, it is functionally co-dependent on its ability to facilitate a critical mass of interaction between funders and campaign founders. Platforms require founder campaigns in order to deliver the "inventive ideas" and "creative projects", which essentially are the cornerstones of their enterprise (Indiegogo 2016; Kickstarter 2016). The boundaries for membership – defined by Ahrne (1994) as those who are allowed to join an organization as either employee, citizen or member of an association – thus becomes tiered as various actors (both internal and external ones) contribute to the functioning of the organization. Bencherki & Snack (2016, p.7) propose that organizational membership (or members) should be defined as contribution (or "contributors") as if individuals "share actions with an organization, they may 'belong' to it". In the case of crowdfunding, there are then both formal organizational boundaries (defined by the platform's legal employee contracts) and partial boundaries (which concern the founder campaigns of the platform). Finally, there is the diffuse and semi-organized "crowd" community online, where the platform engages with its users through a so-called communal approach to consumption in which users are encouraged to participate in the digital interactions of a given brand or platform (see Cova & Pace 2006; Miller et al. 2009). Figure 2 illustrates these varying degrees of membership – or contributions – by respectively the platform and its co-dependent, external actors (i.e. founder campaigns and crowdfunders).

Figure 2. Platform perspective on crowdfunding



The ultimate survival of a platform thus depends on its ability to create a partial boundary that enables the successful creation of various founder campaigns as well as its ability to create an online community of engaged individual users who are willing to support and drive traffic to those campaigns (Mollick 2016). In relation to the founders and crowdfunders, the platform thus defines the parameters for membership by broadly establishing rule frameworks which center on platform membership; the rigidity of this framework depending on the agent in focus, i.e. campaign founder or crowdfunder. From the platform's perspective, it therefore has multiple tiers of membership to define and make decisions on: Firstly, and within the formal boundaries of the organization, the platform defines membership, hierarchy, rules, monitoring and sanctions (similar to other complete organizations). Secondly, and in relation to the founder campaigns which produce the content on which it relies, the platform defines a partial boundary consisting of decisions on rules and membership and a slight degree of monitoring and sanctioning in efforts to avoid e.g. copy-right infringements and fraudulence. Finally, and in relation to funders, the platform seeks to organize a loose online "crowd" community through the decisions on membership. In effect, the platform exercises various types and degrees of organizing depending on the interacting party.

4.2. Founder Campaigns – Complete and Partial Organizations

The founder campaigns represent a mix of both established SMEs seeking to create new business opportunities, small groups of entrepreneurs wanting to launch their idea and individuals seeking money for small, often artistic, projects (Belleflamme et al. 2014). Hence, while founder campaigns from a platform perspective are often treated as a relatively homogenous actor – in terms of rules, membership, sanctions and monitoring – they in reality represent a diverse degree of organizations from complete organizations to partial organizations and single individuals. While established SMEs can generally be said to reflect complete organizations, the diversity of entrepreneurial endeavours, by typically small groups, often reflects partial organizations with yet to define membership, hierarchy, and rules that ultimately depend on their ability to achieve funding success with their respective campaign. The paper therefore proposes that significant numbers of founder campaigns inhabit a unique empirical setting, where, if and when achieving funding success, they must transition from partial organizations to complete organizations, specifically as their proposed product or service invention becomes commercialized and hence transitions towards an innovation. The paper proposes that if not already present these founder campaigns would have to start to institute decisions on membership, hierarchy, rules, monitoring and sanctions in order to continue to operate successfully.

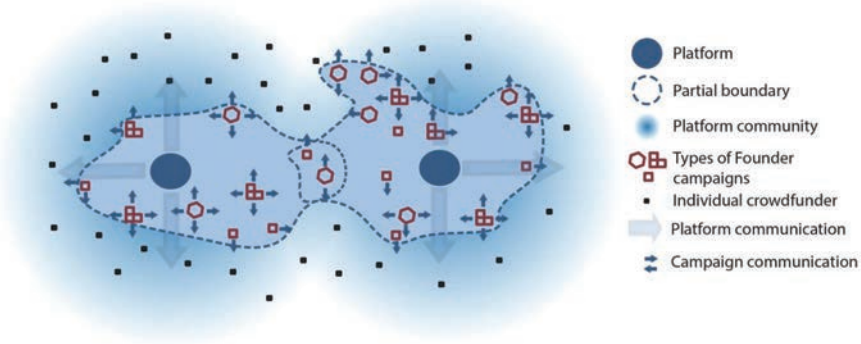
Given this diversity in the forms of organizing found within founder campaigns one can also observe different strategies for attaining funding, different narratives employed, and generally a diversity of aims, abilities and expectations (e.g. Hahn & Lee 2013; Colombo et al. 2014; Zheng et al. 2014; Manning & Bejarano 2016). However, there still exist tensions between the needs of the respective campaigns and the partial boundary set by the respective platform; especially given the competitive nature between platforms to attract campaigns. This leads to pressures on the platform's boundaries as it relies on attracting and maintaining a large selection of founder campaigns. With the recent relaxation of Kickstarters', another large crowdfunding platform, rules regarding which projects can be placed on its site and the simplification of the screening process of those same projects can, for example, be attributed to a need to compete with other platforms like Indiegogo or GoGetFunding (Kelion 2014). Indeed it is not uncommon for founder campaigns to seek out multiple platforms to raise capital. Hence, while on aggregated

scale, the crowdfunding process is reliant on a co-dependent relationship between platform and campaign – each defining and shaping the other – there is also a degree of boundary making between platform and campaign. The platform aims to define a framework for campaigns, while the founder campaigns juggle between the platforms that best suit their needs thereby exhibiting an indirect pressure on that same partial boundary. The number and diversity of campaigns within this partial boundary defines the platform's size, boundary and success, while also pressuring the partial boundary of the platform that seek to juggle the challenges of minimizing instances of fraud, prank and low quality campaigns, while simultaneously allowing for inclusiveness (Mollick 2015; 2016). The founder campaign's relationship to the platform is then defined by the partial boundary parameters set by the platform, but by representing the content providers on which the platform relies, founders also exercise a degree of pressure on those partial boundaries. Given this co-dependence between platform and founder campaigns, multiple hierarchies – "the right to oblige others to comply with central decisions" (Ahrne & Brunsson 2011) – thus emerge as both the platform and founder campaigns exercising central decisions regarding e.g. defining rules for funding procedures or defining rules for refunds and product specifications. Thus, central decisions on membership and rules and executed both by the platform and the founder campaigns.

As with the platform, founder campaigns also have a direct, if not closer interaction, with funders as it is the individual campaigns that rely most heavily on an external "crowd" to be successful. This interaction between founder campaigns and funders primarily takes on a communicative nature (Schwienbacher & Larralde 2012; Lehner 2013). It materializes in three stages: firstly, in terms of mobilizing the campaign founders' own network to spread the word, secondly in galvanizing support via updates during the funding process, and finally in reaching their funding goals in communicating updates with backers on the progress of the given campaign (Lin et al. 2012; Xu et al. 2014). Whereas the platform may serve as an overall marketing and enabling facilitator for hosting and announcing new campaigns, the individual founder campaign success is dependent on their ability to tailor individual communication strategies to insure funder backing. The communicative nature of the interaction should, however, not be confused with a lack of organizational decisions. Founder campaigns define the individual rules for membership for their given campaign, by e.g. setting specific funding targets which crowdfunders must hit in

order to achieve different levels of membership and certain rewards. As illustrated in Figure 3, founder campaigns thus depend on platforms to organize the interaction between them and funders, while acting independently to insure funding success. They do this both by pursuing individually tailored strategies, but also potentially by using multiple platforms to gain capital and thereby also putting pressure on the platforms' partial boundaries.

Figure 3. Founder campaign perspective on crowdfunding



What the figure above probably fails to illustrate is that individual campaigns also seek to construct online communities around their specific campaign in order to mobilize funder support, promotion and feedback (Mollick 2016). The number of arrows around the respective founder campaigns indicates not only campaign communication but the varying degrees of success campaigns have in encouraging funders to participate in digital interactions. Finally, there is also a high degree of interaction between founders themselves as will be elaborated on in the following section.

As with the platform perspective, we observe how partial and complete organization founder campaigns must also exercise different degrees of organizing in order for them to function. Firstly, within the boundaries of the founder campaign themselves they must, at least when having achieved funding, exercise decisions on membership, hierarchy, rules, monitoring and sanctions. Secondly, given their importance to the platform, on aggregated level, they de facto define and shape the partial boundary of platform through their content contribution to the

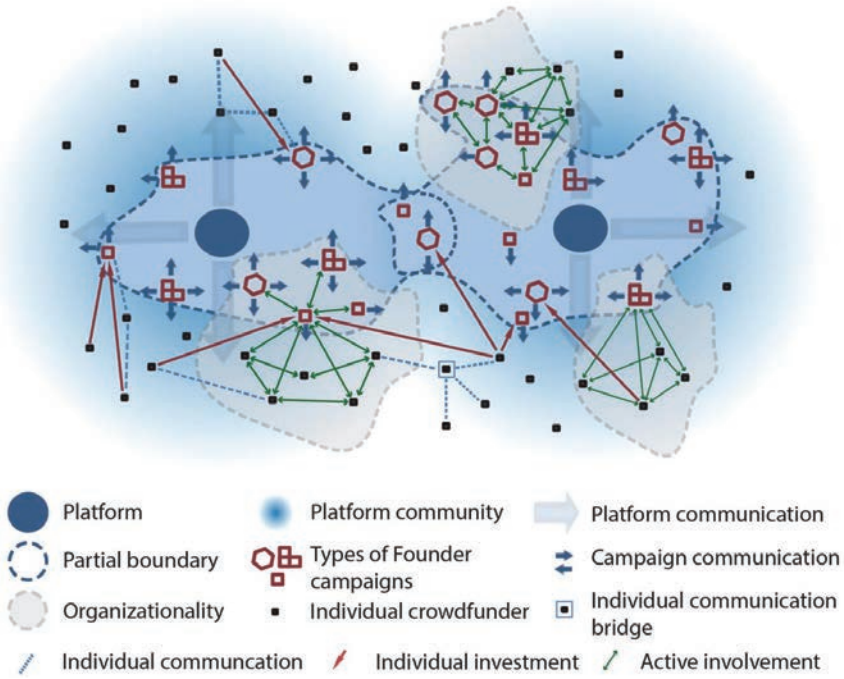
platform organization (Bencherki & Snack 2016). This co-dependence also results in a degree of rule negotiation between platform and founder campaigns and finally results in multiple "central decision" centers between platform proper and the multitude of founder campaigns. In relation to "the crowd", the founder campaigns seek to mobilize funder support, promotion and feedback around their specific idea or project. Hence, while platforms seek to generate an inclusive and open online "crowd" community organized around membership somewhat comparable to "customer clubs" (see Ahrne et al. 2016), founder campaigns engage in both rule-setting, membership and positive sanctioning given the more intense involvement of funders in enabling founder campaign success through monetary and other resource investments. These include: Membership (typically defined by a monetary contribution), positive sanctioning (the rewards incentivizing contributions) and rules defining that parameter for what funders can expect and what is expected of them.

4.3. Funders – Network and Online Social Community

Having examined the crowdfunding process from the perspective of the "platform" and "founder campaign" the form of organizing between them and the "funders" has most commonly been referred to as a network (see Ordanini et al. 2011; Zheng et al. 2014) or online social community (see Belleflamme et al. 2014; Mollick 2016). The crowdfunding platforms often refer to themselves as a community (Kickstarter 2016; Indiegogo 2016). However, instead of treating organizations and networks as opposites, we conceive of them as social orders with varying degrees of organization and thus representing partial organizations (Ahrne & Brunsson 2011). It can be observed that the social relationships that emerge from networks of individuals often become organized adopting one or more organizational elements (Ahrne et al. 2016) – examples include terrorist networks (Schoeneborn & Scherer 2012), hacker collectives (Dobusch & Schoeneborn 2015) and online communities (O'Mahony & Ferraro 2007). As with Starkey, Barnatt, and Tempest (2000) we find that complete (and partial) organizations within co-dependent crowdfunding process also contribute to a functioning network, however, additionally observing that these networks show different degrees of organization depending on organizing agent and target. The platform generates a network based solely on membership, while founder campaigns institute rules, membership and positive sanctions in order to facilitate greater individual involvement. Certain founder campaigns, in particular, gain a high degree of

interaction between themselves, their founders and even other founders that not only support via monetary contributions, but also seek to shape (sometimes successfully so) the direction of the given founder campaign (Hahn & Lee 2013). These instances, while rare, represent deeper forms of social relationships creating instances of greater interaction through for example interconnected decision making and shared identity formation between campaign founders and funders – indeed often campaign founders are also funders of not only their own campaigns but also others (Leinen 2016). These founders offer advice and support for new founders citing a common founder identity (Ordanini et al. 2011; Gerber & Hui 2013; Cordova et al. 2015). The interaction between the given campaign, funders and other founders results in greater degrees of organization, creating a president for further and deeper interactions that create and shape a shared crowdfunder identity – especially amongst founders (Mollick 2016). The shared crowdfunder identity around founders most especially because they, like entrepreneurs, develop a common language and experiential background (Leinen 2016). Decision-making becomes interconnected between funder-to-founder and/or founder-to-founder, that builds upon a demarcated and negotiated identity revolving around the process of crowdfunding where the process itself becomes the attributed collective actor (Mollick 2016). Reflecting on the literature on online communities this form of interaction could also be conceived as a "consumer tribe" that is understood as "a network of heterogeneous persons […] who are linked by a shared passion or emotion […] that are capable of collective action" (Cova & Cova 2002, p.602). This shared passion or emotion in crowdfunding derived from the act of engaging, enabling and in some terms shaping campaigns which goes beyond the typically passive role of consumers within innovation (West & Bogers 2014; Nielsen et al. 2016). Similar forms of deeper online social relationships have also been noted by Dobusch & Schoeneborn (2015) in their paper on the loosely associated international network Anonymous where they highlight the notion of "organizationality" that emerges when an online community reaches a degree of interaction where one can identify instances of interconnected decision-making that is attributed to a collective actor driven by a demarcated and negotiated identity. Figure 4 on the following page illustrates how funders (or the "crowd") play multiple roles from passive observation to active involvement in the process.

Figure 4. Funder perspective on crowdfunding



The differentiation between passive and active funder involvement is here characterized by differences between passively supporting a campaign financially (one-way arrows) and actively engaging with the campaign beyond simply financing or sharing the message (two-way arrows). Therefore, while many funders are linked simply through a network of interested parties wanting a certain good or service provided by the given campaign others are significantly more engaged and organized around the process itself (Hahn & Lee 2013; Gerber & Hui 2013). These active funders directly engage in shaping the direction of the given campaign and involving themselves in its execution citing a common "crowdfunding" identity and in this way further cementing the notion that a community exists through their collective actions. In addition to these different degrees of organization within the networked interactions between funders, founders and

platform, “the crowd” also plays a central role within what would traditionally be subsumed under the complete organization – monitoring and sanctioning. The platform itself relying almost exclusively on the “crowd” to ensure that members uphold its commands and rules (Ahrne & Brunsson 2011) and while traditional organizations do so primarily via financial and management accounting, platforms primarily utilize peer screening. Peer screening refers to the use of “the crowd”, represented both by potential funders and founders who check, critique and even report campaigns they consider to be fraudulent (Sun & Im 2015). The most likely reason for dominance of such a monitoring approach is the sheer scale and variability of campaigns being pursued in addition to the fact that the campaigns are outside the platforms complete boundary. Hence in relying on external founder campaigns to deliver the content on which the platform is dependent, it cannot present reporting demands as within traditional organizations, where employees are obliged to report their work in various financial and management systems. This dynamic is further strengthened by the fact that positive and negative sanctions of campaigns that violate the rules of the platform-based organization are also strongly controlled by founders and especially funders. Specifically, since “crowd” peer screening represents the primary form of monitoring, “crowd” follow suit where they can project positive sanctions onto campaigns through e.g. financial support or word-of-mouth to negative sanctions including negative social media comments (incl. youtube video) questioning the validity or viability of product/service. The involvement of the platform itself only happens in rare circumstances where potential copy-right or fraudulence claims emerge or where the platform picks a winner through e.g. Campaign of the Month awards. Uniquely, then, crowdfunding represents a circumstance where an organization commits core competences to what is at the surface a fluid and volatile "crowd" individuals outside its boundaries. This reliance on “the crowd” to facilitate the core competences of monitoring and sanctioning its reason d’etre also results in soft power pressure on the rules set of the platform, but also the founder campaigns.

5. THE CO-DEPENDENT ORGANIZATION

The paper seeks to contribute three primary insights to the organization literature: First, organizations (exemplified by the platform) can reach a circumstance where they can no-longer be organizationally discerned as separate from “external” agents they use. Second, that in creating this co-dependent organization the actors within maintains this overall structure by

exercising different degrees of organizing depending on agent in focus. Finally, the paper seeks to introduce the notion that organization can draw upon the organizing power of the crowd – not only to tap into external sources of knowledge to overcome distant search issues (Afuah & Tucci 2012), but to instead rely on a large, diverse and shifting group of individuals to execute core organizational decisions on sanctioning and monitoring.

Crowdfunding, as a form of organizing represents a circumstance where the central organizing agent is so dependent on what would otherwise be considered external agents (founder campaigns and funders) that we can no longer consider them as separate entities. This is exemplified by the fact that central decisions on membership, rules, hierarchy, monitoring and sanctioning have in different capacities and to different degrees been consigned to external agents. What emerges then is that these "external agents" become co-dependent contributors to organization; establishing polymorphic and co-dependent organizational structure. As opposed to other circumstances where organizations draw upon external forms of organizing including stakeholder involvement, commitments to an agreed upon "standards" (see Brunsson et al. 2012), or the utilization of external knowledge sources (see Baldwin & von Hippel 2011; Afuah & Tucci 2012; Chesbrough et al. 2014), the CF-platform organization is unable to function without these external agents. Hence, while a company that has agreed to a certain standard or has sought to crowdsource a solution to a given problem may discontinue the interaction with these partial organizations and still function, a CF-platform cannot. Unlike earlier work on polymorphic frameworks (see Comas et al. 2015) this paper further contends that not only can the phenomena of crowdfunding be understood utilizing each prescriptive form of organizing, but also that in order to fully comprehend its organizational nature we must apply different forms of organizing. Hence while the literature on social community (e.g. Mollick 2016) or social networks (e.g. Agrawal et al. 2015) can explain aspects of crowdfunding they also fail to capture the whole picture. In line with Ahrne & Brunsson (2011) the paper finds that the concepts of network e.g. conceal important elements of organization within crowdfunding. The literature on complete and partial organizations thus allows us to "understand the complex interplay and relationships among all these forms" of organizing (Ahrne & Brunsson 2011, p.85).

In order to maintain this polymorphic co-dependent framework, the various actors within the process exercise different degrees of organizing in order to maintain a stable co-dependent structure, achieving this by establishing different partial boundaries through which they respectively organize the agent in focus. The platform e.g. organizes the founder campaigns with clear decisions on membership and rules and to a lesser degree monitoring and sanctioning. The founder campaigns establish a partial boundary in order to organize the "crowd" through decisions on membership, rules and limited positive sanctions. In return the agents being organized also apply an organizing pressure to the respective organizing agent. The founder campaigns negotiate hierarchy, rules and membership with the platform, while the crowd monitors and sanctions the founder campaigns. Hence the co-dependent organization functions not through a central decision-making mechanism, but rather each agent successfully organizing their respective domain (platform organizing campaigns, campaigns organizing the crowd). Hence while the platform represents the gravitational centre of organizing, whose survival depends on its ability to maintain a critical mass of orbiting founder campaigns and funders – the orbiting bodies also act as local gravitational centres of organizing. The application of partial organization literature explains how in the context of crowdfunding each organizing agent applies partial organization because they are not able use all organizational elements due to the external nature of the agents involved nor are they willing to pay the costs in the form of effort or responsibility to bring them into the complete organization structure (Ahrne et al. 2016). Uniquely, then, what appears to be a relinquishing of organizational control, is instead a strengthening of the organization as, through this co-dependent relationship, it is able to achieve more than it would have if it had sought to exert an effort to bring these actors within its complete organizational structure.

The utilization of partial organizations by established organizations such as firms is not a novel idea within the organization literature prior examples including standards, meta-organizations (e.g. industry associations and international governmental organizations), stakeholders and even families (Freeman et al. 2010; Ahrne et al. 2016). However, what unites these agents or constructs is that they are in some regard stable as compared to "the crowd". Hence while an organization relying on a given standard knows what these decided rules entail, the utilization of "the crowd" is an unstable proposition most especially since the content, outcome and quality of

crowd decisions are hard to predict (Mollick & Nanda 2015). Nevertheless the success of the phenomena and recent research indicates that "crowds" can successfully be exploited by organizations in certain circumstances. In the case of crowdfunding the application of partial organizing in the form of membership, rules and positive sanctions appear to result in disperse network of funders that temporally coalesce around certain founder campaigns. The crowd initially obliged to monitor and sanction campaigns due to both intrinsic motivations – including participating in a community and helping others (see Hemer 2011; Gerber & Hui 2013; Agrawal et al. 2015) – and extrinsic motivations – including rewards and early access to new products (see Gerber & Hui 2013; Cholakova & Clarysse 2015). However, once engaged this dispersed crowd also in certain circumstances coalesces into online communities in various capacities (Mollick 2016). The implication is that rather than viewing organizations and networks as opposites we should see them as social orders with varying degrees of organization (Ahrne & Brunsson 2011; Ahrne et al. 2016). Not only because online communities or hacker collectives are partially organized, but also because organizations exploit similar techniques as those e.g. noted by Dobusch & Schoeneborn (2015) to mobilize "the crowd". Hence not only can organization help sustain networks, but partially organized networks can sustain and even execute core organizational decisions on behalf of that same organization.

6. CONCLUSION

The aim of this paper was to contribute both to the crowdfunding and organization literature by illustrating the applicability of the partial organization literature on this emergent form of organization. It contributes to the crowdfunding literature with a proposed theoretical approach that would allow for a more fluid conception of what crowdfunding is as compared to the current static phenomena-driven research approach. The literature on complete and partial organizations allows for a highly relevant theoretical frame for understanding not only the fluid nature of the three primary actors within the process, but also their respective co-dependence. In terms of the organization literature, the conceptualizing of crowdfunding also leads to a series of pertinent observations regarding different forms of organizing. Specifically, we introduce the notion of the polymorphic co-dependent organization observing that crowdfunding represents a process where the organization and the "external" agents on which it relies have become so co-dependent and entangled that they can no longer be organizationally discerned. Secondly, we observe that, in

such a circumstance, the agents within exercise different degrees of organizing on the agent in focus while they in turn are organized by that same agent. Finally, observing that what at first appears to be an unorganized crowd can in fact be utilized by organizations to execute core organizational decisions on behalf of that same organization.

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Chapter 8 | Paper 3

Crowdfunding and institutional change: Towards re-institutionalization?

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Abstract: The emergence of crowdfunding within the field innovation finance has been characterized as a disruptive development that has challenged the existing logics within the field; resulting in an argued 'democratization' of innovation finance brought on by the ability of entrepreneurs to source funding directly from the "crowd". Given this proposed expansion of innovation finance due to crowdfunding and building upon the institutional change literature, the paper seeks to explore how the finances derived from crowdfunding have been distributed and evolved longitudinally. The paper observes that we are witnessing some signs of reinstitutionalization within the crowdfunding field that are expressed by a clustering of resources around certain individuals and geographic regions after years of expanding innovation finance access. These pressures brought on in the form of agglomeration and a Matthew-like Effect of professionalization that results in increasing resource clustering around certain individuals and geographical regions. Therefore while the bulk of recipients of crowdfunding remain newcomers there are signs that a core of well-positioned actors could garner increasing returns over time, challenging its argued democratizing capacity.

1. EXECUTIVE SUMMARY

The emergence of crowdfunding as an alternative form of finance for entrepreneurs has been hailed as an expansive development within the field of innovation finance bringing with it increased access to capital across typical divides (Sorenson et al. 2016) facilitated by the democratization of the funding process itself (Mollick and Robb 2016). This democratization enabled via the unique blend of crowdsourcing (Poetz and Schreier 2012) and micro-financing (Morduch 1999) that crowdfunding represents, where fundraising is enabled by a widely dispersed community of users, whose interactions are facilitated by one or more platforms (e.g., IndieGoGo, Kickstarter, Kiva), trading "a small group of sophisticated investors" for "large audiences (the 'crowd')" (Belleflamme, Lambert, and Schwienbacher 2014:2). It thereby departs from traditional entrepreneurial fundraising, as it does not depend on large professional investors, but instead can rely upon small pledges from a diverse group of individuals (Tomczak and Brem 2013). Crowdfunding has subsequently received considerable academic attention as an increasing body of literature seeks to explore the potentially "disruptive force" of crowdfunding in the driving of innovation finance (Mollick 2014; Turan 2015). These studies all indicate that crowdfunding has in one manner or another led to an expansion of innovation finance available to entrepreneurs (see Lehner 2013; Agrawal et al. 2015; Sorenson et al. 2016). Overcoming for example issues that are typically associated with finance derived from venture capitalists (VCs) where successfully funded entrepreneurs often mirror the VCs funding them result in a clustering of finance around a small number of regions and actors (see Sorenson & Stuart 2001; Shane & Stuart 2002; Sorenson et al. 2016).

Given this proposed expansion in innovation finance brought on by the emergence of crowdfunding within the field innovation finance, we propose to explore how the finances derived from crowdfunding have been distributed and evolved longitudinally. Specifically the paper builds on the theory of institutional change (Greenwood, Suddaby, and Hinings 2002) proposing that crowdfunding could be seen as a deinstitutionalizing event within the innovation finance field, resulting from a series of precipitating technological and social "jolts" (see Meyer et al. 1990) creating a "disruptive force" of emergent new players that challenge the existing institutionalized field (see Mollick 2014; Mollick and Robb 2016; Turan 2015). As the theory would expect, such deinstitutionalization would also result in a host of new players emerging and

that challenge the fields' isomorphic stability by e.g. enabling new actors to achieve funding and to be involved in the funding process itself. The theory, however, also denotes that fields typically also undergo a process of reinstitutionalization after the initial deinstitutionalization where practices and routines once more solidify (Barley and Tolbert 1997). Subsequently we may then expect an eventual clustering of finance around specific agents and regions as these new routines and practices take hold influencing these now new "crowd" innovation financiers. The present paper therefore examines the growth and potential maturation of crowdfunding as a field from an institutional change perspective (Greenwood et al. 2002).

Drawing on data from the crowdfunding site IndieGoGo[16], we find an increased clustering of crowdfunding campaign success and funding receipts around experienced campaign entrepreneurs and particular geographical regions in the United States. Thus, while crowdfunding may be driven by a fluid and diffuse crowd of consumers there still appear to emerge isomorphic pressures that cause a clustering of resources around certain regions and groups, illustrating that reinstitutionalization can occur in even highly diffuse contexts, in part through a Matthew Effect (Merton 1968), in which success-breeds-success independently of other factors. Our finding indicates that, while crowdfunding on IndieGoGo still offers many opportunities for non-experts to engage in successful innovation finance, there are trends pointing towards an increased level of clustering of resources around specific regions and actors. While still not undermining the many expansive distributive qualities of crowdfunding we should also be aware that this may be due to the current only semi-institutionalized nature of the field that could potentially diminish as the field starts to reinstitutionalize.

2. INTRODUCTION

The literature on open and user innovation increasingly contends that, with the advent Web 2.0, the continuously decreasing cost of communication, and the rise of multiple types of freeware, growing numbers of actors can engage in the innovation process in multiple capacities (Baldwin and von Hippel 2011). The rise of 3D printing (and other open workshops) is the latest

[16] IndieGoGo is one of the largest reward-based crowdfunding platforms in existence, utilizing a fundraising model typical of the field (Cholakova & Clarysse 2015). IndieGoGo is an excellent platform to study due to both its scale and typicality. Our data were collected utilizing a data scraping methodology which extracts a specified set of data from an indicated website – in this case the crowdfunding platform IndieGoGo. Utilizing the emergent dataset we gained not only access to details regarding ongoing projects, but past projects, as well, dating from 2009 to 2015 (Innovaccer 2016).

development, as digital end-user generated content becomes increasingly translatable into real-world product and service innovations (de Jong and de Bruijn 2012). Alongside these developments, crowdfunding has been characterized as a force democratizing innovation finance (José Planells 2015; Kim and Hann 2015; Mollick and Robb 2016), granting consumers a direct and active role in innovation selection (Nielsen, Reisch, and Thøgersen 2016) and providing alternative, less restrictive, finance for business ventures (Kitchens and Torrence 2012). Key areas of research include crowdfunding's ability to reduce the geographical constraints of traditional funding (Agrawal et al. 2015), "expand access to entrepreneurial finance including among women and minority innovators" (Sorenson et al. 2016:1526), empower both entrepreneurs and end-users to steer the direction of innovation (Lehner 2013), and increase funding opportunities for a broader range of user-innovators and entrepreneurs alike (Lehner and Nicholls 2014). Crowdfunding has thus been noted by Gerner & Hui (2013:1) to change "how, why, and which ideas are brought into existence."

While numerous crowdfunding models exist, the present paper focuses on the reward-based approach, which to date remains the preeminent type of crowdfunding (Cholakova and Clarysse 2015). In reward-based crowdfunding systems, individuals invest money with the expectation that, if the campaign is successfully funded, they will receive a tangible (but non-financial) reward, product or service. While reward-based crowdfunding typically represents a form a pre-purchasing of a yet-to-be-realized product or service, individuals can also be rewarded with other forms of non-financial rewards (e.g. t-shirt, coffee mug, etc.). As with other models of crowdfunding there are three broad actor categories central to the process: the crowdfounders, crowdfunders (or investors), and platforms. Here, the crowdfounders (or founders) are the entrepreneurs initiating the campaign. Crowdfunders (or funders) are the target audiences of the open call, or campaign, who are enticed to invest. And finally, the platform represents the mechanism facilitating contact between the crowdfounders and crowdfunders – typically an online website like IndieGoGo.com. In relation to the expansive distributive qualities of crowdfunding, it is the heterogeneous nature of the crowdfunders that are seen as a bulwark against a kind of mirroring seen within conventional venture capital, where "the entrepreneurs funded by VCs often mirror the investors in terms of their educational, social and professional characteristics and end up concentrated in a small number of regions." (Sorenson et al.

2016:1526). The question is thus whether "the crowd" will continue to maintain this multifaceted nature or whether these actors, as institutional change theory would suggest, will also start to adopt certain routines and practices that will result in a similar clustering of resource around certain groups or areas. Next, we then seek to place the development of crowdfunding as a source of innovation finance within the theoretical framework of institutional change contending that, within the field of innovation finance, it represents a deinstitutionalizing development brought on by a number of external jolts.

3. THEORETICAL FRAMEWORK

In order to model the stages of institutional change within the field of innovation finance, specifically the potential reinstitutionalization of crowdfunding, we build on accounts of organizational fields set out by DiMaggio and Powell (1983). Fields representing "sets of organizations that, in the aggregate, constitute a recognized area of institutional life; key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products" (DiMaggio & Powell 1983, pp.148–149). Historically, the concept of fields was developed in tandem across debates on institutional spheres (Fligstein 1990), societal sectors (Scott and Meyer 1992), and networks (Powell et al. 2005), with the concept of an "organizational field" in some ways a compromise among these diverse approaches (Scott 1991), focusing on how various actors with dissimilar motivations work together to accomplish a given task.

Institutional approaches to fields hold that, while fields are never static, they do at times experience phases of stability (Hoffman 1999). Rao et al. (2000:252), for example, argue that fields emerge when actors "carve out legitimated social spaces for their practices through the establishment of professional organizations and various symbolic, cultural, and normative boundaries." Especially in mature fields like venture capital, where there exist professional communities, there is a tendency to reach isomorphic stability (Greenwood et al. 2002). In other words, as fields mature, expertise develops, leading to stable and predictable relationships.

Within a destabilized or emerging field, however, there is a greater likelihood of a cacophonic space in which actors may act in their own self-interest. Examples of emerging fields include the

rise to dominance of the management consulting industry between the two world wars (David, Sine, and Haveman 2012) or the change and growth in tasks that accounting firms took on (Greenwood et al. 2002). As a result, actors may bring in varying logics from other institutional fields, or, in some cases, create logics de novo. Under such circumstances, opposing perspectives destabilize the socially negotiated consensus, allowing new logics, scripts and actors to emerge to challenge extant isomorphic stability (Greenwood et al. 2002). Adherents of field theory contend that such openings, during which the negotiated consensus is broken, occur as a result of external "jolts" that destabilize established practices (see Meyer et al. 1990) or by embedded actors – or institutional entrepreneurs – who enact change from within the field itself (Greenwood and Suddaby 2006).

Adapting Greenwood et al.'s (2002) stages of institutional change we develop a model of the evolution of the phenomena of crowdfunding within the field of innovation finance – starting with the initial jolts that challenged the institutional order within the field (see Figure 1). We explain each stage in this adapted model below.

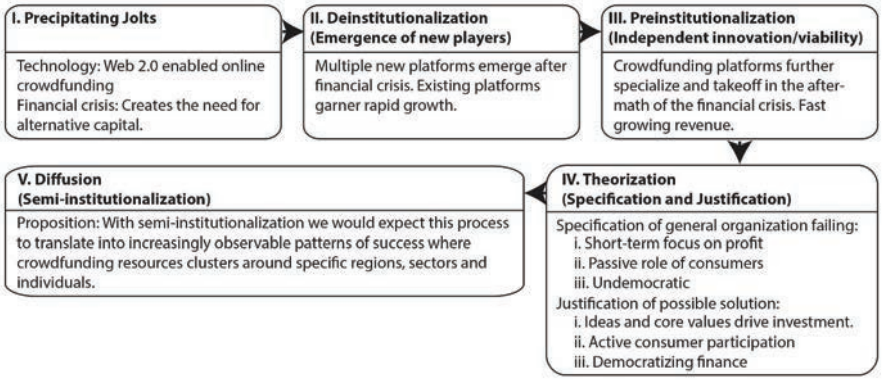
3.1. Stages of Institutional Change

Greenwood et al. (2002) argue that shocks, or jolts, can facilitate deinstitutionalization, as new entrants engage with the field, and alliances form between well-established incumbents and/or challengers (Scott et al. 2000; Fligstein & McAdam 2012). In the case of crowdfunding, two primary external "jolts" have been noted that allow new actors to challenge the established practices within the field. First, a technological "jolt" sufficiently lowered transaction costs to allow for financing via incremental aggregated investments (Colombo et al. 2014; Belleflamme et al. 2014). Second, the 2008 financial crisis created a context ripe for alternative finance, as the accessibility of traditional channels deteriorated (Tomczak & Brem 2013; Bruton et al. 2015). These precipitating jolts (Stage I) potentially allow for the emergence and growth of new actors[17] within the innovation finance field as well as open up space for existing actors like Prosper.com to replace traditional seed capital sources. These emergent and ascendant actors challenging the field as entrepreneurs could now seek capital directly from consumers. This arguably disturbed

[17] The biggest two reward-based platforms IndieGoGo and Kickstarter launched respectively in early 2008 and 2009.

the constructed field-level consensus "by introducing new ideas and thus the possibility of change" (Greenwood et al. 2002, p.60), through the "crowd" rather than professionally driven finance, destabilizing the isomorphic stability within the field (Stage II).

Figure 1. Crowdfunding – Stages of Institutional Change (adapted from Greenwood et al. 2002)



According to Tolbert and Zucker (1996), these emergent actors and organizations continue to innovate independently, seeking to develop technically viable solutions to locally perceived problems. This "innovative action" (Fligstein & McAdam 2012) is similar Tolbert and Zucker's (1996) pre-institutionalization phase (Greenwood et al. 2002): organizations work independently to innovate and develop a response to the perceived problem, sometimes altering traditional practices (Fligstein & McAdam 2011). Within crowdfunding, this could, for example, be expressed by the growth of multiple models of crowdfunding – donation, reward, equity, and lending-based approaches (Zhang et al. 2014; Cholakova & Clarysse 2015; Mollick 2014). Their viability is boosted by growth in earnings, number of platforms and users (Zhang et al. 2014; European Commission 2015).

As effective practices become more widely adopted, actors develop common "scripts" that "are observable, recurrent activities and patterns of interaction characteristic of a particular setting" (Barley & Tolbert 1997, p.98). These new recurrent activities and patterns ultimately become so widely adopted that they undergo "theorization" (Stage IV), where "theoretical accounts simplify

and distil the properties of new practices and explain the outcomes they produce" (Greenwood et al. 2002, p.60). In effect, localized practices become subsumed within a larger simplified form for wider adoption that consists of two primary tasks – the specification of the general organizational failing and justification of the abstract solution provided by the new idea (see Tolbert & Zucker 1996). As an effect, actors within crowdfunding develop a common theme on the failings of existing innovation finance and their prescriptive solution thereto.

These theorized practices within crowdfunding include a view of the field of innovation finance as too dependent on short-term return on investments – leaving little room for passion projects and sidelining unique or quirky ideas. Instead, crowdfunding allows these projects room to breathe as "crowd investors typically do not look much at collaterals or business plans, but at the ideas and core values of the firm" (Lehner 2013, p.290). Building further upon this theme it is also argued that crowdfunding allows consumers and creators to engage directly with each other, democratizing the innovation process. Crowdfunding is therefore argued to tap into non-material incentive structures such as the desire to support specific causes or ideas, allowing for investments motivated by normative considerations (see Gerber & Hui 2013; Allison et al. 2015; Mollick & Robb 2016). In larger contexts, these justifications correlate with a larger prevailing normative prescription that grant them "moral" legitimacy (Suchman 1995) – specifically, the tenet of a democratized financing process appeals both to the larger field of open and user innovation (see von Hippel 2005; Chesbrough et al. 2014), but also larger calls for increased citizen integration within multiple domains.

The paper thus argues that the field of crowdfunding may currently be transitioning from theorization (Stage IV) to diffusion (Stage V), where the theorized elements regarding crowdfunding – e.g. democratizing investment – are becoming increasingly "objectified" and gaining a social consensus within the field. Theorization represents, as per Greenwood et al. (2002, p.60), "the development and specification of abstract categories and the elaboration of chains of cause and effect." Theorization is in principle the description of how outcomes are produced. In their abstract form, they may be more widely adopted (Abbott 1988). Strang and Meyer (1993, p.495) thus propose that "models must make the transition from theoretical

formulation to social movement to institutional imperative" developing a case for cognitive/pragmatic/moral legitimacy (Suchman 1995).

Increasing recognition by external agents – like regulatory agencies – further illustrates that crowdfunding may be moving towards reinstitutionalization, where ideas are still not taken-for-granted but have moved beyond the initial theorizing stage. These theorized practices are expressed, for example, in the recent 2012 Jobs Act – Title III reform, that sought to reduce the regulatory restrictions on raising capital from non-accredited investors and was specifically aimed at enabling equity-based crowdfunding (Turan 2015). In addition, incumbent organizations – like banks[18] and large industries[19] – are also starting to take note of crowdfunding increasingly seeking to mimic or incorporate this line of innovation finance into their existing practices.

3.2. Stages of Institutional Change: Maturation of Crowdfunding

Having applied Greenwood et al.'s (2002) model on "Stages of Institutional Change" to crowdfunding literature, we suggest the evolution of crowdfunding as a means of innovation finance mimics patterns of earlier institutional changes, and therefore we may also expect a potential reinstitutionalization of the field. Based on our field theoretic approach, we would expect reinstitutionalization to emerge in large part due to emerging practices, routines and scripts that result in a form of isomorphic stability. In the case of crowdfunding, isomorphic stability could be indicated by a clustering of resources around certain regions and groups that benefit more from the isomorphic cognitive legitimacy that emerges from reinstitutionalization. Clustering of resources and success in particular places and among particular groups could indicate that an emerging social consensus not only results in a common and increasingly taken-for-granted understanding of what crowdfunding is, but also could, over time, translate empirically into a narrowing of actors, rather than an emergence of more actors. We, therefore, develop three propositions that would indicate that the social consensus within crowdfunding is being translated into a narrowing of actors benefiting from it.

[18] Examples include e.g. Nordea Crowdfunding which is an equity-based platform launched by the Northern European bank Nordea (Nordea 2016).
[19] The recent Whirlpool Vessi (home beer brew fermentor and tap system) illustrates that even large established organizations are seeking to utilize crowdfunding (Kell 2016).

Firstly, we would expect that any empirical signs of narrowing of beneficiaries would be observable in terms of the geographical distribution of capital garnered from crowdfunding. We would, for instance, expect to identify certain geographical regions as emerging crowdfunding hubs. Successful crowdfunding projects, in other words, would be increasingly more likely to be found in specific areas. Such an outcome would be expected based on studies of agglomeration economies (Gordon & McCann 2000; Rosenthal & Strange 2001; 2004), which identify several mechanisms that can lead to geographic concentrations of economic activity. Notable sources of spatial concentration include labor market pooling, resulting from the formation of a specialized talent base; knowledge spillovers, as workers develop and share expertise; economies of scale in infrastructure; and locally embedded social networks facilitating trust and lowering transaction costs. Not only can these mechanisms lead to agglomerative geographies, there is evidence that agglomeration itself can improve the performance of the sector in question by raising levels of productivity (Andersson & Lööf 2009; Combes et al. 2012; Tencati & Zsolnai 2012). In addition, there is evidence that increased productivity as a result of agglomeration can itself become attractive, drawing further economic activity (Graham et al. 2010). Hence, despite its perhaps disruptive nature, we would expect the distribution of funding to coalesce around certain regions.

Proposition 1: *Certain geographical areas increasingly become the primary beneficiaries of crowdfunding.*

Secondly, we would expect that any empirical signs of a narrowing of beneficiaries would also be observable in terms of the individual entrepreneurs (or crowdfounders) benefiting. This narrowing in the number of beneficiaries emerging due to two co-dependent forces of reputation gains from the point-of-view of crowdfunders and increasing professionalization of the crowdfounders. Firstly, reputation from the crowdfunders' point-of-view can be a significant qualifier for when and if a given campaign receives support (Zhang et al. 2014). Hence, we would expect that successful crowdfounder campaigns are rewarded with reputational gains, while unsuccessful ones suffer. Indeed, one may even hypothesize that unsuccessful campaigns cause more reputational damage than opposite positive reputational gain from a successful campaign due to crowdfunder loss aversion (see Tversky & Kahneman 1991; McGraw et al.

2010). In addition to reputation gains and losses, we would also expect an increasing level of professionalization amongst crowdfounders as they gain more experience with how to execute a successful crowdfunding campaign. Hence, we would expect the increasing experience and successful prior campaigns to result in greater likelihood of success, while contrary failures to achieve funding goals will lead to a lower likelihood of success and perhaps eventual abandonment of seeking capital via crowdfunding.

Proposition 2: *Prior success in gaining funding will result in a greater likelihood for future crowdfunding success.*

Proposition 3: *Failure to reach funding goals on prior campaigns will result in a lesser likelihood of future crowdfunding success.*

In the following section, we describe the empirical context, data, and methods we use to probe the plausibility of these propositions.

4. EMPIRICAL SETTING

To a large extent, crowdfunding is a web-enabled tool designed to facilitate contact between the crowdfounder and a potentially large number of prospective crowdfunders. While crowdfunding can also be supported via e-mail and/or host-created websites, crowdfounders more commonly utilize platforms like IndieGoGo. These platforms serve as secure middlemen between the crowdfounder and crowdfunder. Given these web-enabled central hubs for crowdfunding campaigns, a data-scraping approach was identified as a useful potential method for studying crowdfunding. Utilizing a data scraped dataset obtained with the help of the web-data firm Innovaccer, we collected data on campaigns launched on IndieGoGo starting from 2009 (Innovaccer 2016).

4.1. Empirical Case: IndieGoGo

We selected IndieGoGo as our empirical case because of its scale and predominance within the US reward-based crowdfunding market, representing the second largest Kickstarter. The platform itself receives 15 million visitors a month and hosts numerous types of projects represented by funding campaigns (IndieGoGo 2016). It therefore represents a highly relevant

and significant empirical case to study the growth and evolution of the crowdfunding market. In addition to its size, the platform is unique in that, unlike other platforms, it allows campaigns to accept funds even if they do not reach their funding goal. This model, which IndieGoGo refers to as flexible funding, was selected by 96.7% of campaigns in our data sample, while the remaining campaigns only receive funding if they receive enough pledges to reach a goal they set. The availability of the flexible funding model is empirically interesting, as it allows us to study not only the factors associated with campaigns that reach their funding goals, but also factors associated with funding receipts. The platform supports various activities, including community initiatives, aid campaigns, and product or service innovations, within a number of sectors. Launched in 2008, IndieGoGo has the stated aims of "empowering everyone to change the world, one idea at a time. We provide the tools to help campaigns—large and mainstream, or small and personal—boost the awareness and funds to get there" (IndieGoGo 2016).

A crowdfunding campaign typically consists of a photo gallery, a sales-pitch video, a short bio and background section, a campaign description, and a perk overview. In addition, the number of backers, user comments, updates, financing progress and goals, and social media tab is included for all campaigns. Potential crowdfunders often communicate with the respective crowdfounders via the comments section, asking questions, offering feedback, and following up on the progress of the given campaign.

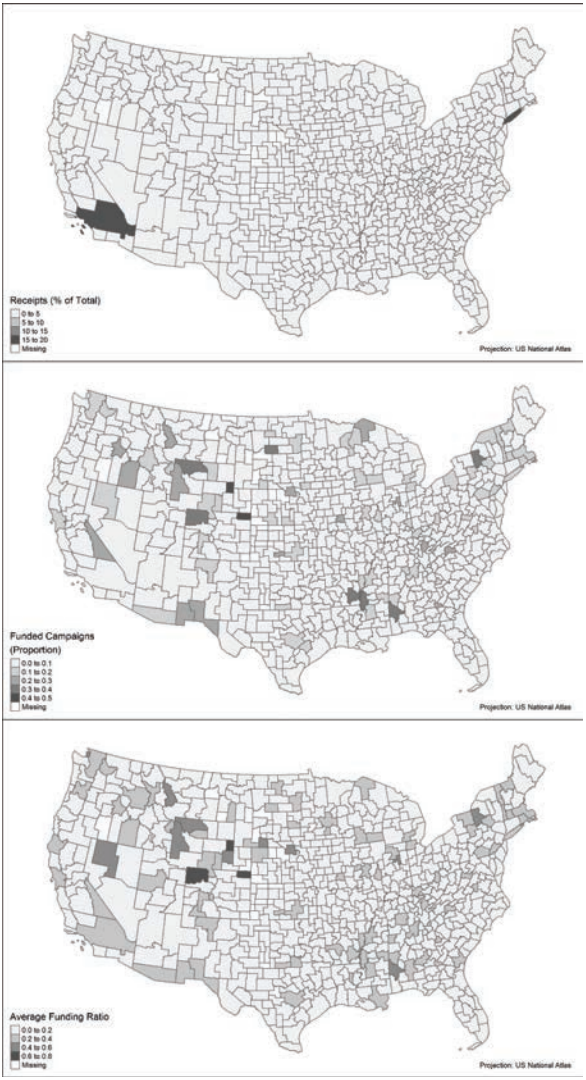
4.2. Data and Primary Variables

The dataset scraped from the IndieGoGo website reflects all publicly available data on the given campaign page including information about the given campaign, crowdfunders supporting these campaigns, team members constituting the campaigns and perks available to motivate investment. The dataset contains every campaign launched on IndieGoGo after December 31, 2009 and completed by February 26, 2015 that are widely dispersed, but are primarily concentrated in the United States, Canada, and Western Europe. In order to model the geographic distribution of successful campaigns and their evolution, we focus only on the United States.

We focus on two primary dependent variables. First, we estimate the potential receipts campaigns receive by assuming that all campaigns take all pledges offered. For the vast majority of campaigns, this just means that they take all the money raised at the time the campaign is ended. For the small proportion of campaigns that use a fixed funding model, we assign the value of money raised at the time the campaign ended only if this value exceeds the campaign goal. Otherwise, the campaign is assigned zero monetary receipts. Our second dependent variable is whether or not a campaign is fully funded, in other words, that the funding received meets or exceeds the campaign goal. We take this as an indicator that the crowdfunding campaign was successful, inasmuch as sufficient funding was received to meet the crowdfounders' objectives. This is a relatively rare event, with only 8.5% of campaigns with complete data (as compared to about 9.7% for all US campaigns or 8.7% of US campaigns with complete data).

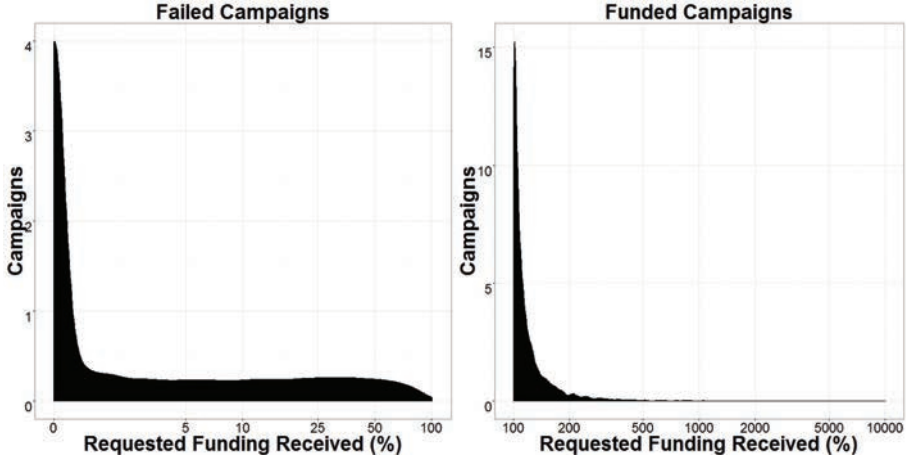
Each campaign includes location information. In the United States, this is usually at the level of the city or the zip code. As they are entered by individuals, however, the locations are non-standard. Using text processing in R (R Core Team 2015), locations were standardized and then geocoded using the Texas A&M Geocoder (Texas A&M Geoservices 2015). Since some location information was missing, non-specific, or referred to multiple locations, not all campaigns could be successfully geocoded. Following Mollick (2014), we restrict our analysis to campaigns seeking a consequential goal, in our case at least $1,000 and no more than $1 million, resulting in a total of 158,707 geocoded campaigns with complete data, approximately 50.2% of the 315,882 campaigns for which data were scraped, or 80.2% of all 197,950 campaigns with funds denominated in US dollars. The geographic distribution of this sample of IndieGoGo campaigns in the contiguous United States is presented in Figures 2 and 3. The distribution of crowdfunding success is, clearly, geographically uneven.

Figure 2. Percentage of total receipts, success rate, and average ratio of funding requested to funding received of IndieGoGo campaigns in the contiguous United States.



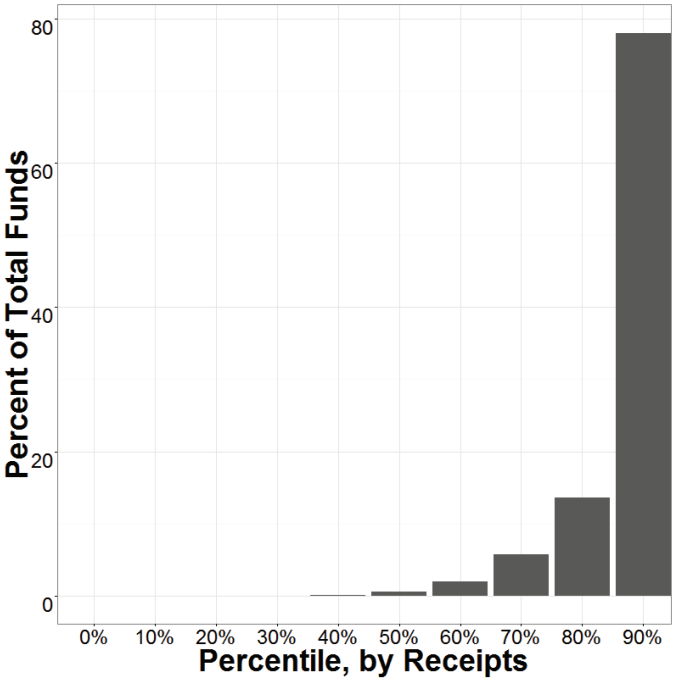
The distribution of funding receipts on IndieGoGo is not only geographically uneven, it is also very skewed across funded campaigns. Figure 3 presents the distribution of the percentage of requested funding received by campaigns. While the vast majority of campaigns fail to reach their funding targets, and the bulk of these attract less than 50% of the requested funds, there is a very small minority of campaigns that receive many, many times the value in pledges that they request.

Figure 3. Percentage of funding requested received for modeled campaigns.



Indeed, funding pledges are very highly concentrated. Figure 4 shows the distribution of funding across percentile groups. The top 10% of campaigns receive nearly 80% of funds pledged to campaigns in our sample.

Figure 4: Distribution of fund receipts for modelled campaigns.



4.3. Exploratory Methods

We explore the distribution of successful crowdfunding campaigns individually and at the national scale from early 2010 until early 2015. At the national scale, we aggregate campaign receipts by US commuting zones, commonly used as a proxy for labor market areas in the United States (United States Department of Agriculture Economic Research Service, 2013), computing the Gini coefficient for funding receipts across commuting zones for each year in which we have projects. Within commuting zones for each year, we compute the Gini coefficient for receipts by campaign type (see below).

4.4. Regression Models

We estimate ordinary least squares regression models, with the natural logarithm of campaigns' funding receipts as the dependent variable. In addition, we model whether or not campaigns reach their funding goals, as an indicator of success in crowdfunding. As this is a binary outcome, we use logistic regression (Long 1997) to model the probability that a campaign is fully funded. For statistical inference, we compute bootstrapped standard errors clustered on commuting zones (Cameron et al. 2011) using the multiwayvcov package to compute bootstrapped standard errors (Graham et al. 2016), deriving 95% confidence intervals from these for both ordinary least squares and regression models. All computations are conducted in R 3.2.5 (R Core Team 2015). We assess model fit using R^2 for ordinary least squared regression models and area under the Receiver Operating Characteristic (ROC) curve for logistic regression models, computed with the pROC package (Robin et al. 2011). To test our hypothesis that the effects of prior funding will increase over time as the field becomes more structured, we also estimate separate versions of both ordinary least squares and logistic regression models for all complete years (2011–2014).

4.4.1. Campaign/project level variables

To test our proposition regarding prior experience, we compute two variables. First, using Indigogo's unique user IDs, we create a list of all campaigns each user has participated in. Using this list, we compute for each campaign the total number of other campaigns in which at least one campaign team member has participated (Prior Campaigns). Of these, we also compute the number funded (Prior Funded Campaigns).

To control for the effects of connectivity beyond prior experience, we adopt a network approach. First, we divide our dataset into two-year intervals, utilizing data on users' involvement in campaigns in those two years to create a bipartite network (Wasserman & Faust 1994) in which users are connected to campaigns. We project this network to create a one-mode network in which site users are connected by links whose strength is determined by the number of campaigns they both work on during the year in which the campaign started, as well as the prior year. We compute the sum of all links of campaign team members to produce our connectivity variable (Teammember Degree (ln)).

We include several additional control variables at the campaign level. First, we control for the total size of the team, as reflected on Innovacer's site (Team Size (ln)).[20] Second, we include fixed effects by project type. Third, given that campaigns seeking higher levels of funding require more contributions to achieve their goals, we would expect lower goals to be associated with a higher probability of success and therefore include the natural logarithm of the campaign goal, in US dollars (Campaign Goal (ln)), as a control in logistic regression models and estimate ordinary least squares models with and without this variable.[21] Fourth, to control for time trends, we include fixed effects for the year in which the campaign is launched. Finally, we estimate a separate intercept for campaigns with a team member degree of zero (Isolate) and campaigns using flexible funding (Flexible Funding).

4.4.2. Local demographic variables

To test our proposition that certain areas will become hubs of crowdfunding success, we utilize a variety of demographic variables to characterize the geographic context of each campaign, estimated from US Census block-level data for a five-kilometer circular buffer around the geocoded campaign location. These include total population, median income, and the proportion of non-white population as recorded in the 2010 US Census, as well as the proportion of the population between 18 and 39, as recorded in the 2006-2010 American Community Survey five-year estimates (Minnesota Population Center 2011).

To summarize geographic context, we produce buffers with a five-kilometer radius around each location. Data from the US Census and American Community Survey are at the block group level, so it is necessary to estimate these values for our location buffers. For total population, proportion non-white, and proportion aged 18 to 39, we begin with block group counts of total population, white population, and population aged 18 to 39 in each block group. First, we compute the area, in square kilometers, of each block group. Then, we intersect the block groups

[20]This is not a perfect measure, as the site sometimes records a team size of 0, but we consider it to be a reasonable proxy for the actual team size.

[21]While some previous studies have used duration as an explanatory variable, duration is likely endogenous, as failing campaigns may stay active longer than successful ones in order to gather further funds. We therefore choose to exclude this variable from our models.

with our buffers and compute the area of the intersected polygons. We use the ratio of the intersected area with the original block group area to estimate the population in each category in the intersected block group areas, effectively assuming an even distribution of population within the block group.

Next, we sum up these values for each location buffer. We compute the proportion of the non-white population by taking the ratio of the white population and the total population, subtracting this value from 1. We compute the proportion of the population aged 18 to 39 by taking the total estimated population in this age group and dividing it by the total population. For median income, we compute a weighted mean of the intersected block groups, with weights based on the proportion of the location buffer accounted for by the block group area.

Finally, we utilize the Northwest Regional Center for Rural Development's county-level social capital index (Rupasingha & Goetz 2008). Because our social capital variable is defined specifically at the county level, we assign each campaign to the social capital score of the county in which it is found (Social Capital).

4.4.3. Regional variables

To approximate the regional market of campaigns, we construct a 50-kilometer circular buffer around each campaign. Within this region, we compute the total number of prior campaigns (Prior Campaigns in Region), the number of funded campaigns in the region (Prior Funded Campaigns in Region), and the total number of prior campaigns of the same type (Prior Campaigns of Same Type in Region). Summaries of all variables used in modeling are presented in Table 1 in the Appendix labelled.

5. RESULTS

5.1. National Funding Distributions

Figure 5 presents the evolution of Gini coefficients for funding receipts and the ratio of receipts to campaign goals at the campaign level and the sum of funding receipts, proportion of campaigns that receive funding, and the mean ratio of receipts to campaign goals at the commuting zone level. Overall receipts have a consistently high Gini coefficient across time at the campaign level. For campaigns, the Gini coefficient for funding ratios is lower, but still consistently high. At the commuting zone level, there is a decline in the Gini coefficient for funding success and the ratio of funding to campaign goals, followed by a substantial increase. Part of this may be artificial, a result of the fact that we do not have yearlong data for 2015, and the Gini coefficient for the funding ratio at the campaign level remains quite high and stable over time. Taken together, the two plots suggest that a geographic expansion of successful campaigns took place in the early 2010s, but by 2013 some commuting zones appeared to be emerging as dominant sites. Interestingly, throughout this time, the lion's share of funding receipts consistently accrued to only a minority of commuting zones and campaigns.

Figure 5: Evolution of Gini coefficient across time. Produced using ggplot2 (Wickham 2009) in R 3.2.5 (R Core Team 2015).

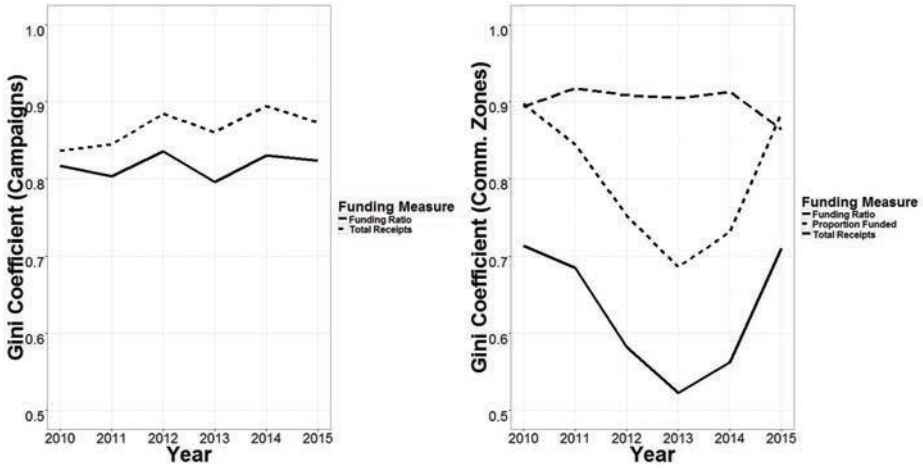
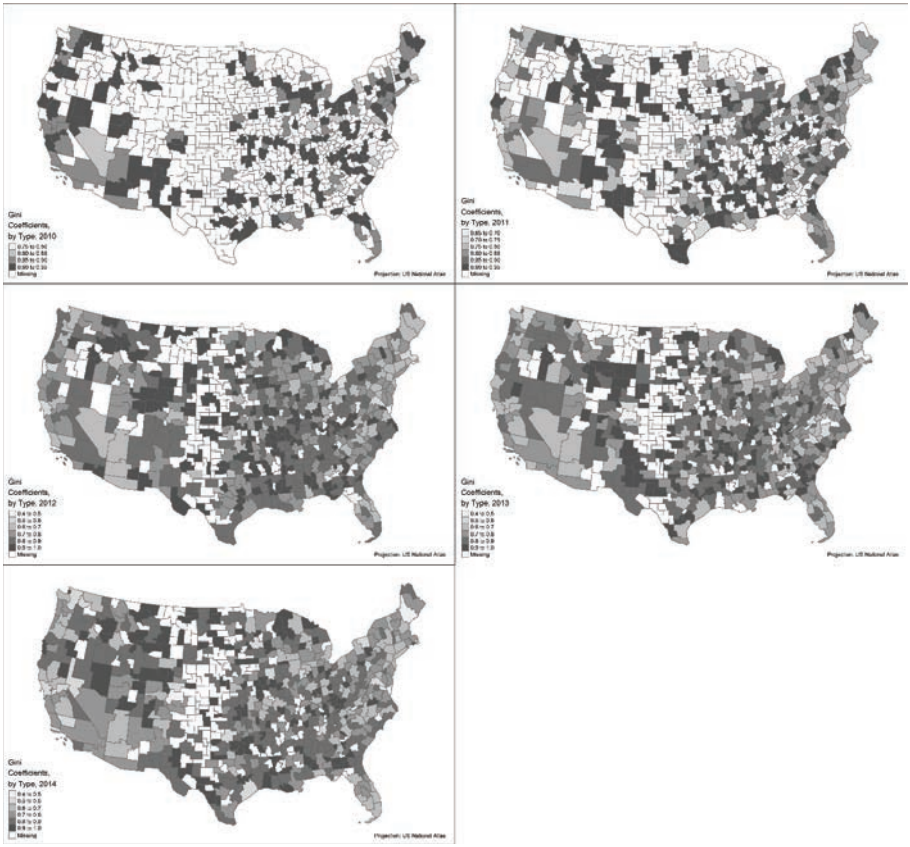


Figure 6 presents the evolution of Gini coefficients for campaign receipts among different campaign types in single commuting zones in the contiguous United States from 2011 through 2014. Combined with Figure 5, these maps suggest a geographic diffusion of crowdfunding activities. Hence, while crowdfunding is diffusing, it appears that certain regions are increasingly benefitting, providing initial support for Proposition 1.

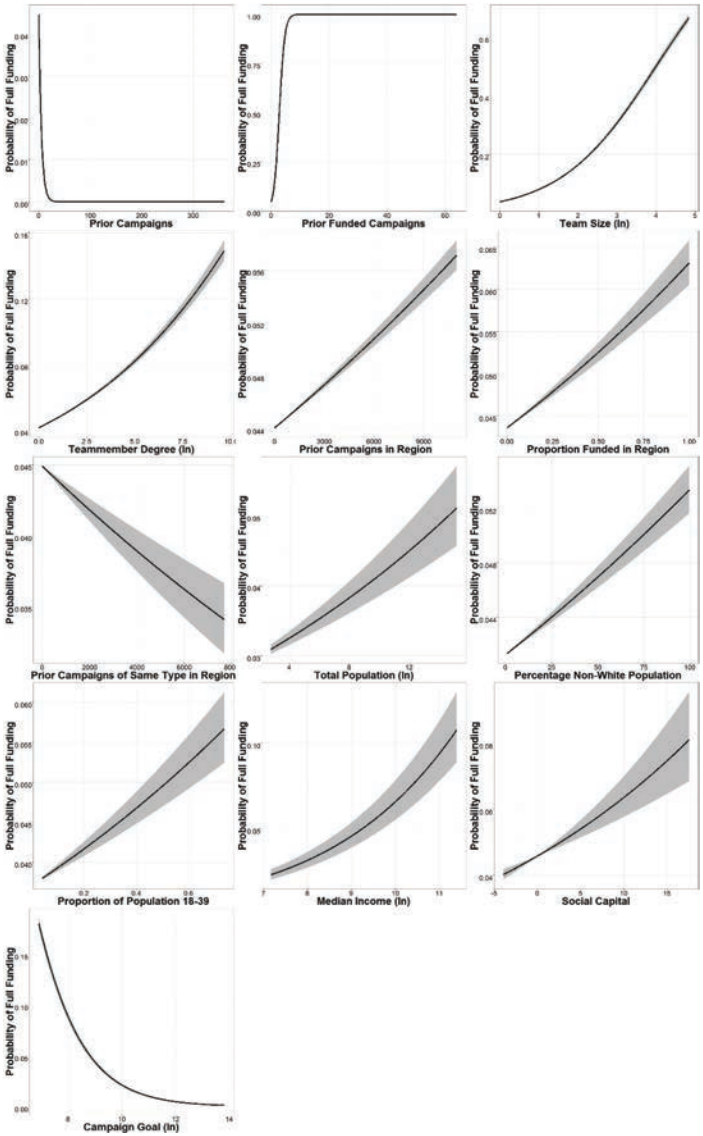
Figure 6: Evolution of Gini coefficient for campaign receipts across campaign types, by commuting zone and year. Produced using tmap (Tennekes 2016) in R 3.2.5 (R Core Team 2015).



5.2. Regression Results

Estimated models for the entire dataset are presented in Tables 2a (ordinary least squares models) and 3b (logistic regression models). Based on the adjusted R^2, our best ordinary least squares regression model includes fixed effects by campaign types (OLS Model 2). Based on likelihood ratio tests and the area under the ROC curve, the logistic regression model with fixed effects by campaign types (Logit Model 2) is also the most preferred of our logistic regressions. Both models preferable to models estimated alternatively dropping Team Size and Teammember Degree, which we estimate due to concerns of potential multicolinearity between these variables. Finally, we find that dropping the Campaign Goal variable from the ordinary least squares models does not significantly alter the adjusted R^2, suggesting the bulk of explained variance in funding receipts across campaigns is not explained simply by the size of project undertaken. Based on these findings, we focus our interpretation on OLS Model 2 and Logit Model 2 that can both be found in the Appendix in respectively Table 2a and 2b.

Figure 7: Logit Model 2 predicted probabilities plots. Prior campaigns and prior funded campaigns set to zero. Year set to 2014. Campaign type set to Creative Arts and Isolated set to one.



To aid interpretation of logistic regression coefficients, we utilize predicted probability plots for continuous variables, using coefficient estimates and confidence intervals from Logit Model 2, which show the expected changes in the probability that a campaign is at least fully funded, as the value of independent variables change, based on the coefficients estimated in the penalized likelihood logistic regression. For interpretive purposes, we set all prior campaign variables to zero, all continuous variables at their means, the project status as "Isolate" and the project type as "Creative Arts", and the Year set to 2014. We estimate 95% bootstrapped confidence intervals, clustered on commuting zones, for the change in predicted probability, considering only the confidence intervals for the variables whose effects are being plotted (see Figure 7).

5.2.1. Campaign-level results

While we expected prior campaign success to have a positive impact on the success of subsequent campaigns, the magnitude of this effect is surprising. In OLS Model 2, each additional prior successful campaign is associated with a 173% increase in expected funding receipts, allowing for the negative effect of each prior campaign. As Figure 7 shows, Logit Model 2 predicts that, under average conditions, a campaign whose teammembers are connected to at least 5 prior projects has a very high probability of successfully securing funding. This provides very strong support for Proposition 2. When controlling for successes, the effect of prior projects is statistically significantly negative both in terms of receipts (with a single failed prior project estimated to result in a 17.7% reduction in expected funding receipts) and the probability of success, in accordance with the expectations raised in Proposition 3. This could be because prior non-successful campaigns deal with sufficient reputational damage to overcome the benefits of prior experience, though it is also possible that some unsuccessful campaign proponents continue undertaking new campaigns as a result of sunk costs.

The effect of connectivity is positive, but relatively modest, with a 100% increase in Teammember Degree associated with only an estimated 15.9% increase in funding receipts, and similarly limited effects on the probability of receiving full funding. Surprisingly, isolated campaigns are more likely to attract funding than connected campaigns, and this effect offsets some of the benefits of increasing connectedness, an effect that holds even when Team Size is not included as a control. This could be due to the unstable state of the IndieGoGo crowdfunding

field at the time the data were collected. As noted in the theoretical discussion, periods of instability can provide opportunities for new entrepreneurs, as well as more well connected and established actors, who can vie for the resources available in the field.

Team size, on the other hand, does seem to have a substantive effect on project outcomes, with an effect on the probability of receiving full funding almost as pronounced as that of prior campaigns, but its estimated effect on receipts is relatively modest. Still, projects with very large numbers of team members are much more likely to be funded, perhaps because of the team members' own pledges, though also likely because of the economies of scale that comes with a large team size. This finding is also consistent with the idea that the formation of larger coalitions can provide positional opportunities for actors in a developing field. Finally, it could also relate to the larger overall social network that bigger teams have in terms of reach, Zheng et al. (2014) illustrating the importance of the entrepreneurs' social network when it comes to accumulating funding.

None of this should, however, be interpreted as suggesting that the most experienced and capable campaign founders have successfully taken over the IndieGoGo field. Indeed, as Figure 8 demonstrates, campaigns whose founders have prior IndieGoGo successes are a tiny minority of the total number of campaigns (see also Table 3). Nevertheless, they generally have a higher probability of being funded and have much higher average funding ratios than campaigns whose founders have no prior successes. Collectively, campaigns with at least one success account for 10.2% of total receipts, meaning that the average campaign with at least one success gains about 6.87 times the share of total receipts the average campaign with no successes does.

Table 3. Distribution of campaigns in sample, by prior successes.

Prior Successes	Number of Campaigns
0	156,133
1-2	2,462
3-5	99
6+	13

Figure 8: Average funding ratio, proportion of campaigns fully funded, and proportion of total campaign receipts, by founders' prior successes. Produced using ggplot2 (Wickham 2009) in R 3.2.5 (R Core Team 2015).

5.2.2. Geographic effects

The geographic variables are interesting, as well. When project type is controlled, the effect of prior campaigns, prior campaigns of the same type, and the proportion of campaigns fully funded within 50 kilometers are only statistically significant in the logistic regression models, but even here they have very weak effects. This is also the case for the Total Population, Non-White Percentage of the Population, and Proportion of the Population aged 18-39, though, here, the effects are slightly larger.

The other two geographic variables have stronger effects. Social Capital has no significant effect on funding receipts, but areas with the highest Social Capital scores gain about 0.06 in their predicted probability of being fully funded, relative to the lowest scores. Median Income (ln) has a stronger effect, with a 10% increase associated with an estimated 7.4% increase in receipts. It has a similarly substantive effect on the probability of project success, though, notably, its effect is less pronounced than the effects of Team Size and Prior Funded Projects, with the poorest neighborhoods experiencing around a 4% probability of project success, while the richest enjoy a 12% chance. These findings suggest that, while there has been a geographic spread of crowdfunding, affluent areas still have advantages in getting campaigns funded, consistent with the expectations of Proposition 1.

5.2.3. Temporal effects

The estimated effects of Prior Campaigns and Prior Funded campaigns are remarkably stable across years, increasing our confidence in the reliability of our findings (Tables 4a and 4b in the Appendix). One interesting finding is that the size of the Median Income coefficient appears to increase over time in both ordinary least squares and logistic models. Both these findings are consistent with the propositions outlined in the theory section above, though only in the case of Proposition 1, regarding geographic concentration, do we find evidence of this effect increasing over time.

6. DISCUSSION

In assessing the disruptive and democratizing implications of crowdfunding (Gerber & Hui 2013; Mollick & Robb 2016), we begin with what might appear to be a counterintuitive observation. Even in a context where innovation finance is driven by a fluid and diffuse crowd of consumers, there are already some signs of maturation characteristic of reinstitutionalization, as more professional actors and geographic regions emerge, some of which are particularly well positioned to take advantage of the opportunities crowdfunding platforms like IndieGoGo offer. This does not, as we argued above, mean IndieGoGo and platforms make no contribution to financial democratization, as attested by the fact that the bulk of receipts still accrue to the over 150,000 campaigns whose founders are newcomers to the platform. It does, however, suggest that a core of well-positioned actors could be garnering increasing returns over time.

Both geographic and individual variables may explain some patterns in crowdfunding success on IndieGoGo (Agrawal et al. 2015), though idiosyncrasies of campaigns and funders clearly account for considerable variation. While no single geographic variable showed massive impacts on the probability of crowdfunding success, their collective effects could be substantial, even if only median income helps explain geographic variation in funding receipts. Urban areas like New York and San Francisco, with large populations, high median income, and high social capital, are particularly well positioned for campaign success. Given that many of these variables do not appear to be significant predictors of actual receipts, these findings could suggest that knowledge spillovers in these places improve founders' ability to choose appropriate campaign goals. At the campaign level, prior successes and the ability to gather a large team can help propel campaigns to success. Taken together, these findings suggest certain areas – and even certain individuals or groups within those areas – are primed to take advantages of the opportunities afforded by crowdfunding. Such areas and, increasingly, individuals could form a core around which crowdfunding on IndieGoGo could further institutionalize.

These findings reveal an important tension in crowdfunding platforms as institutions. On the one hand, successful crowdfunding platforms need to generate successful projects and innovations. Our evidence suggests that more professionalized teams working with readily available local resources tend to be able to garner such success. On the other hand, there is a risk that

crowdfunding's potential as a democratizing force could be diminished if success accrues to a geographically delimited minority of founders. At present, our data suggest that prior success helps – though is hardly required for – future success, but there is no guarantee that this will continue to be the case.

Perhaps the real lesson here is that there is a need for institutional design that will continue to support democratization, on the one hand, but without generating so much noise from weak projects that success begins to resemble a weighted lottery, rather than a meritocracy. One very important way to support such an outcome would be to provide education, training, and skill development for would-be founders. That is to say, the fact that successes breed success on a platform like IndieGoGo suggests best practices might already be in development for crowdfunding work. Indeed, several other papers on crowdfunding have pointed to the importance of images, updating, and so on (e.g. Mollick 2014; Xu et al. 2014). Tapping crowdfunding leaders as sources of information and advice to would-be funders could be a way to square the circle. Rather than seeing a tension between professionalization and diffusion, it might be possible to disseminate professional skills as a means of supporting successful diffusion. Professional crowdfunders could thus serve as institutional entrepreneurs within the larger innovation finance field, legitimating the process of crowdfunding through their expertise and success (David et al. 2012).

The value of crowdfunding in financing new ventures and ideas is evident, however, we should not, as the paper aims to show, expect it to be untouched by the pressures that affect other forms of institutional change. Despite being driven by consumers this does not necessarily translate into a disruption of agents and areas benefiting. Nor does it automatically and radically change the types of projects or individuals that receive financing. Instead, crowdfunding does appear to follow similar trajectories of other phenomenon and institutional changes. One example is the Matthew Effect (Merton 1968), where the rich get richer, which may in the case of crowdfunding, over time, result in the beneficiaries (i.e. the crowdfounders hosting the campaigns) becoming less distinguishable from those who previously sought other sources of capital, including venture capital.

7. CONCLUSION

Crowdfunding has been heralded as a significant novel institutional innovation, potentially disrupting the field of innovation finance. Using data from IndieGoGo campaigns undertaken between April 2009 and February 2015, we demonstrate that, though crowdfunding on this site has spread geographically, the distribution of campaign receipts, as measured by the Gini coefficient across commuting zones in the United States, has remained highly geographically concentrated. We find evidence that even success rates, which had become more equitably shared with democratization, may also be re-concentrating on certain geographic areas, consistent with the idea that, as actors develop new skills, scripts, and coalitions, the field of crowdfunding may be taking on a more structured and stable shape. Further evidence that the crowdfunding field on IndieGoGo is re-institutionalizing is provided by our modelling work. We find that prior experience and success, team size, local affluence, and local social capital are strong predictors of campaign success. If continued over time, these patterns could lead to rich-get-richer dynamics, as the lion's share of funding receipts come to be garnered by more professionalized campaigns in particular areas.

Our findings suggest that while crowdfunding is indeed enabled by a diffuse "crowd" of funders their choice of funding opportunities is dictated by the available crowdfounder campaigns. The semi-institutionalization of crowdfunding thus appears to coalesce around the crowdfounder teams themselves – and the geographic areas in which they are most likely to be found. The geographic agglomeration and professionalization of some crowdfounders, however, could be used as a resource for disseminating skills and knowledge to would-be founders, taking advantage of crowdfunding's semi-institutionalized state to redirect efforts in ways that might make professionalization and democratization complementary, rather than in tension. Future research applying this analytic approach to other crowdfunding platforms could help determine if this is an outcome unique to IndieGoGo or if it represents a broader implication of home bias in crowdfunding initiatives. In addition, future research could explore whether there are observable differences between the growing number of professional crowdfunders campaigns and other more novice campaigns. Nonetheless, caution should be exercised as to whether crowdfunding truly represents an expanded distributive force for more equitable finance opportunities or whether it is simply a new source of finance for already entrenched social agents. In line with

Stewart's (2002) then commentary on the Internet and e-commerce (and the Internet bubble) we somewhat echo his sentiment simply replacing "Internet and e-commerce" with "crowdfunding". "Obviously crowdfunding is important because [it] can substantially reduce transaction costs in the value delivery systems that serve some markets, and [it] can selectively create markets that were not economically viable because geographic dispersion made search for and transactions within them unattractive to both buyers and sellers. However, it is not clear that crowdfunding creates much incremental [or different] demand." (Stewart 2002:1). While acknowledging that crowdfunding is more than a simple buyers and sellers' market – crowdfunding for example represents a market for ideas and imagined future products or services – we should take note of prior literature focused e-commerce to insure that past mistaken hype is not repeated. Acknowledging that innovation finance has indeed expanded due to crowdfunding, there are also signs that this expansion is starting to cluster around specific regions and individuals – we should therefore be wary of assuming that crowdfunding will continue to result in a more distributive finance opportunities for entrepreneurs.

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9. APPENDICES

Table 1: Variables used in model estimation, with summary statistics for all continuous variable observations used in models.

Variable	Mean SD	Min. Max.	Explanation
Funding Receipts (ln)	3.47 3.4	0 14.7	Monetary pledges received at the time the campaign ends.
Funded	0.0871 0.282	0 1	The campaign receives monetary pledges greater than or equal to the campaign goal.
Flexible Funding	0.967 0.18	0	The campaign utilizes the flexible funding option.
Prior Campaigns	0.117 1.56	0.00 360	Number of campaigns at least one member of the current campaign has worked on
Prior Funded Campaigns	0.0219 0.323	0.00 64	Number of campaigns at least one member of the current campaign has worked on that were funded
Team Size (ln)	0.261 0.505	0.00 4.84	Team size measure
Teammember Degree (ln)	0.510 1.01	0.00 9.65	Total connections between campaign team members using site and others via other campaigns
Isolate	0.806 0.396	0.00 1.00	Campaigns with a degree of zero
Prior Campaigns in Region	616 1,280	0.00 11,010	Number of campaigns within 50 kilometers of the current campaign in previous years
Proportion of Prior Campaigns in Region Funded	0.0219 0.323	0.00 1	Proportion of campaigns within 50 kilometers of the current campaign in previous years that were funded
Prior Campaigns of Same Type in Region	133 382	0.00 7,690	Number of campaigns within 50 kilometers of the current campaign in previous years that are of the same type as the campaign in question
Total Population (ln)	11.8 2.19	2.77 15.2	Estimated total population within 5 kilometers of campaign location, logged
Percentage Non-White	30.9 18.7	0.77 99.5	Percentage of population within 5 kilometers that is non-white

18-39 Proportion of Population	0.0775 0.321	0.0397 0.737	Proportion of the population within 5 kilometers aged 18-39
Median Income (ln)	8.95 0.458	7.17 11.4	Estimated median income within 5 kilometers, logged
Social Capital	-0.747 1.03	-3.94 17.6	Social capital index value
Campaign Goal (ln)	8.99 1.41	6.91 13.8	Campaign goal, in US dollars, logged
Year			Year in which campaign is launched
Type			Classification of project for which funds are sought

Table 2a: Ordinary least squares regression model estimations, full dataset.

Variable	OLS Model 1	OLS Model 2	OLS Model 3	OLS Model 4	OLS Model 5
Intercept	-8.29* (-10.7, -5.89)	-6.17* (-8.24, -4.1)	-6.08* (-8.13, -4.04)	-6.44* (-8.46, -4.42)	-7.64* (-9.46, -5.82)
Flexible Funding	2.14* (1.98, 2.3)	2.02* (1.88, 2.15)	2.02* (1.88, 2.16)	2.01* (1.87, 2.15)	2.03* (1.9, 2.17)
Prior Campaigns	-0.203* (-0.308, -0.0993)	-0.195* (-0.287, -0.103)	-0.198* (-0.3, -0.0951)	-0.196* (-0.285, -0.107)	-0.202* (-0.284, -0.12)
Prior Funded Campaigns	1.29* (1.05, 1.52)	1.2* (0.975, 1.43)	1.25* (1.01, 1.48)	1.17* (0.949, 1.4)	1.21* (0.988, 1.43)
Team Size (ln)	1.49* (1.38, 1.59)	0.511* (0.433, 0.588)	2.53* (2.43, 2.64)		
Teammember Degree (ln)	0.618* (0.533, 0.702)	1.59* (1.5, 1.68)		1.29* (1.21, 1.37)	1.27* (1.19, 1.34)
Isolate	0.36* (0.295, 0.425)	0.431* (0.372, 0.49)	0.282* (0.223, 0.341)	0.634* (0.568, 0.701)	0.626* (0.562, 0.689)
Prior Campaigns in Region	-0.00018* (-0.00236, -0.000124)	1.81e-05 (-1.25e-05, 4.86e-05)	1.96e-05 (-1.26e-05, 5.18e-05)	1.64e-05 (-1.39e-05, 4.68e-05)	1.46e-05 (-1.83e-05, 4.75e-05)
Proportion of Prior Campaigns in Region Funded	0.0217 (-0.891, 0.934)	0.327 (-0.42, 1.07)	0.323 (-0.452, 1.1)	0.336 (-0.432, 1.1)	0.375 (-0.388, 1.14)
Prior Campaigns of Same Type in	0.000939* (0.000718,	4.32e-05 (-5.64e-05, 0.000143)	3.5e-05 (-6.23e-05,	5.46e-05 (-5.01e-05,	6.28e-05 (-4.09e-05,

Region	0.00116)		0.000132)	0.000159)	0.000167)
Total Population (ln)	0.0229 (-0.12, 0.166)	0.0228 (-0.102, 0.148)	0.0242 (-0.107, 0.156)	0.02 (-0.101, 0.141)	0.0222 (-0.0964, 0.141)
Non-White Percentage of Population	0.00176 (-0.00587, 0.00939)	0.000966 (-0.00563, 0.00756)	0.00102 (-0.00533, 0.00736)	0.00092 (-0.00589, 0.00773)	0,0005 (-0.00668, 0.00768)
Median Income (ln)	0.838* (0.487, 1.19)	0.735* (0.421, 1.05)	0.738* (0.422, 1.05)	0.745* (0.447, 1.04)	0.718* (0.427, 1.01)
18-39 Proportion of Pop.	1.65 (-0.144, 3.44)	1.2 (-0.448, 2.85)	1.18 (-0.448, 2.81)	1.28 (-0.31, 2.87)	1.43 (-0.198, 3.05)
Social Capital	0.0469 (-0.157, 0.25)	0.0667 (-0.108, 0.241)	0.0646 (-0.109, 0.238)	0.0705 (-0.11, 0.252)	0.077 (-0.0956, 0.25)
Campaign Goal (ln)		-0.174 (-0.193, -0.154)	-0.176* (-0.195, -0.157)	-0.165* (-0.185, -0.146)	
2011	0.3* (0.173, 0.426)	0.533* (0.411, 0.656)	0.579* (0.441, 0.718)	0.475* (0.361, 0.589)	0.481* (0.373, 0.589)
2012	0.196* (0.0433, 0.348)	0.655* (0.528, 0.781)	0.662* (0.531, 0.792)	0.65* (0.52, 0.781)	0.612* (0.492, 0.732)
2013	0.718* (0.573, 0.763)	1.15* (1.02, 1.28)	1.16* (1.03, 1.3)	1.13* (0.994, 1.27)	1.09* (0.961, 1.21)
2014	0.214* (0.0489, 0.378)	0.706* (0.566, 0.847)	0.718* (0.572, 0.863)	0.696* (0.551, 0.841)	0.633* (0.498, 0.768)
2015	0.0661 (-0.161, 0.293)	0.462* (0.251, 0.672)	0.469* (0.272, 0.667)	0.458* (0.25, 0.666)	0.452* (0.247, 0.658)
Signi.Positive Campaign Types, Ref.cat. Animals		Creative Arts, Food	←Same	←Same	Creative Arts
Signi. Negative Campaign Types, Ref.cat. Animals		Community, Education, Health, Religion, Small Business, Technology	←Same	←Same	←Same + Politics, Sports
N	158,707	158,707	158,707	158,707	158,707
Adjusted R^2	0.222	0.258	0.256	0.253	0.249

95% confidence intervals by bootstrapped standard errors, clustered by commuting zone, in parenthesis. Campaign type reference category is Animals. Estimated in R 3.2.5 (R Core Team, 2016). Confidence intervals computed using multiwayvcov (Graham et al. 2016). * = 95% confidence interval excludes zero.

Table 2b: Logistic regression model estimations, full dataset.

Variable	Logit Model 1	Logit Model 2	Logit Model 3	Logit Model 4
Intercept	-0.767* (-0.91, -0.624)	-0.884* (-1.04, -0.733)	-1.15* (-1.29, -1.01)	-0.85* (-0.998, -0.702)
Flexible Funding	-1* (-1.01, -0.988)	-1.06* (-1.08, -1.05)	-1.06* (-1.07, -1.04)	-1.06* (-1.07, -1.05)
Prior Campaigns	-0.198* (-0.204, -0.192)	-0.197* (-0.202, -0.192)	-0.204* (-0.209, -0.199)	-0.196* (-0.201, -0.191)
Prior Funded Campaigns	1.1* (1.07, 1.13)	1.08* (1.05, 1.11)	1.09* (1.07, 1.12)	1.08* (1.06, 1.11)
Team Size (ln)	0.831* (0.819, 0.843)	0.82* (0.808, 0.832)		1.09* (1.08, 1.1)
Teammember Degree (ln)	0.164* (0.159, 0.17)	0.145* (0.139, 0.15)	0.531* (0.528, 0.535)	
Isolate	0.263* (0.258, 0.267)	0.301* (0.296, 0.306)	0.461* (0.455, 0.468)	0.242* (0.237, 0.247)
Prior Campaigns in Region	-7.49e-05* (-7.75e-05, -7.23e-05)	2.48e-05* (2.29e-05, 2.67e-05)	2.26e-05* (2.08e-05, 2.43e-05)	2.57e-05* (2.4e-05, 2.75e-05)
Proportion of Prior Campaigns in Region Funded	0.251* (0.204, 0.298)	0.391* (0.346, 0.436)	0.406* (0.361, 0.452)	0.388* (0.344, 0.433)
Prior Campaigns of Same Type in Region	0.000323* (0.000309, 0.000338)	-3.74e-05* (-4.72e-05, -2.75e-05)	-2.77e-05* (-3.74e-05, -1.81e-05)	-4.07e-05* (-5.03e-05, -3.11e-05)
Total Population (ln)	0.0442* (0.0362, 0.0523)	0.0422* (0.0345, 0.05)	0.0387* (0.0314, 0.0461)	0.0429* (0.0351, 0.0507)
Non-White Proportion of Population	0.00305* (0.00264, 0.00345)	0.00271* (0.00236, 0.00305)	0.00267* (0.00231, 0.00304)	0.00273* (0.00236, 0.00309)
Median Income (ln)	0.43* (0.412, 0.448)	0.387* (0.368, 0.406)	0.397* (0.38, 0.414)	0.387* (0.368, 0.406)
18-39 Proportion of Population	0.706* (0.596, 0.816)	0.602* (0.49, 0.714)	0.68* (0.571, 0.79)	0.591* (0.48, 0.701)
Social Capital	0.0205* (0.0099, 0.0311)	0.0346* (0.0243, 0.045)	0.037* (0.027, 0.0469)	0.034* (0.0241, 0.0439)
Campaign Goal (ln)	-0.766* (-0.772, -0.761)	-0.747* (-0.753, -0.742)	-0.735* (-0.74, -0.73)	-0.747* (-0.752, -0.742)

2011	0.415* (0.405, 0.424)	0.491* (0.481, 0.5)	0.411* (0.401, 0.421)	0.514* (0.504, 0.523)
2012	0.348* (0.336, 0.359)	0.481* (0.471, 0.491)	0.462* (0.451, 0.472)	0.485* (0.475, 0.495)
2013	0.729* (0.718, 0.74)	0.857* (0.847, 0.867)	0.833* (0.823, 0.843)	0.864* (0.853, 0.874)
2014	0.486* (0.473, 0.499)	0.623* (0.612, 0.635)	0.609* (0.597, 0.62)	0.628* (0.616, 0.639)
2015	0.166* (0.141, 0.191)	0.276* (0.253, 0.299)	0.267* (0.244, 0.29)	0.279* (0.256, 0.301)
Signi.Positive Campaign Types, Ref.cat. Animals		Community, Creative Arts, Environment, Food, Health, Politics	←Same	←Same
Signi. Negative Campaign Types, Ref.cat. Animals		Small Business, Technology	←Same	←Same
N	158,707	158,707	158,707	158,707
Area under ROC Curve	0.791	0.799	0.798	0.799

95% confidence intervals by bootstrapped standard errors, clustered by commuting zone, in parenthesis. Campaign type reference category is Animals. Estimated in R 3.2.5 (R Core Team, 2016). Confidence intervals computed using multiwayvcov (Graham et al. 2016). * = 95% confidence intervals exclude zero.

Table 4a. Ordinary least squares regression model estimations, by years.

Variable	2011	2012	2013	2014
Intercept	-2.49 (-5.27, 0.296)	-5.48* (-7.47, -3.48)	-6* (-8.2, -3.79)	-5.52* (-7.5, -3.54)
Flex	1.17* (0.47, 1.86)	1.87* (1.7, 2.05)	2.31* (2.1, 2.53)	1.89* (1.71, 2.07)
Prior Campaigns	-0.199* (-0.382, -0.0167)	-0.153* (-0.301, -0.00547)	-0.22* (-0.37, -0.0705)	-0.184* (-0.355, -0.0125)
Prior Funded Campaigns	1.28* (0.677, 1.89)	0.895* (0.513, 1.28)	1.29* (0.984, 1.6)	1.17* (0.872, 1.48)
Team Size (ln)	1.67* (1.42, 1.93)	1.31* (1.12, 1.5)	1.13* (0.818, 1.43)	1.63* (1.37, 1.88)
Teammember Degree (ln)	0.287* (0.198, 0.375)	0.59* (0.435, 0.745)	0.688* (0.521, 0.856)	0.686* (0.549, 0.823)
Isolate	0.309*	0.508*	0.535*	0.329*

	(0.137, 0.481)	(0.417, 0.6)	(0.427, 0.643)	(0.216, 0.443)
Prior Campaigns in Region	0.00065* (-0.000735, 0.00204)	0.000213 (-3.33e-06, 0.00043)	-2.48e-06 (-5.36e-05, 4.86e-05)	1.82e-05 (-1.38e-05, 5.02e-05)
Proportion of Prior Campaigns in Region Funded	0.0728 (-0.931, 1.08)	-0.0303 (-0.676, 0.615)	0.204 (-1.4, 1.81)	1.08 (-0.298, 2.47)
Prior Campaigns of Same Type in Region	8.79e-05 (-0.0024, 0.00258)	-0.000122 (-0.000623, 0.000379)	8.56e-05 (-7.74e-05, 0.000249)	2.75e-05 (-7.51e-05, 0.00013)
Total Population (ln)	0.0404 (-0.178, 0.259)	0.0226 (-0.0981, 0.143)	0.0239 (-0.12, 0.168)	0.0185 (-0.0849, 0.122)
Non-White Proportion of Population	0.00229 (-0.00628, 0.0109)	9.77e-05 (-0.00652, 0.00672)	0.0012 (-0.00631, 0.00872)	0.000404 (-0.00598, 0.00679)
Median Income (ln)	0.502* (0.015, 0.989)	0.732* (0.439, 1.03)	0.797* (0.457, 1.14)	0.761* (0.49, 1.03)
18-39 Proportion of Population	0.792 (-1.89, 3.47)	0.943 (-0.76, 2.65)	1.37 (-0.617, 3.35)	1.34 (-0.00803, 2.69)
Social Capital	-0.0593 (-0.323, 0.204)	0.0518 (-0.112, 0.216)	0.0744 (-0.116, 0.265)	0.0983 (-0.0598, 0.256)
Campaign Goal (ln)	-0.225* (-0.284, -0.166)	-0.164* (-0.189, -0.14)	-0.155* (-0.179, -0.13)	-0.182* (-0.21, -0.153)
Signi.Positive Campaign Types, Ref.cat. Animals	Creative Arts, Food	Creative Arts	Creative Arts, Food	Creative Arts
Signi. Negative Campaign Types, Ref.cat. Animals	Small Business	Community, Education, Small Business, Technology	←Same + Sports, Health, Religion	Environment, Health, Small Business, Technology
N	12,727	42,574	47,746	51,218
Adjusted R-squared	0.249	0.239	0.237	0.295

95% confidence intervals by bootstrapped standard errors, clustered by commuting zone, in parenthesis. Campaign type reference category is Animals. Estimated in R 3.2.5 (R Core Team, 2016). Confidence intervals computed using multiwayvcov (Graham et al. 2016). * = 95% confidence intervals exclude zero.

Table 4b. Logistic regression model estimations, by years.

Variable	Logit 2011	Logit 2012	Logit 2013	Logit 2014
Intercept	0.567* (0.25,0.885)	-0.966* (-1.11,-0.817)	-1.5* (-1.67,-1.32)	-1.9* (-2,-1.79)
Prior Campaigns	-0.431* (-0.452,-0.41)	-0.143* (-0.152,-0.133)	-0.339* (-0.346,-0.332)	-0.267* (-0.275,-0.259)
Prior Funded Campaigns	1.34* (1.21,1.46)	0.844* (0.791,0.898)	1.27* (1.24,1.29)	1.08* (1.05,1.12)
Team Size (ln)	0.894* (0.871,0.917)	0.649* (0.629,0.67)	0.595* (0.563,0.627)	0.781* (0.757,0.805)
Teammember Degree (ln)	0.0597* (0.0504,0.0689)	0.215* (0.206,0.225)	0.228* (0.209,0.246)	0.239* (0.226,0.251)
Isolate	0.338* (0.323,0.352)	0.443* (0.436,0.45)	0.29* (0.279,0.301)	0.136* (0.129,0.143)
Prior Campaigns in Region	0.000834* (0.00073,0.000938)	0.00027* (0.000258,0.000282)	4.4e-05* (4.01e-05,4.78e-05)	1.17e-05* (9.6e-06,1.38e-05)
Proportion of Prior Campaigns in Region Funded	0.469* (0.363,0.574)	-0.123* (-0.168,-0.0779)	0.187* (0.0931,0.282)	1.02* (0.943,1.1)
Prior Campaigns of Same Type in Region	0.000487* (0.000198,0.000775)	-0.000425* (-0.000463,-0.000386)	-0.000124* (-0.000137,-0.000111)	1.99e-07 (-1.4e-05,1.44e-05)
Total Population (ln)	-0.00207 (-0.0169,0.0128)	0.0585* (0.0508,0.0662)	0.0484* (0.0393,0.0576)	0.0386* (0.0324,0.0449)
Non-White Proportion of Population	0.00797* (0.00716,0.00878)	0.00232* (0.00197,0.00268)	0.00337* (0.00296,0.00379)	1.56e-05 (-0.000321,0.000352)
18-39 Proportion of Population	1* (0.741,1.26)	0.591* (0.475,0.708)	0.441* (0.315,0.567)	0.792* (0.695,0.889)
Median Income (ln)	0.224* (0.186,0.263)	0.336* (0.318,0.355)	0.413* (0.389,0.436)	0.442* (0.428,0.456)
Social Capital	-0.00995 (-0.027,0.00707)	0.0463* (0.0372,0.0554)	0.0554* (0.0439,0.0669)	0.0291* (0.021,0.0372)
Campaign Goal (ln)	-0.83* (-0.839,-0.821)	-0.814* (-0.82,-0.809)	-0.708* (-0.714,-0.702)	-0.714* (-0.718,-0.71)

Signi.Positive Campaign Types, Ref.cat. Animals	Community, Creative Arts, Education, Environment, Food, Health, Religion	←Same + Politics, Sports	Community, Creative Arts, Environment, Food, Health, Politics, Sports	←Same + Education
Signi. Negative Campaign Types, Ref.cat. Animals	Politics, Small Business, Sports, Technology	Small Business, Technology	Religion, Small Business, Technology	Religion, Small Business, Technology
N	12,727	42,574	47,746	51,218
Area under ROC Curve	0.779	0.808	0.784	0.816

95% confidence intervals by bootstrapped standard errors, clustered by commuting zone, in parenthesis. Campaign type reference category is Animals. Estimated in R 3.2.5 (R Core Team, 2016). Confidence intervals computed using multiwayvcov (Graham et al. 2016). * = 95% confidence intervals exclude zero.

Chapter 9 | Paper 4

Reward-based crowdfunding and sustainable entrepreneurship: A web-based experiment

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Abstract: Reward-based crowdfunding is a rapidly growing source of innovation finance which has been heralded by its proponents as an enabler of a wider diversity of entrepreneurs including sustainable entrepreneurs. Utilizing a web-based experiment the study, however, finds that any mono-causal conclusion on whether crowdfunding is an attractive proposition for sustainable entrepreneurs is misplaced. Instead it finds that different personal characteristic, personal value orientations and most importantly product details play a significant role in determining (un)sustainable pledging behavior. Reward-based crowdfunding therefore appears for certain types of campaigns as an enabler of sustainable product innovation, while in other circumstances it enables egocentrically-oriented campaigns.

1. INTRODUCTION

In recent years, crowdfunding has become an increasingly popular alternative source of innovation finance for a variety of entrepreneurial projects from small local artistic projects to large ventures seeking millions of dollars of capital (Belleflamme et al. 2014; Mollick 2014). The process itself is uniquely characterized by the process through which for example innovation finance is raised where the entrepreneurs rather than seeking investments from a small group of professional investors instead engage an open call, essentially through the Internet, for the provision of financial resources from a large dispersed "crowd" of individuals ('crowdfunders') (Lambert & Schwienbacher 2010; Belleflamme et al. 2014). And while the notion of mobilizing a large and diverse group of people to finance a specific project is not new the interconnectivity of internet has significantly decreased the costs and requirements needed to engage in this type of funding creating a rapidly growing source of innovation finance not previously possible (Lehner 2013; Colombo et al. 2014).

The emergence of this rapidly growing alternative source of innovation finance has subsequently resulted in a natural enthusiasm within the field. Not least from scholars who suggest that crowdfunding could signal a shift in financing opportunities for sustainable entrepreneurs and ventures (Lehner & Nicholls 2014; Calic & Mosakowski 2016) who otherwise "are often constrained by their self-imposed social and environmental goals" (Choi & Gray 2008, p.565). Sustainable entrepreneurs representing an individual or group individuals that have recognized, developed, and exploited an opportunity to "bring into existence a future goods and services with economic, social and ecological gains" (Belz & Binder 2017, p.2). The shift brought on by the fact that entrepreneurs can now directly approach consumers for finance who are in turn argued to be driven by different intentional dynamics as compared to for example professional investors thus changing "how, why, and which ideas are brought into existence." (Gerber & Hui 2013, p.1). Existing empirical evidence from Allison et al. (2015) and Calic & Mosakowski (2016), for example, would seem to confirm this assertion finding that crowdfunders are respectively drawn by intrinsic cues when seeking to invest and that sustainability orientation in projects positively influences funding success. Other literature, however, counters that extrinsic cues continue to play a central role in guiding investment behavior (Moss et al. 2015) and that environmental ventures are not better placed to receive funding as compared to other campaign types (Hörisch

2015). The potential of crowdfunding as significant financier of sustainable entrepreneurship therefore remains debated with diverging insights emerging from this nascent literature. And because the current literature builds primarily on large datasets acquired from various crowdfunding platforms it subsequently remains difficult to rule out confounding variables and detangle cause and effect.

As an alternative this paper employed a web-based experiment in order to explore the potential causal links between crowdfunder pledging behavior and the three values most commonly associated with environmentally significant behavior (ESB). ESB defined as "the extent to which it changes the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere itself" (Stern 2000, p.408). The study, however, expands this definition as to focus also on improving social factors not purely environmental ones as will be detailed in Chapter 3. Focusing on crowdfunder pledging behavior directed at products where an idealized sustainable product is seen to offer an improved or the same economic performance with lesser externalities in the form of social and environmental hazards (Halme & Laurila 2009; Bos-Brouwers 2010). A pledge in turn represents a set amount of money spent by the consumer with the expectation that if the project they are financing is successful in reaching its funding goal they will receive a tangible (but non-financial) reward, product or service. It thus commonly referred to as a form of pre-purchasing (Ahlers et al. 2015).

In applying these three values, characterized as Egoistic ("what is in it for me"), Altruistic ("what is in it for others") and Biospheric values ("what is in it for the environment"), in a random fashion to a specific campaign text it allows for a causal observation to be drawn between the respective value frame within the campaign text and the individuals subsequent willingness and level of pledges. Thereby observing the causal relationship between the values most associated with (un)sustainable purchasing behavior and individual pledging behavior in a reward-based crowdfunding context. The paper finds that that any mono-causal conclusion regarding whether reward-based crowdfunding is attractive alternative source of finance for sustainable entrepreneurs is misplaced. Rather the study observes that for certain products altruistic and/or biospheric value frame significantly predicts pledging behavior, while in others circumstances egocentric-oriented campaigns are best at attracting pledges. Reward-based

crowdfunding is therefore neither a silver-bullet that will suddenly enable a great number of sustainable entrepreneurs to receive funding, but neither do crowdfunders appear adverse towards sustainably-oriented campaigns. Instead it is the products pursued within the campaign that best predict which of the value frame most significantly affect pledging behavior. Reward-based crowdfunding therefore appears for certain types of campaigns as an enabler of sustainable entrepreneurship, while in other circumstances it appears to support hedonistic (or egocentric) oriented campaigns.

The paper contributes to the respective fields of crowdfunding and sustainable entrepreneurship in two main capacities. Firstly, the paper observes that when seeking to understand any behavior there is a need to understand the details and context underlying any decision. Exemplified by the significant affect that for example product specifics had on individual pledging behavior – rather than observing a binary sustainable or unsustainable behavior individuals often oscillate between the two. In certain circumstances enticed by sustainably-oriented value frames while in others motivated by egocentric value frames. That a product can so strongly influence behavior is of significance for both scholars of crowdfunding and sustainable entrepreneurship. Secondly the exemplified web-based experiment method provides a template that can be applied in numerous contexts – repeating design choices in order to further understand the mechanics behind successful reward-based crowdfunding or even online shopping behavior in general.

The paper will firstly touch upon the background material that inspired the research focus; second introduce the overall theoretical foundation and framework for exploring the antecedents of individual pledging behavior as they relate to sustainable consumer behavior. Thirdly, the method and research design of the paper will be introduced and finally present the analysis, discussion and final conclusion.

2. BACKGROUND

The crowdfunding process itself can be said to depend on its ability to insure that strangers are willing support strangers for causes, products or services that have not yet been realized and of which they have little direct oversight or control. The process facilitated through a secure middleman, representing the platform, utilizing peer-to-peer screening and validated user profiles

to create an environment where an increasing number of individuals are willing to pre-purchase what are often still drawing board idea (Bruton et al. 2015). Thus creating an emergent and increasingly common source of finance for entrepreneurs that fills a funding gap often found at the idea/inception and proof of concept/prototyping phase (World Bank 2013; European Commission 2015; Sorenson et al. 2016). In addition to representing a potential financial resource crowdfunding can also serve to test market interest, engage in potential customer feedback, and even serve as a marketing tool, as some campaigns go "viral" and receive significant exposure (Colombo et al. 2014; Zhang et al. 2014).

The prototypically crowdfunding process consists of three primary actors; the crowd founders, crowdfunders and platforms. Where the crowd founders in the case of this study represent the entrepreneurs initiating the respective campaign, while the crowdfunders in turn represent a diverse and dispersed group of individuals who are, through the open call, enticed to donate, invest, lend or pledge towards the specific idea, product, or service. The process as noted is most commonly facilitated through a dedicated platform that serves to facilitate contact and act a secure middleman exemplified by the platforms like IndieGoGo or Kickstarter. The type of financial support offered by the crowdfunders to enable the given entrepreneurs and what they receive in return depends on the model of crowdfunding in questions. Here four ideal types can broadly be subdivided as illustrated in Table 1 below.

Table 1. The four models of crowdfunding

Crowdfunding Model	Definition
Donation-based	Donation towards a specific project with no expectations of financial or material returns.
Reward-based	Individuals invest a pre-defined amount of money with the expectation that if successfully funded, they will receive a tangible (but non-financial) reward, product or service.
Equity-based	Small investments in crowdfunding project in return for an incremental stock in the respective business.
Lending-based	In the lending-based model the crowdfunder lends a small amount of money to a specific platform, project or person.

Source: Zhang et al. (2014) and Cholakova & Clarysse (2015)

The emergence of crowdfunding as increasingly common source of innovation finance has resulted in a steady stream of academic research that has sought to understand the process most notably the antecedents of funding success and failure (see for example Burtch et al. 2013; Mollick 2014; Manning & Bejarano 2016). Additional interest perhaps sparked by the observation that it appears to expand access to innovation finance (Sorenson et al. 2016), enable a wider spectra of idea and projects (Gerber & Hui 2013; Lehner & Nicholls 2014), and not least overcome certain geographic barriers present with other forms of finance (Agrawal et al. 2015). However given the novelty of the research the exact antecedents seen to influence crowdfunders financial behavior remains debated and there arguably remain large gaps in our understanding of this phenomenon despite the rapidly growing literature (Moritz & Block 2014; Mollick 2014). Because of the nascent state of the literature there is also only a limited number of scholarly works at the intersection between crowdfunding and sustainability. Table 2 on page 6 outlining the state-of-the-art literature found at the intersection between the two. The current literature presenting very mixed conclusions from observing that sustainability has a positive effect on funding success (Calic & Mosakowski 2016) to no observable affects between for example environmental orientation and crowdfunding success (Hörisch 2015).

It was on the basis of these and other emergent differences in the conclusions observed within the literature that cemented the need for an alternative approach to explore the causation between sustainability and funding success. An experimental method representing an ideal approach as it can detangle even complex relationships not easily teased out with other methods and observe causality (Trochim 2001; Colquitt 2008).

Table 2. Literature review: Crowdfunding and environmental, social, and sustainable entrepreneurship

Paper	CF-model	Method	Results
Calic and Mosakowski (2016)	Reward-based crowdfunding, Kickstarter platform	Quantitative, Dataset, Logistic and OLS regression analysis, Sample size of 87,261 projects	Sustainability orientation positively affects funding success of crowdfunding projects, but is partially mediated by the project creativity and third party endorsements.
Lam & Law (2016)	Reward, donation, loan, and equity-based models.	Case study, qualitative cross case analysis, Sample of eight project cases.	Crowdfunding can play a significant role at the start of a renewable and sustainable energy project's life-cycle.
Vasileiadou et al. (2016)	Mix of platforms including reward, donation, and equity-based models.	Case study. Empirical review of online crowdfunding platforms in the Netherlands hosting projects related to renewable electricity production. Sample of seven platform cases.	The scale of crowdfunding resources supporting renewable energy in the Netherlands remains low, but the dynamic of the projects supported holds potential.
Allison et al. (2015)	Loan-based Crowdfunding, Kiva.org.	Quantitative, Dataset, OLS regression analysis based on semantic computer-aided text analysis, Sample size of 36,665 loans.	Crowdfunders respond more positively to narratives where the venture is framed as an opportunity to help others and less positively to frames of business opportunity - suggesting that social needs trump investment opportunities.
Moss et al. (2015)	Loan-based Crowdfunding, Kiva.org.	Quantitative, Dataset, Cox regression (or proportional hazards regression) based on semantic computer-aided text analysis, Sample size of over 400,000 loans.	Finds that campaigns that signal narratives of conscientiousness, courage, empathy, and warmth are less likely to receive funding as compared to those signaling autonomy, competitive aggressiveness, and risk-taking.
Hörisch (2015)	Reward-based crowdfunding, IndieGoGo platform.	Quantitative, Dataset, Binary logistic regression, Sample size of 583 projects.	"No positive connection between environmental orientation and crowdfunding success." (Hörisch 2015, p.636).
Lehner and Nicholls (2014)	Stakeholder model of the crowdfunding process as a whole.	Case study of the UK social finance market and CF. Sample represented by the UK cabinet on the future of the UK social finance market and CF.	"The relatively new phenomenon of CF can not only provide necessary funds for the social enterprises, it may also lead to a higher legitimacy of these through early societal interaction and participation. This legitimacy can be understood as a strong positive signal for further investors." (Lehner & Nicholls 2014, p.271).
Lehner (2013)	Conceptual model crowdfunding process as whole.	Review of extant literature on financing social ventures and crowdfunding.	"Crowd investors typically do not look much at collaterals or business plans, but at the ideas and core values of the firm and thus at its legitimacy." (Lehner 2013, p.290).

3. THEORY

In order to reliably explore when and if crowdfunder pledging behavior is causally linked with what could be considered sustainability-oriented campaigns the study draws upon Stern's Value-Belief-Norm (VBN) theory on environmentally significant behavior (ESB) (Stern et al. 1999; Stern 2000). Specifically the study builds on the later empirical work de Groot and Steg (2008) who empirically validated the significant relationship between the three values previously noted – egoistic, altruistic and biospheric – and sustainable behavior as will be outlined below.

Overall the role of values in shaping behavior has been empirically explored by a diversity of research disciplines and is widely seen as key antecedents for behavior (Rokeach 1979; Schwartz 1992). The most agreed upon conception of values stems from the work of Shalom Schwartz (1994, p.21) where values are defined as "a desirable transsituational goal varying in importance, which serves as a guiding principle in the life of a person or other social entity". Thus values firstly reflect a desired end-state, secondly remain abstract and transcend specific situations, thirdly serve as a guiding principle for in this case individual action and finally are ordered in a system of priorities. When faced with competing values – e.g. egoistic, altruistic and biospheric values – the individuals' choice is therefore based on the value considered most relevant to act on (de Groot & Steg 2008). Hence the study of values allows for theoretically reasoned and empirically validated mechanism for predicting attitudes and behaviors (Stern & Dietz 1994). Once more it is widely assumed that individuals hold a relatively stable and small number of values providing an economically efficient instrument for explaining similarities and differences in e.g. behavior (Rokeach 1973).

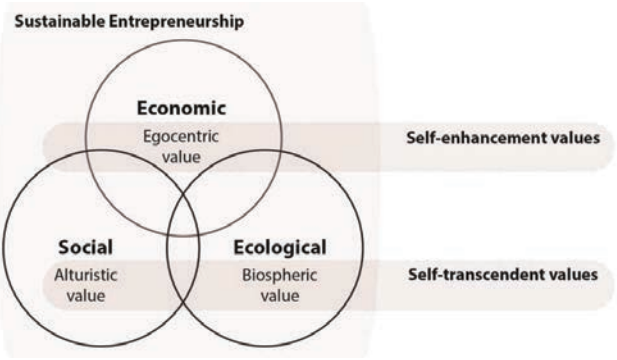
The role of values in predicting ESB is also well established within the literature and is often used as predictor of sustainable consumer behavior (Thøgersen & Ölander 2002; Jackson 2005). Especially the literature on social dilemmas and common-pool resources explore the impact of values on environmental behavior - commonly utilizing self-transcendence versus self-enhancement value orientations as means of understanding individual behavior (Ostrom 1990; de Groot & Steg 2008). These two dimensional values orientations derived from Schwartz's Value Survey (1992; 1994). Later studies within social dilemma's and environmental research further empirically validated these results showing that self-transcendence values are commonly associated with prosocial or collective-oriented behavior including pro-environmental behavior,

while self-enhancement values result in a prioritization of outcomes that optimize individual utility often at a cost to the commons (Van Lange et al. 2013; Parks et al. 2013). Given the limited number of values that influence environmental behavior these two dimensions are therefore seen as a significant predictor of ESB (Stern & Dietz 1994; Thøgersen & Ölander 2002).

These two value orientations have however been criticized as lacking when studying issues of ESB and sustainability at large leading for calls for a third value emphasizing the value of nature (Axelrod 1994; Stern 2000). Specifically since ESB behavior may both occur due to the perceived cost to oneself, a social costs for others or due to the perceived costs to the ecosystem and biosphere itself. Self-transcendence specifically may therefore be driven both by respectively a social-altruistic value or what has been conceptualized as a biospheric value. Theoretically it was therefore argued we should conceive of three values influencing ESB: egoistic, altruistic and biospheric. Empirical work by de Groot and Steg (2008) has later validated these observations hence our value frames build upon these three. In addition de Groot and Steg (2008) also observed that while altruistic and biospheric correlate significantly, they do diverge when individuals are placed in a situation where the choice is between a social or environmental good e.g. when choosing to donate to either a humanitarian (social) or environmental organization. Here they find that altruistic oriented people exhibit a significant intention to invest in humanitarian organizations, while biospheric oriented people exhibit significant intention to invest in an environmental organization. We therefore postulate that a similar observation will emerge when seeking to explore the role of values in predicting the individuals' pledge in specific campaign. We therefore expand our understanding of ESB to include both a social and environmental component that while correlating may also diverge. Firstly the study suggests that this is necessary because this reorientation of values appears to correlate well with the empirical observations of de Groot and Steg (2008); that self-transcendence values (altruistic and biospheric) while correlating do differ significantly when seeking to predict behavior related to a choice between a social and environmental good. In the case of a crowdfunding different campaigns for example appeal to different self-transcendent value orientations e.g. one product could focus on being made using fair labor, while another could focus on being made from organic and/or recycled materials. A differentiated understanding of this is therefore called for. Secondly this reorientation is also consistent with

the taxonomy most commonly used when conceiving of sustainability - specifically that it consists of three central dimensions the economic, social and environmental (Brundtland Commission 1987; Rio Declaration 1992). Thirdly this also consistent with literature on sustainable entrepreneurship that is seen as an individual or group individuals who have recognized, developed, and exploited an opportunity to "bring into existence a future goods and services with economic, social and ecological gains" (Belz & Binder 2017, p.2). As detailed in Figure 1 the study therefore expresses the respective values within the taxonomy most commonly used by the sustainable entrepreneurship literature and indeed the larger literature focused on sustainability (Elkington 1997; Klewitz & Hansen 2014).

Figure 1. Values and sustainable entrepreneurship



4. METHOD

In order to observe the causality between individual pledging behavior and the respective campaigns sustainability-orientation the study adopted a web-based experiment method inspired by past online experimental designs (see Camilleri & Larrick 2013; Oulasvirta et al. 2014). The campaign sustainability-orientation derived by framing the campaign text based on the three aforementioned values plus one neutral description. Each respondent was subsequently allocated the same fictive sum (200$ per round over two rounds) to back one or more campaigns and while all subjects faced the same campaigns (a total of eight respective products), the campaign text (or pitch) itself was randomly framed. By finally randomly combining the respective value frames within a specific campaign we can observe how variations in a value frame for the respective campaign influences pledge behavior. A web-based experiment in addition allows the study to better mimic a lifelike crowdfunding website, as opposed to e.g. a traditional public goods game used previously to study crowdfunding (Corazzini et al. 2015), and thus arguably observe more natural and externally valid behavior (see https://goo.gl/aL26HW for an example of the web-based experiment). The following sections will present the key methodological components that are foundation for studies approach.

4.1 Value Frames

In order to measure the causality between individual pledging behavior and the respective campaigns sustainability-orientation the individuals pledge was dependent variable upon which the effect of the value frames embedded in the campaign text was measured. Each value frame dominantly reflected in the campaign text (or pitches) available to the respondents.

- Egoistic value frame: *The benefits of the given product are expressed dominantly in terms of the individual utility derived (e.g. design and personalization, individual monetary savings, individual health benefits).*
- Altruistic value frame: *The benefits of the given product are expressed dominantly in terms of the social utility derived.(e.g. fair wages to workers, cooperative based business model)*
- Biospheric value frame: *The benefits of the given product are expressed dominantly in terms of the environmental utility derived. (e.g. organic or recycled materials)*
- Description (control): *The give product is expressed in terms of its descriptive characteristics. (e.g. function, color, purpose)*

As a control the paper opted for a descriptive "frame" as it represented the best available option for creating a control variable on which the impact of the respective other three value frames could be measured. These value frames included both within the text itself and represented by the subtitle teaser text for the campaign. The inclusion of both a text and subtitle teaser was in order to identify potential simplification strategies that respondents may adopt in scanning campaigns. This approach also better mimics an actual crowdfunding websites where campaign subtitle teasers play a key initial role in the selection of campaigns. For the sake of simplicity the control will be referred to as the descriptive value frame.

In order to validate that the product "pitches" did indeed reflect their intended value frames two consecutive pre-tests were run one firstly using a snowballed convince sample that resulted in 96 completed responses and secondly later using purchased panel sample resulting in 89 completed responses. The secondary panel sample was utilized to get a stratified sample (by region, gender, income) to insure that any network or systematic biases that may have influenced the convenience sample would be minimized in the second. There was expectation that using only the convenience sample to validate our value frame pitches would give an unrealistic presentation of how a US sample would label the given pitches.

The pitches themselves were firstly created in group discussions with fellow researchers and subsequently pre-tested in ad hoc individual and group discussions. The resulting pitches were then subjected to a validation using a simple survey design. The respondents of both the first and second survey were asked to label all eight product pitches shown at random utilizing the four value frame labels previously introduced or a fifth "other" category if they did not believe any of the labels qualified. Hence while all respondents were shown products 1 – 8 in the same order – the respective value frame were randomly selected in balance manner. In the initial survey respondents only underwent this process once, however in the second the study opted for two rounds to increase the number of observations we received out of the stratified sample. In correlating the intended value frame with respondent feedback we insured that the experimenter written campaign texts did indeed reflect their pre-supposed value frames. The sample validating the value frames in both rounds represented a separate sample from the one on which the experiment survey was applied. After each round the value framed pitches that performed

poorly were revised subsequently. In the initial round the cut-off for revisions was set for any value framed pitches that correlated less than 70 pct. with its intended value frame. In the second round the cut-off for revisions was set at 50 pct. due to more diverse nature of the sample and we expected a lower level of correlation with the academically constructed value labels. Having validated that product "pitches" reflect their intended values the study was subsequently distributed to a representative US sample. See Appendix A for the result the two value frame validation surveys.

4.2 Design

The four respective value frames were applied to a total of eight products in a two round experimental design - each round consisting of four products and a respective assigned value frame (4x4). Having two rounds with a 4x4 design insured that each value frame would be balanced across rounds and for the respective products – see Table 3.

Table 3. Product and value-frame design

		Product	Value		Product	Value
Block BA	Round 1 (4x4)	Product 1:	Egocentric	Round 2 (4x4)	Product 5:	Control
		Product 2:	Altruistic		Product 6:	Biospheric
		Product 3:	Biospheric		Product 7:	Altruistic
		Product 4:	Control		Product 8:	Egocentric
Block BB		Product 1:	Altruistic		Product 5:	Egocentric
		Product 2:	Biospheric		Product 6:	Control
		Product 3:	Control		Product 7:	Biospheric
		Product 4:	Egocentric		Product 8:	Altruistic
Block BC		Product 1:	Control		Product 5:	Biospheric
		Product 2:	Egocentric		Product 6:	Altruistic
		Product 3:	Altruistic		Product 7:	Egocentric
		Product 4:	Biospheric		Product 8:	Control
Block BD		Product 1:	Biospheric		Product 5:	Altruistic
		Product 2:	Control		Product 6:	Egocentric
		Product 3:	Egocentric		Product 7:	Control
		Product 4:	Altruistic		Product 8:	Biospheric

The product themselves were screened in smaller group discussions in order to insure that they had a broad appeal (e.g. we sought to identify products that were as gender neutral as possible) and were selected to be within the same price range inspired by former successful reward-based crowdfunding campaigns. Products within Round 1 are e.g. priced between 20 – 25 US dollars, while products in Round 2 are priced between 115 and 130 US dollars. Subsequent pitches were

written in order to dominantly reflect one of the value frames and subsequent feedback was then offered by colleagues. Table 4 provides an overview of the eight products included in the web-based experiment.

Table 4. Overview of the eight products

Round	Product	General product description
Round 1	Powercell	Thin sleeve that slips over battery to extend lifespan
	Vacuum	A vacuum-based food container
	Dora Bars	A nutritious snack bar
	Advensac	A travel sack with adaptable split storage
Round 2	Smartmeter	Wireless “smart” thermostat
	Ebuds	Wireless earbuds designed to fit every type of ear
	Gazelle	Personalized tailored sportswear
	Vulcan	Temperature Adjustable Mug

Finally the front-end of the experiment itself utilized a HTML5 based template design with a number of back-end embedded surveys. The HTML-code serving to create a realistic interface while the embedded surveys served to record and correlate the specific pledge with the given product and subsequent value frame. Finally the respondents IP-address served to connect the specific individual investments to the specific product and value-frame. Each round of the experiment included a main index page – providing the respondent with an overview of all four campaigns including a value framed subtitled teaser text – and four sub-pages linked to main index page for each of the four products. In addition to the two rounds the web-based experiment was preceded by an explanative introduction and after the first round a product evaluation of four initial products (Powercell, Vacuum, Dora Bars, Advensac) was conducted. Finally after round 2 another product evaluation was conducted on the final four products in addition to a questionnaire on a number of personal characteristics. More details of the product evaluation and questionnaire are outlined in section 4.4.

Ideally for the design real money would have been used, instead of a fictive allocated sum; however, in practice the implementation of such an approach would been unfeasible given the web-based nature of the experiment barrier including the amount of personal information and not least resources needed to execute properly. It would also have created taxation issues and may dissuade participation as it would require respondents to relinquish significant personal information. In addition the products were hypothetical and could therefore not be purchased. It

was therefore deemed unfeasible to utilize real money. We also argue that vast majority of reward-based crowdfunding platforms pledges are not a direct purchase. Rather they represent the crowdfunders' backing, or willingness to support a campaign, if it reaches its' funding goal. Hence like in this experiment, backing a campaign is not the same as actual purchase – it represents a willingness to purchase by the individual, but not the action itself. None-the-less a component of social desirability may emerge from the results given this limitation.

4.3 Sample

Traditionally many closed experiments suffer from the so-called 'college sophomore problem' reflecting the overrepresentations of college students (Sears 1986; Cooper et al. 2010). The resulting observations have led to avid debate on the reliability of these studies when they seek to generalize about the population at large (see Reynolds 2010; Cooper et al. 2010). However, despite these criticisms college student still represent the most commonly utilized sample group perhaps because most experiments require pre-installed, linked and synced software to run (Cooper et al. 2010). The emergence of online or web-based experiments (see Reips 2000), however, offer an alternative option that provide a "serviceable replacement for more traditional data sources, such as college students and other similar convenience samples" (Zhou & Fishbach 2016, p.1; see also Paolacci & Chandler 2014). The study therefore opted to embrace this approach utilizing a browser-enabled design with the specific goal of being able to approach a more representative sample.

Utilizing the survey provider Qualtrics the web-based experiment was circulated to a representative national sample within the United States (US). The US selected as it to date remains one of leading crowdfunding countries in the world hosting many of the largest reward-based crowdfunding platforms including Kickstarter and Indiegogo (Mollick 2014). Given this strong presence it seemed as natural first point of departure for studying the phenomena. The sample was collected utilizing a simple random sample of the US population compiled using overall demographic quotas based on census percentages for representation: age, gender, ethnicity, household income, and census region. The proposal was that we may thereby achieve more generalizable causal conclusions as compared to convenience sampling or a college sophomore sample. In total, 989 valid web-based experiments were completed (response rate

51%). Table 5 on the following page illustrates the main summary statistics for the sample composition.

Table 5. Main summary statistics for the sample composition.

Characteristics		%	Characteristics		%
Gender	Female	59.2	**Marital Status**	Single, never married	19.8
	Male	40.7		Married or long-term	60.5
	Prefer not to say	0.1		relationship	12.6
				Divorced	6.0
				Widowed	0.7
				Separated	0.4
				Prefer not to say	
Age	18 – 24	3.6	**Employment**	Full-time employed	31.9
	25 – 34	17.3		Part-time employed	10.8
	35 – 44	15.1		Self-employed	7.0
	45 – 54	16.0		Unemployed	9.6
	55 – 64	23.2		Homemaker	12.1
	Older than 65	24.1		Student/ in education	2.0
	Prefer not to say	0.7		Retired	26.0
				Prefer not to say	0.6
Income per month	Less than 1400 $	21.1	**Years of education**	11 years or less	1.5
	1401 – 1650 $	7.5		12 – 13 years	21.9
	1651 – 1900 $	5.2		14 – 15 years	24.2
	1901 – 2150 $	5.4		16 – 18 years	37.4
	2151 – 2400 $	5.9		19 – 20 years	6.7
	2401 – 3000 $	7.6		20 years or more	7.6
	3001 – 3600 $	8.6		Prefer not to say	0.7
	3601 – 4200 $	8.0			
	4201 – 4800 $	5.8			
	More than 4800 $	17.2			
	Prefer not to say	7.7			

4.4 Additional Questionnaire

In order control for the affect that personal value orientation and product involvement may have on individual pledging behavior the study employed respectively de Groot and Steg's (2008) personal value orientation scale and Zaichkowsky's (1994) Personal Involvement Inventory. Firstly de Groot and Steg's (2008) personal value orientation scale to examine the respondent's value orientations in order to observe the interaction affects that personal value orientation may have in terms of influencing which campaign value frames affect pledging behavior. In line with Schwartz (1994), respondents were asked to rate on a 9 point Likert scale the importance of the 12 value orientation below "as a guiding principle in their lives". Each of the three value frames

(egoistic, altruistic and biospheric) measured using four subsets. In addition to control the individuals' respective interest in the eight different products presented, a post-test was also run employing Zaichkowsky's (1994) Personal Involvement Inventory (PII). The respective individuals' final Personal Involvement Inventory for each product rated on a scale from 10 to 70 with 70 indicating a very high level of PII4. The Cronbach's alpha for the personal value orientation and the PII were all shown to exceed the 0.7 threshold set-out by Saunders et al. (2012) to denote internal consistency. Appendix B includes an overview of respectively de Groot and Steg's (2008) personal value orientation scale and Zaichkowsky's (1994) Personal Involvement Inventory. Finally, the paper also controls for other common independent variables outlined in section 4.6.

4.5 Selective Attrition

In order to minimize the impact of selective attrition that is especially prevalent in online or web-based experimental studies - due to higher dropout rates (see Zhou & Fishbach 2016) - the study was designed so to minimizing the potentially harmful effects of selective attrition. The current design implemented in such a fashion that no block was more arduous to complete as compared to the others. This was implemented to avoid skewed dropout rates between interventions that are comparably more or less arduous – this is also reflected in similar dropout rates for the four blocks where participants were randomly assigned (BA 48%, BB 46%, BC 48%, and for BD 52%). To control for variations in respondent dropouts within the respective blocks we ran a number regression analyses by blocks on a number of demographic characteristics . For the variables of income (categorical), married (dummy) and gender (dummy) we observe that block BD was significantly different and while we would expect to observe some significant differences when running six variables in a four way comparison these differences nonetheless require a secondary control. We therefore ran a secondary control to observe whether this resulted in any significant difference with regards to the personal values of the participants or product evaluation across groups as this could bias the results. No significant differences were observed.

The mean dropout rate for the experiment was 49% which is within what can be expected from online experiments that can range from 1% to 87% depending on the specific nature of the experiment (Reips 2000). However, as noted by Zhou & Fishbach (2016, p.4) one should be

"concerned if dropout rates are substantial (e.g., 20% or above), because [of] the threat of compromised internal validity due to selective attrition". Having compared attrition rates and controlled for differences between blocks within the experiment we are confident that selective attrition will have only negligible effect on the experiments internal validity.

4.6 Statistical Analysis

The dependent variable "pledges" is measured in relative percentage terms where the study observes each pledge as a pct. of the total sum pledged by the given individual. The study adopts a relative rather than absolute sum in order to account for the fact that 65.2 pct. of the sample pledged only part of their total allocated budget. A relative percentage of the total sum pledged was therefore seen to provide a more accurate account of pledging behavior with regards to respective effects of the value frames. If subject A spent 50 dollars on campaign X and respectively 25 dollars on product Y and Z the respective relative pledge would be 50 pct., 25 pct. and 25 pct.

The analysis itself was conducted in a stepwise fashion in order to best capture the diversity of insights emerging from the experiment and various potential factors that could be seen to influence pledging behavior. Firstly, model one sought to observe the causation between the respective value frames and the relative amount pledged. Hence the primary independent variables in the first model are only the value frames themselves. Subsequently, model two sought to observe the potential interaction affect that we could expect between the respective value frames of the campaign texts with the individuals own stated values with relation to three value frames. This in order to gauge both how like and contrary values between personal value orientations (see section 4.4) and campaign value frames influence pledging behavior. Building upon previous literature noting a causation between personal values and subsequent purchasing behavior (Dickson 2000; Vermeir & Verbeke 2008). The second model thus seeks to observe the interaction affects between the campaign value frames and personal value orientations on pledging behavior. Finally, model three sought to observe how the specific products themselves maybe influenced differently by the respective value frame by discerning the effect of the respective value frames by the individual products. This final model drawing inspiration from the limited prior literature that suggests that product types act as moderator for willingness-to-pay for sustainability characteristics (Sichtmann et al. 2016; Luchs & Kumar 2017).

The control for all models included age (years), education (years), income (categories) in addition to six dummy variables labelled “gender”, “married”, “retired”, “unemployed”, “Knowledge of CF” and “Participated in CF”. All affects are measured utilizing the descriptive value frame as the constant. The study employs the statistical & data analysis software Stata 14 utilizing a mixed-effects linear regression for all the models detailed above. This approach accounting for the fact that observations at individual level are most likely correlated to the two respective rounds in the experiment.

5. ANALYSIS

With the stated aim of observing the causation between individual pledging behavior and the sustainability-orientation of the respective campaign the study will now employ the three models as detailed above.

5.1 Model 1: Pledges and Campaign Value Frame

The evidence regarding the proposed connection between crowdfunder pledges and the sustainability-orientation of the campaign as noted remain mixed and divergent. In order to untangle these divergent observations we firstly observed the causation between the campaign value frame and respondent pledges in relative terms. The effect of the three value frame measured against the baseline set by the control (or descriptive value frame) as illustrated in Table 6 below.

Table 6. Effects of campaign value frame on pledges (Model 1)

Campaign value frame	Relative pledge in pct.
Egocentric value frame	1.813**
	(0.800)
Altruistic value frame	3.698***
	(0.800)
Biospheric value frame	3.025***
	(0.800)
Descriptive value frame	*Reference*
N	7912

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Mixed-effects linear regression coefficients. Robust standard errors in parentheses
Control variables: Gender (dummy), Age (years), Income (categories), Education (years), Married (dummy), Unemployed (dummy), Retired (dummy), Fullinvest (dummy), KnowledgeofCF (dummy) and ParticipationinCF (dummy)

The initial analysis thus reveals that each of three value frames had significant positive affect on pledges as compared to the control baseline. However it also revealed that in its current form we cannot detangle the respective effects of the value frames from one another as the confidence intervals overlap. There exist three plausible explanations for these results. Firstly, the variations in the sample in terms of the diversity of individuals with different personal value orientations could result in an entangled outcome when we fail to account for the possible interaction affects between campaign value frames and personal value orientation when deciding how to pledge. Second, a similar variation, but in this case by product, could also result in the overlapping confidence intervals where individual pledges based on the respective value frames varying

depending upon the product. Thus in failing to account for this each value frame appears to have a significant, but overlapping effect. Finally it could be because the campaign value framed texts were not registered as significantly different by the sample resulting in outcome where we cannot significantly distinguish between them. The following section will thus firstly seek to observe the potential interaction between the respondents reported value orientation scores and the value framed campaign text.

5.2 Model 2: Interaction Effect Between Campaign Value Frame and Personal Value Orientation

In order to observe the interaction effect between personal value orientation and the campaign value frame on pledging behavior the study sought to observe how like and contrary values between the individual and campaign text influenced the coefficients. Personal value orientation derived from a 9-point Likert scale as set-out de Groot and Steg's (2008). Table 7 on outlines the result of various interaction effects – starting with egocentric campaign value frames by the three personal value orientations and then subsequently repeating this for respectively the altruistic and biospheric value framed campaign texts.

Table 7. Interaction effect between personal value orientation and campaign value frame by relative pledge (Model 2)

Campaign value frame by personal value orientation	Relative pledge in pct.		
Egocentric by egocentric value orientation	0.7471*		
	(0.396)		
Egocentric by altruistic value orientation	0.3178		
	(0.576)		
Egocentric by biospheric value orientation	-0.9158*		
	(0.484)		
Altruistic by egocentric value orientation		-0.7859**	
		(0.396)	
Altruistic by altruistic value orientation		0.0609	
		(0.576)	
Altruistic by biospheric value orientation		0.6149	
		(0.484)	
Biospheric by egocentric value orientation			-0.6070
			(0.396)
Biospheric by altruistic value orientation			0.3008
			(0.576)
Biospheric by biospheric value orientation			0.6039
			(0.484)
N	7912	7912	7912

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Mixed-effects linear regression coefficients. Robust standard errors in parentheses

Control variables: Gender (dummy), Age (years), Income (categories), Education (years), Married (dummy), Unemployed (dummy), Retired (dummy), Fullinvest (dummy), KnowledgeofCF (dummy) and ParticipationinCF (dummy)

The interaction effect between personal value orientation and campaign value frame was surprisingly small. Indeed the only truly significant ($p < 0.05$) interaction effect observed was between campaigns framed in altruistic fashion and the egocentric personal value orientation, where the egocentric personal value orientation had negative relationship to pledging behavior towards campaigns framed altruistically. If we look at p-values < 0.1 there is also an observed positive relationship between egocentric personal value orientation and egocentrically framed campaigns and a negative relationship with regards to campaigns framed in a biospheric fashion. However the overall personal value orientation had a surprisingly small effect on pledging behavior and does little in terms of disentangling the overlapping effects observed in section 5.1. In the current study personal value orientation thus appear to have only a limited explanatory power when seeking to understand individual pledging behavior.

5.3 Model 3: Campaign Value Frames and Products

Having failed disentangle the overlapping observed effects of the respective value frames on pledging behavior using personal value orientations the study subsequently sought explore whether the products themselves could better explain the results. Specifically in seeking observe whether different products resulted in different pledging behavior based on respective value frames. Table 8 clearly indicates that while, as shown in section 5.1, all campaign value frames influenced pledges the diversity of affects appear to depend significantly on product itself.

Table 8. Causation between campaign text value frame and relative pledge by product (Model 3)

	Round 1				Round 2			
	Powercell	Vacuum	Dora Bars	Advensac	Smartmeter	Ebuds	Gazelle	Vulcan
Egocentric	0.8071	0.5882	-0.0235	0.8798	0.3703	8.5806***	4.9820***	2.0489
	(2.574)	(2.126)	(1.857)	(1.831)	(2.430)	(2.197)	(1.821)	(2.265)
Altruistic	5.3799**	4.1158*	7.0443***	4.9195***	-1.0625	1.2060	7.5615***	6.1231***
	(2.595)	(2.220)	(1.823)	(1.785)	(2.366)	(2.156)	(1.902)	(2.281)
Biospheric	7.1096***	1.5877	0.8582	1.0895	5.1974**	-0.4778	4.8680**	4.9809**
	(2.513)	(2.236)	(1.892)	(1.750)	(2.321)	(2.242)	(1.914)	(2.211)
N	989	989	989	989	989	989	989	989

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Mixed-effects linear regression coefficients. Robust standard errors in paratheses

Control variables: Gender (dummy), Age (years), Income (categories), Education (years), Married (dummy), Unemployed (dummy), Retired (dummy), Fullinvest (dummy), KnowledgeofCF (dummy) and ParticipationinCF (dummy)

Based on the table above it is notable how strongly products influence which of the three value frames influence pledging behavior – where only Gazelle continues to have entangled effects. This further exemplified by the fact that if we ran the regression again without the product Ebuds the egocentric value frame no longer has any significant affect. More surprisingly we also observe that while altruistic and biospheric value frames do correlate as generally assumed it is equally common for them to diverge. Confirming de Groot and Steg's (2008) initial observation that altruistic and biospheric appear to result in different behavior.

These results indicate that product specific characteristic appear to be a significant moderator in explaining the causation between campaign value frame and subsequent pledge behavior. For that same reason the author also feels confident that the campaign value frames texts were significantly different confirming the internal validity of the study. This based on both the outcome of the pre-test of the campaign specific value frames (see section 4.1) and subsequent observed variation of pledges by value frame when controlling for products.

6. DISCUSSION

Having reviewed the literature on crowdfunding and its potential as emergent source of finance for sustainable entrepreneurs diverging insights have emerged as noted. It was with this in mind that the study sought to examine which of the two sides was causally correct. Instead the study finds that any mono-causal conclusion on whether reward-based crowdfunding is an attractive proposition for sustainable entrepreneurs is misplaced. Instead varying personal characteristics, to some degree personal value orientation, and most significantly product specific details play a significant role in determining which of three value frames influence pledging behavior. Reward-based crowdfunding is therefore for certain types of campaigns an enabler of sustainable product innovation, while in other circumstances it appears to support hedonistic (or egocentric) oriented campaigns. These observations hold important implications for sustainable entrepreneurs hoping that reward-based crowdfunding could provide a growing alternative source for sustainable innovation finance.

While the observation that personal characteristics (e.g. gender) or personal value orientations to some degree influence pledging behavior is perhaps unsurprising, the strong moderating effect of products was a surprising outcome. Especially since most sustainable consumer behavior

models do not account for product specifics and instead focus the "internalist" versus "externalist" debate which seeks to gauge whether processes internal to the individual – i.e. attitudes, values, habits and personal norms – or external to the individual – i.e. fiscal and regulatory incentives, institutional constraints and social norms – best predict sustainable consumer intention and behavior (Jackson 2005). Instead our study finds that products themselves also act as a significant predictor of sustainable intention (and behavior) that is independent of this "internalist" versus "externalist" debate. Campaign specificities relating to the product strongly influence which of the three value frame are associated with significant increases in pledges with only one product (Gazelle) exhibiting continued entangled affects across all three value frames.

These entangled observations may also explain the conflicting observation from the crowdfunding literature that relate to the effect of sustainability on the likelihood of funding success. The study finds that if we seek to study the effect of sustainability on the likelihood of funding success without accounting for product specificities we lose important nuances. Hence sustainable entrepreneurs may for certain products find a ready supply of willing backers, while for other products face issues with crowdfunders unwilling to accept the trade-off between sustainability and other value attributes. In aggregating the outcome of large datasets with relation to the effect of sustainability on the chances of funding success we run the danger of losing this product or campaign sensitivity.

Drawing on the literature on the influences of product types on consumers' willingness-to-pay for sustainability we find some limited insights primarily within the domains of food (de-Magistris & Gracia 2016; Tait et al. 2016), fashion (Hustvedt & Bernard 2008) and energy/housing (Bollino 2009; Robinson et al. 2016). This literature suggests that especially functionality, esthetics, and price are important moderators on a person's willingness-to-pay for a sustainable product/service. A few articles further observe the general value attributes associated with willingness-to-pay and sustainability - including trade-offs between hedonistic (e.g. esthetics), utilitarian (e.g. functional performance) and sustainable product characteristic (Sichtmann et al. 2016; Luchs & Kumar 2017). This literature, however, focuses on trade-offs within products i.e. the individual (un)willingness to sacrifice respectively esthetics or functional performance for sustainability and therefore not directly applicable to our discussion.

Instead we observe that the product itself may be strong a moderator of willingness-to-pay for sustainability.

Building upon these observations the paper proposes that product characteristic relating to use and purpose could represent a manner by which the results can be interpreted. Including accounting for the likely public or private setting in which the products would inhabit given that peer effects are seen to significantly influence consumers' willingness to pay for sustainable products (Salazar & Oerlemans 2016). Table 9 a more detailed overview of the eight products within the experiment.

Table 9. Detailed overview of the eight products

Product	Product description	Product characteristics	Value frame
Powercell	Thin sleeve that slips over battery to extend lifespan	Home use | Battery powered remote/appliances | Out of sight	Altruistic Biospheric
Vacuum	A vacuum-based food container	Home use | Kitchen | Private and potentially seen by limited number of people	None
Dora Bars	A nutritious snack bar	Personal consumption | Diverse locations | Public, but not a typically source of focus	Altruistic
Advensac	A travel sack with adaptable split storage	Personal use | Traveling & active use | Public and source of potential attention	Altruistic
Smartmeter	Wireless "smart" thermostat	Home use | Diverse locations in home | Private and potentially seen by limited number of people	Biospheric
Ebuds	Wireless earbuds designed to fit every type of ear	Personal use | Diverse locations in public | Public and source of potential attention	Egocentric
Gazelle	Personalized tailored sportswear	Personal use | Diverse locations in public | Public and source of potential attention	Egocentric Altruistic Biospheric
Vulcan	Temperature Adjustable Mug	Personal use | Home or office | Public and source of potential attention	Altruistic Biospheric

In terms of our initial insights we find that the two products that are most visible and associated with on-person everyday use (i.e. Ebuds & Gazelle) were significantly influenced by egocentric value frames, while home use products (i.e. Powercell and Smartmeter) were in turn significantly associated with altruistic or biospheric value frames. This could suggest that products that are visible and associated with personal style attract support on their egocentric

merits – e.g. design and functionality – while for more out of sight and in home products altruistic – e.g. fairly produced – or biospheric – e.g. environmentally friendly – values frames prove more enticing for attracting pledges. These observation, however, require further research as they are for example challenged by other products like the AdvenSac that is both visible and for personal everyday use, but was significantly influenced by only the altruistic frame.

Finally the study observes that sustainable value frames – the altruistic and biospheric frames – often do not correlate as we would expect from theory. Instead just as certain products significantly influence whether a (un)sustainable value frames predict pledging behavior, the study further finds that what we would typically consider correlating sustainable value frames can result in diverging behavior. Hence in certain circumstances only altruistic value frames significantly predict pledges (i.e. Dora Bars, Advensac), while in other only biospheric value frames significantly predict pledges (i.e. Smartmeter). Therefore in addition to diverging pledge behavior by product with regards to consumers' willingness to support sustainable or unsustainable products – the study also shows similar characteristics for social or environmentally oriented products. For certain products pledging based on social sustainability component while in other cases along biospheric (or environmental) sustainability component.

Reward-based crowdfunding therefore appears to enable a great diversity of entrepreneurship from traditional entrepreneurs pursuing an economic bottom-line, to social & and environmental entrepreneurs pursuing respectively an economic and social/environmental bottom-line, or finally sustainable entrepreneurs pursuing a triple-bottom-line (Shah & Tripsas 2007; Lenox & York 2012; Belz & Binder 2017). With crowdfunders pledging behavior significantly dependent on personal characteristics and personal value orientations, but even more fundamentally on the product in question that is seeking finance.

7. CONCLUSION

Inspired by the diverging insights regarding the potential of crowdfunding as a financier of sustainable entrepreneurship the study sought observe the causation between individual pledging behavior and the respective sustainability-orientation of the campaign itself based upon the three values most commonly associated with sustainable consumer behavior (de Groot & Steg 2008). These three value frames – egocentric, altruistic and biospheric – derived from the VBN-theory

that were later empirically validated by de Groot & Steg (2008). Employing a web-based experiment mimicking a real-life crowdfunding platform and randomly combining the respective value frames within a specific campaign we observe how variations in a value frame for the respective campaign influences pledging behavior.

The study finds that mono-causal conclusion regarding whether reward-based crowdfunding is attractive alternative source of finance for sustainable entrepreneurs is misplaced. Instead certain products with an altruistic and/or environmental value frame significantly predict pledging behavior, while in others circumstances egocentric-oriented campaigns are best at attracting pledges. Reward-based crowdfunding is therefore appears to be neither a silver-bullet that will suddenly enable a great number of sustainable entrepreneurs to receive funding, but neither do crowdfunders appear adverse towards sustainably-oriented campaigns. Instead we observe that the strongest predictor of whether a sustainable entrepreneur is able to attract investment based on sustainably-oriented messages is not specific personal value orientations (i.e. strong egocentric, altruistic or biospheric personal values) or personal characteristics (i.e. age, sex and income), but rather the product itself. The products themselves detangling the overlapping confidence intervals related to pledging behavior at aggregated level that allow us to observe discernable effects of the three value frames on pledging behavior. Not only in terms of sustainable vs unsustainable (i.e. altruistic & biospheric vs. egocentric) value frames, but also with regards to sustainable value frames (altruistic vs. biospheric) diverging and influencing pledging behavior differently depending on the product.

The study therefore suggests that greater attention to the products themselves when seeking to understand both crowdfunding behavior, but also willingness-to-pay in a sustainability context, is called for. This includes more detailed, potentially qualitative, understanding of successful sustainable crowdfunding initiatives. In addition one could also explore experimentally how mixed messages, for example campaigns framed in an egocentric and biospheric value frames, affect behavior. Exploring also how different models of crowdfunding (reward vs. equity) may be influenced differently by value frames. Perhaps purchasing behavior and investment behavior activate different cues for support various campaigns just as product specifics appear to do. Additionally one could overcome the issues with regards to the hypothetical nature of the experiment, by introducing real costs to respondent behavior. This could be achieved by

employing a similar design as here, but with real products that can framed in various ways and then stating that certain number of participants drawn at random will be given the products they purchase in addition to the left over budget. Alternatively one could construct a closed public-good experiment where campaigns that hit a certain level of funding will result in the participants being rewarded, while the ones that fail to reach their funding goals will lose. Finally an alternative method of measuring personal value orientations that is not a one-dimensional Likert-based approach is also recommended. The current approach outlined by the various literatures arguably suffering from its unidimensional nature where each of the three values and their respective four subcomponents (see Appendix B) are measured in isolation on the previously noted Likert scale. Thus creating a context where respondents rate each values importance in an isolated fashion that in turn creates an idealized situation where rating one choice highly does not impact the other (Hansen & Bech 2012). This arguably removes the trade-offs and opportunity costs typically associated with acting in an egocentric/altruistic/biospheric fashion. There is arguably a need to introduce trade-offs if we are to better understand which values a given person holds in the highest regard. Employing a discrete-choice method where respondents are placed in a series of hypothetical scenarios in which they themselves have to choose between two alternatives consisting of a different combination of attributes relating to the three value frames could help overcome this unidimensional issue (Mangham et al. 2009).

Despite the limitations of the current web-based experiment the paper contends that this form of mimicked real-life experimental approach provides significant insights with regards the potential of reward-based crowdfunding as an alternative source of innovation finance for sustainable entrepreneurs. Both with regards to uncovering the causation between (un)sustainable value frames and pledging behavior, but also how products themselves largely dictate which value frame significantly predict pledging behavior. Something that to best of our knowledge remains largely unexplored both within the sustainability literature, but also the crowdfunding literature. Finally the study provides researchers with an example of how experimental methods allows us rigorously test theory and observe cause-effect relationships within the fields of for example entrepreneurship, innovation, or sustainable consumer behavior research.

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9. APPENDICES

Appendix A: Results of Value Frame Validation Surveys

		Round 1 – Convenience Sample			Round 2 – Stratified sample		
	Value Frames	Confirmed in N	# of Obs.	Confirmed in pct.	Confirmed in N	# of Obs.	Confirmed in pct.
Product 1 Powercell	Egocentric	22	24	92 pct.	25	47	53 pct.
	Altruistic	13	23	57 pct.*	14	47	30 pct.**
	Biospheric	22	24	92 pct.	36	40	90 pct.
	Descriptive	12	25	48 pct.*	18	44	41 pct.**
Product 2 Vaccuum	Egocentric	23	26	88 pct.	34	52	65 pct.
	Altruistic	15	24	63 pct.*	19	41	46 pct.**
	Biospheric	21	22	95 pct.	36	46	78 pct.
	Descriptive	20	24	83 pct.	18	39	46 pct.**
Product 3 Dora	Egocentric	20	25	80 pct.	27	41	66 pct.
	Altruistic	24	24	100 pct.	31	50	62 pct.
	Biospheric	20	24	83 pct.	29	39	74 pct.
	Descriptive	17	23	72 pct.	12	48	25 pct.**
Product 4 AdvenSac	Egocentric	18	22	82 pct.	16	45	36 pct.**
	Altruistic	22	25	88 pct.	27	47	57 pct.
	Biospheric	20	24	83 pct.	29	46	63 pct.
	Descriptive	16	25	64 pct.*	22	40	55 pct.
Product 5 Smartmete	Egocentric	20	24	83 pct.	28	43	65 pct.
	Altruistic	17	23	74 pct.	28	51	55 pct.
	Biospheric	22	25	88 pct.	32	48	67 pct.
	Descriptive	21	24	88 pct.	20	36	56 pct.
Product 6 eBuds	Egocentric	20	24	83 pct.	17	39	44 pct.**
	Altruistic	23	24	96 pct.	27	48	56 pct.
	Biospheric	21	23	91 pct.	35	46	76 pct.
	Descriptive	13	25	52 pct.*	32	45	71 pct.
Product 7 Gazelle	Egocentric	23	24	96 pct.	35	53	66 pct.
	Altruistic	22	24	92 pct.	27	40	68 pct.
	Biospheric	24	26	92 pct.	30	45	67 pct.
	Descriptive	13	22	59 pct.*	22	40	55 pct.
Product 8 Vulcan	Egocentric	17	23	74 pct.	26	44	59 pct.
	Altruistic	16	24	67 pct.*	35	46	76 pct.
	Biospheric	21	24	88 pct.	35	49	71 pct.
	Descriptive	19	24	79 pct.	24	43	56 pct.

Convenience Sample: *A total of 221 responses were collected of which 111 were incomplete. In the subsequent sample (110) 14 respondents employed clear simplification strategies. This resulted in 96 completed responses*

Stratified sample: *A total of 165 responses were collected of which 50 were incomplete. In the subsequent sample (115) 10 respondents employed clear simplification strategies. A time condition was also included where any respondent taking less than 50 pct. (300 seconds) of the average time (617 seconds) were cut. This resulted in 16 additional responses being cut resulting in a final 89 completed responses.*

Appendix B: Personal value orientation scale and Personal Involvement Inventory

Table B1: Personal value orientation scale

Value item
Egoistic value orientations
1. Social power: control over others, dominance
2. Wealth: material possessions, money
3. Authority: the right to lead or command
4. Influential: having an impact on people and events
Altruistic value orientations
1. Equality: equal opportunity for all
2. A world at peace: free of war and conflict
3. Social justice: correcting injustice, care for the weak
4. Helpful: working for the welfare of others
Biospheric value orientations
1. Preventing pollution: protecting natural resources
2. Respecting the earth: harmony with other species
3. Unity with nature: fitting into nature
4. Protecting the environment: preserving nature

Source: de Groot & Steg (2008)

Table B2: Personal Involvement Inventory

To me (object to be judged) is:									
1.	Important	○	○	○	○	○	○	○	Unimportant*
2.	Boring	○	○	○	○	○	○	○	Interesting
3.	Relevant	○	○	○	○	○	○	○	Irrelevant*
4.	Exciting	○	○	○	○	○	○	○	Unexciting*
5.	Means nothing	○	○	○	○	○	○	○	Means a lot to me
6.	Appealing	○	○	○	○	○	○	○	Unappealing*
7.	Fascinating	○	○	○	○	○	○	○	Mundane*
8.	Worthless	○	○	○	○	○	○	○	Valuable
9.	Involving	○	○	○	○	○	○	○	Uninvolving*
10.	Not needed	○	○	○	○	○	○	○	Needed

* indicates item is reverse scored

Source: Zaichkowsky (1994)

Chapter 10 | Discussion

Based on these four papers the dissertation can now begin to respond to the overall research question: *Under which conditions and to what extent can sustainable entrepreneurs with social and/or environmentally-oriented products draw benefit from reward-based crowdfunding*? In short, the dissertation finds that reward-based crowdfunding is neither a silver-bullet that will suddenly enable a great number of sustainable entrepreneurs to receive funding, nor is it an adverse or hostile setting. The dissertation will therefore propose a number of conditions, which appear to ameliorate the success of sustainable entrepreneurs in getting finance, as well as revealing conditions that relate to funding failure.

The present chapter will summarize the key findings of each paper and their overlapping insights before seeking to construct the aforementioned conditions relating to crowdfunding success and failure. The dissertation will subsequently discuss these findings in terms of implication to practice, the limitations of the dissertation, contributions to theory, and finally propose relevant areas for future research.

10.1 | Findings

The role of end-users (including sustainable entrepreneurs) in driving the transition towards a more sustainable society is a growing area of research, as illustrated in the literature review. Where the years 2010–2015 accounted for three-quarters of the total literature base. As with other forms of entrepreneurship, sustainable entrepreneurs are dependent on finance in order to enable the creation of their respective product or service invention. In this capacity reward-based crowdfunding represents a rapidly growing source of innovation finance for a variety of for- and non-profit projects (Zhang et al. 2014; European Commission 2015). It fills a prevalent funding gap that is prevalent for entrepreneurs who seek seed finance for their idea/inception and proof of concept/prototyping (World Bank 2013; Sorenson et al. 2016).

However – and just as observed in the literature review on sustainable end-user innovation – crowdfunding is not necessarily a dividend from a sustainability perspective (Nielsen et al. 2016). In fact, crowdfunding is, at its heart, arguably a consumptive exercise that enables a

diversity of niche products and services. These product and service are enabled because the respective entrepreneurs can now tap into a large and disperse crowd of consumers, wherein a small group may have a particular liking for a certain product. So while potentially enabling a diversity of sustainable products or services, reward-based crowdfunding also enables a host of other products and services, which feed into the current trends of overconsumption. The benefits of enabling the funding of sustainable entrepreneurship may then be counteracted by the financings of a host of other (unsustainable) entrepreneurs. Put simply reward-based crowdfunding is (as is any other form of consumption driven business-model) therefore embedded within a larger context, in which a great number of factors must change in order for us to transition towards a more sustainable level of consumption. The dissertation therefore finds that any mono-causal conclusions on reward-based crowdfunding as a "good" or "bad" thing for sustainable entrepreneurship is greatly misplaced. It rather seems to be embedded within a larger discourse on how to encourage sustainable behavior and consumption (Gifford & Nilsson 2014; Thøgersen 2014; van Vugt et al. 2014). The question is then, under which conditions and to what extent reward-based crowdfunding can be seen to enable sustainable entrepreneurs and their social and/or environmentally-oriented products.

To this end, the potential of reward-based crowdfunding in depends on organization; on organizing it in a fashion that best encourages a willingness to support sustainable innovation ahead of other forms of product and service innovation. In order to do so we must therefore understand how the process is organized; and furthermore, understand the co-dependent nature of crowdfunding. The conceptual paper provided us with initial insights into how the current static or stable approach within the literature runs the risk of overly simplifying the complex interactions, which successfully enable this form of consumer-driven financing (Nielsen 2016). If we are to truly understand how crowdfunding could enable sustainable entrepreneurship we must also be able to account for co-dependent variations in for example behavior relating to different models of crowdfunding. It is for instance not inconceivable that the drivers for supporting sustainable innovation in a reward-based setting differ from those within an equity-based setting. This view is inspired by the growing research focused on constructed preferences, in which contextual factors are seen to strongly influence values and preferences which, in turn, are fluid rather than fixed (see Slovic 1995; Payne et al. 1999; Warren et al. 2011). For these – and other – reasons, the dissertation only focused on one model of crowdfunding (ie. reward-

based crowdfunding) as it was identified as the most accessible and most commonly associated with product or service innovation.

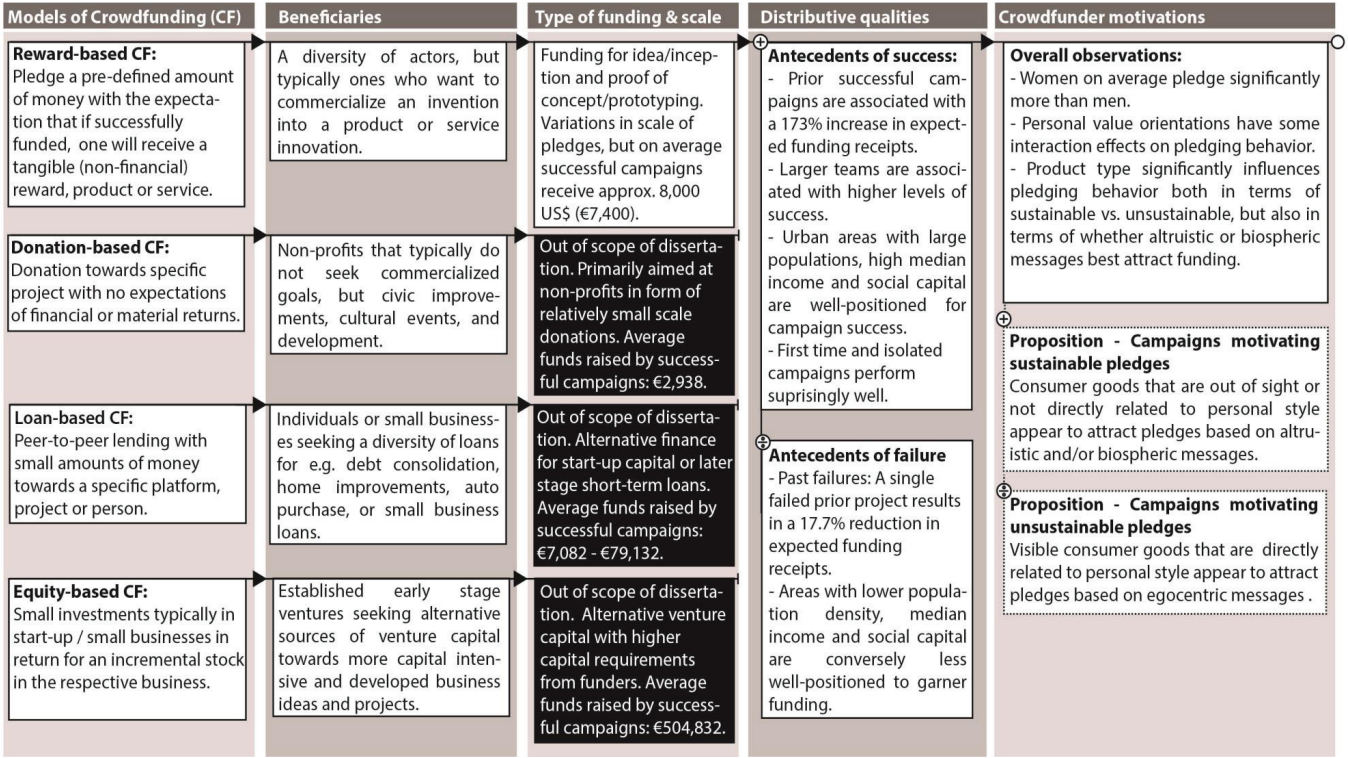
In order to understand under which conditions and to what extent reward-based crowdfunding can enable sustainable entrepreneurship, the dissertation sought to firstly uncover whether or not it was associated with an expansion of innovation finance beyond the current status quo. The longitudinal study observes that it indeed appears to enable a diversity of campaigns with the bulk of IndieGoGo recipients (150,000 campaigns) being newcomers to the platform from a geographically diverse area (Nielsen et al. 2017). This finding confirmed observations from earlier studies that indicate, which reward-based crowdfunding has – in one manner or another – led to an expansion of innovation finance available to entrepreneurs (see Lehner 2013; Agrawal et al. 2015; Sorenson et al. 2016). In addition the study revealed that reward-based crowdfunding can provide innovation finance well past the observed 50,000 US$ threshold set by the World Bank (2013). However – and in line with Mollick (2014) – it also finds that the average campaign funding level hovers around 8,000 US$; indicating that while some very successful campaigns can garner significant resources (the most successful reward-based campaign (Pebble Time) for example receiving $20,338,986 in support), most successful campaigns can expect and aim for significantly less. Mollick (2014) finds that the average funding level of fully funded campaigns is $7,825 for the reward-based platform Kickstarter. The study of this dissertation observed it as $7,980 for IndieGoGo. These variations in pledging scale depend heavily on the nature of the campaign and platform itself; however, an entrepreneur to a certain extent expect funding to fall within these confines. This confirms the observation that reward-based crowdfunding is well-matched for early seed funding stages and less so for growth, expansion, and maturation. Nonetheless it does offer alternatives to other forms of innovation finance where the successfully funded entrepreneurs often mirror the people funding them, which result in a clustering of finance around a small number of regions and actors (see Sorenson & Stuart 2001; Shane & Stuart 2002; Sorenson et al. 2016). Paper 3 of this, however, also finds that there are some signs that even reward-based crowdfunding is showing signs of field maturation characteristics of reinstitutionalization, where professional actors and resource strong geographic regions emerge. These are particularly well positioned to take advantage of the opportunities offered by crowdfunding platforms such as IndieGoGo. Despite these findings, reward-based crowdfunding does appear to enable new actors to gain access to

innovation finance and therefore offers some promise for sustainable entrepreneurship. A subsequent question is then whether these newly expanded innovation finance opportunities driven by user-consumers are a match for sustainable entrepreneurs?

The ability of sustainable entrepreneurs to attract financial support from user-consumers is seen as fundamental for understanding to what extent reward-based crowdfunding can be employed as a source of innovation finance. In order to observe this the dissertation employed a web-based experiment (on a representative sample in the continental US) that sought to explore the motivations of user-consumers to pledge towards specific campaigns. It achieved this by gauging the effects of various (un)sustainable product campaign text value frame orientations – egocentric values (what is in it for me), altruistic values (what is in it for others), and biospheric values (what is in it for the environment) – on respondents' pledging behaviors. The experiment found that certain personal value orientations (i.e. strong egocentric personal values) and personal characteristics (e.g. age, sex, and income) to some degree explain pledging behavior, but not nearly as significantly as the type of products itself. Products not only affects willingness-to-pledge in terms of sustainable vs. unsustainable (i.e. altruistic and biospheric vs. egocentric) value frames, but also with regards to sustainable value frames (altruistic vs. biospheric). The study therefore concludes that reward-based crowdfunding is for certain types of campaigns an enabler of sustainable product. The study suggests that in other circumstances it appears to support egocentrically oriented campaigns. Postulating that products that are visible and tied to everyday use appear to be sold on their egocentric merits (for example aesthetic quality and design), while products not directly tied to outward appearing personal style are more influenced by altruistic and/or biospheric messages.

Having outlined the key findings, Figure 8 now provides an overview of some of the key insights derived from the dissertation (in addition to the aforementioned conditions relating to success and failure that are especially relevant for sustainable entrepreneurs).

Figure 8. Dissertation findings and observed conditions relating to funding success and failure for sustainable entrepreneurs



As illustrated the dissertation finds that experienced crowdfunding teams (with past successes), who reside in an urban area with high median income and social capital and who pursue consumer goods that are out of sight (or not directly related to personal style) are well-placed to receive support. Campaigns are further boosted especially if they can mobilize female support and in turn only seek funding within the range of around 8,000 US$ (€7,400). Conversely sustainable entrepreneurs who have failed in the past to receive funding, who are located in poorer rural areas, and who pursue visible consumer goods relating to personal style targeting funding range well-past 8,000 US$ (€7,400) will find it more difficult to garner funding. A core question for proponents of crowdfunding as a driver of sustainable entrepreneurship is therefore similar to those faced by many other scholars of sustainable consumption relating to how we can alter consumer behavior. While there is evident potential for certain types of product and service innovations there also those that appear ill-suited. Fashion and other "wearables" for example appear "locked-in" consumers towards unsustainable practices where they desire the latest fashion or newest models (Niinimäki & Hassi 2011). In this regard reward-based crowdfunding appears to follow rather than break current market pressures.

10.2 | Implications for Practice

For practitioners

Reward-based crowdfunding represents a rapidly growing source of innovation funding for a diversity of entrepreneurs, start-ups and even established firms. In order to distill the key insights of the dissertation for practitioners Table 9 provides a series of Q&As related to entrepreneurs successfully achieving funding.

Table 9. Q&A for (sustainable) entrepreneurs planning to pursue reward-based crowdfunding

Audience	Questions	Insight
All entrepreneurs	What is your target?	The amounts typically raised by successful crowdfunding campaigns vary greatly; however, the average funding level of fully funded campaigns is approximately $8,000. Campaigns seeking significantly greater sums should also consider alternatives.
	Have you budgeted for failure (and success)?	A large majority of campaigns fail to meet their funding goals, but the costs relating to preparation are rarely accounted for (Gerber & Hui 2013; Mollick 2014). Even when successful, campaign founders often fail to account accurately for costs associated with implementing their project plan. These include higher than expected development costs or even mailing and return costs (Blaseg & Skiera 2016).
	Have you succeeded or failed in the past?	Past success and failure are strongly associated with the likelihood of funding success. A prior successful campaign is associated with a 173% increase in expected funding receipts, while past failure is associated with a 17,7% reduction in expected funding receipts.
	Have you prepared a disseminat ion strategy?	The scale, connectedness, and "quality" of your team are significant predictors of crowdfunding success (Zheng et al. 2014; Nielsen et al. 2017). A large majority of campaigns receive only small amounts of support, while a small minority of campaigns receives the bulk of funds raised. For example in the case of IndieGoGo "the top 10% of campaigns receive nearly 80 % of funds pledged to campaigns in our sample" (Nielsen et al. 2017, p.16). Most campaigns fail early and significantly below their target. In addition, the ability to mobilize female support may lead to higher pledging levels (Nielsen 2017).
	Where are you located?	A campaign located in an urban setting with high median income and social capital is significantly more likely to receive funding as compared to ones located in poorer rural areas.
Sustainable entrepreneurs	What type of product are you pursuing?	Consumer goods that are out of sight or not directly related to personal style appear to attract significant higher levels of pledges, based on altruistic and/or biospheric values. Conversely visible consumer-goods related to personal style appear to attract investments based on egocentric characteristics.

In addition to the aforementioned there are a host of other preconditions that are not within the purview of the dissertation; including for example how to manage a successfully funded campaign after having been successfully funded. The current literature is largely limited to understanding the antecedents of funding success and failure, while neglecting how funding success is translated into a successful business model. This is problematic as Blaseg & Skiera (2016) note that one-in-ten fully funded campaigns fail to deliver on the promised product or service. Other areas of concern for practioners could also include the dangers of so-called "copycats" that utilize reward-based platforms as an access point for finding products to copy (Smith 2013).

For policy makers

From a policy perspective reward-based crowdfunding provides a number of opportunities but also challenges most commonly related to questions of fraud and consumer protection. To begin with – and with focus on the opportunities provided by reward-based crowdfunding – three emergent ways have arisen, which that exemplify its potential: Firstly, policy makers can help initiate platforms aimed at tackling social or environmental challenges, as exemplified by the German crowdfunding platform EcoCrowd[22] which is a partly publicly funded platform created to tackle environmental challenges. The benefits of such of initiatives are that, if successful, they become self-sustaining resource centers for sustainable ideas and ventures. End-users can thereby engage in the process of sustainable innovation in a number of capacities; from rigorous engagement in the form of initiating campaigns to less intensive engagement in the form of active campaigning or passive contributions towards a specific project.

Secondly, policy makers could utilize existing platforms and co-finance projects, which have already received significant support. Examples here of include The Peckham Coal Line urban park[23] that sought to convert an old raised coal line in London into a raised urban park through the civic crowdfunding website SpaceHive. The Peckham Coal Line ultimately raised £75,757 of which governmental funds represented £10,000. In these circumstances policy makers can act to support community initiatives that – at least initially – enjoy a high degree of democratic legitimacy and often draw on the goodwill of multiple sources of volunteers. Govement projects

[22] https://www.ecocrowd.de/en
[23] https://www.spacehive.com/peckhamcoalline

could thereby be implemented by alternatively facilitating "entrepreneurial ideas of the community. Thereby allowing citizens to play both an active role in supporting the projects they would like to see happen, while also seeing the government as a facilitating actor in enabling these projects." (Nielsen et al. 2015, p.34).

Finally, policy makers could seek to employ the diversity of insights emerging from the literature on "crowds" to solve collective problems. The literature on collective intelligence[24] (see Malone et al. 2009; Pedersen 2016) illustrates that crowds can in certain circumstances outperform individual experts. Meanwhile the literature on crowdsourcing (see Jeppesen & Lakhani 2010; Afuah & Tucci 2012) provides insights into how open calls to a "crowd" rather than to a designated "agent" can solve complex technical problems. Lastly, the emergence of crowdfunding illustrates that the crowd is also rapidly becoming a growing source of innovation finance. The MIT Climate CoLab (2017) project exemplifies the potential of mobilizing crowds to solve collective problems as they employ collective intelligence to solve global climate change. The dissertation further proposes that a hybrid model of crowdsourcing and crowdfunding could provide additional momentum for a variety of projects. This hybrid cross between crowdsourcing and crowdfunding employs, for example, collective intelligence as a means to identify solutions to collective problems, crowdfunding as source of financial support to enable them, and crowdsourcing as a tool to solve technical issues that may arise during the process.

Conversely reward-based crowdfunding also presents a diversity of challenges for policy makers; the most pressing within the literature relating to issues of failure and fraud. Failure is an evident possibility in reward-based crowdfunding where one-in-ten campaigns fails to deliver on the promised product or service; either because it does not live up to promised expectations or because it cannot deliver all together (World Bank 2013; Blaseg & Skiera 2016). From a consumer protection perspective, reward-based crowdfunding is therefore arguably a more risk-prevalent form of consumption compared to traditional consumption. This is also reflected in the Terms of Use of, for example, Kickstarter (2017), in which the company notes that campaign founders "must make every reasonable effort to find another way of bringing the project to the

[24] Also labelled Wisdom of Crowds (Surowiecki 2005), Collective Wisdom (Elster & Landemore 2012), and Swarm Intelligence (Eberhart et al. 2001)

best possible conclusion for backers" but ultimately campaigns can and will fail to deliver. Backers can subsequently pursue legal action, however, only against the founders and not the platform itself.

Fraud is often a noted concern with crowdfunding; however, in the case of reward-based crowdfunding, Mollick (2014) finds the rate of fraud in crowdfunding to be very low with only 2.3% of projects showing indications of potential fraud on the Kickstarter platform. This is due to the interplay between a number of features of most crowdfunding platforms including "threshold funding, active participation by large communities, frequent interaction between founders and potential funders, and the ability of founders to broadcast signals of quality through rich descriptions and biographic information" (Mollick 2014, p.14). The most common policy concern – for reward-based crowdfunding at least – therefore appears to be focused on fostering ways in which to help founders create realistic plans and goals. Policy interventions thus seem limited to educating entrepreneurs.

However, the dissertation argues that unanswered questions remain; not least with regards to accountability. Platforms typically appear to adopt a shroud of utilitarian function, where they are not an actor but rather a mechanism for carrying out a process. This means that agency and responsibility rests with and between the founders and backers using the platform. However, would Kickstarter be partially liable if one of the hosted campaigns was later shown to use child labor or if its product contained high levels of a carcinogenic compound? These discussions become especially relevant when reflecting on other platform-based organizations such as Uber, AirBnB, and YouTube. With multiple central decision hubs as introduced in the conceptual paper, placement of responsibility becomes increasingly pertinent and the complexities for policymakers become clear. For example, how to implement reform without hampering the individuals' property rights becomes an important question.

The dissertation further postulates that while the chances of fraud within reward-based crowdfunding remain limited, because of the relatively small sums of to be made from the average campaign, this is likely not so for other models of crowdfunding. In equity-based crowdfunding (with higher monetary stakes) the chances of criminals creating fake crowdfunding platforms and fake companies to attract investors' money is arguably significantly

increased. Hence rather than creating fake campaigns that have to stand up to wisdom, queries, and insights of the entire crowd, the most likely approach is arguably to create a fake platform with content and phish for investments. Regulation in order to approve, certify, and monitor platforms on both a national and EU-level is therefore needed in order to protect consumers, as well as to insure that the trust-based foundation on which crowdfunding is founded remains.

10.3 | Limitations

The limitations of the individual papers have already been discussed in the respective papers as well as in Chapter 5. I will therefore forgo repetition and instead focus on the overarching limitations of the dissertation.

Firstly, the novelty of the research field presents both a unique opportunity to explore a nascent phenomenon but also creates paucity of insights to draw upon. The vast majority of the literature on the field originates from 2014 and onward, and it remains arguably compartmentalized, varied in quality, and generally unstructured. This is exemplified by the diversity of definitions of crowdfunding and by extension the numerous understandings of the phenomenon that depend on the specific aims of the paper itself (Moritz & Block 2014). The dissertation argues that this has resulted in a conception of crowdfunding as a stable component of actors and things, rather than in a fluid and co-dependent form of organizing. However – and spite of the dissertations own noted critique - the empirical examination of reward-based crowdfunding has largely adopted a similar approach to that critiqued by the conceptual paper (Paper 2). The dissertation employing simplified models in order to analyze the process – the web-based experiment, for example, recreated only aspects of the actual crowdfunding experience not including the ability to screen and communicate with the founders of the campaign, see the actions of others, or share experiences via social media. The simplification of the process was necessary in order to observe meaningful correlations between variables and to identify causal influences on choice. However this approach also removes complexity and thus runs the risk of oversimplifying or missing out on key causal influences on decision-making.

This leads to the second limitation of the dissertation, which is one of method. The dissertation draws heavily on quantitative research and could have been well-served in also applying a qualitative approach in order to gain more in-depth analyses. The methodological design, for

instance have, employed interviews in order to examine why respondents of the experiment supported various products in the manner they did. Interviews would also allow us to better understand, for example, why certain projects (that to a certain degree confound logic) proved very successful in garnering funding. The success of the potato salad crowdfunding project managed, for example, to make 55.492,00 US$ based on a project description and video with founder Zack Danger Brown simply stating that "basically I'm just making potato salad. I haven't decided what kind yet" (Brown 2014). Alternatively, a Qualitative Comparative Analysis (QCA) could have been employed in order to explore the comparative differences in successful and unsuccessful campaigns; utilizing these positive (funding success) and negative (funding failure) outcomes as a means to identify the major causal conditions that relate to these respective outcomes. QCA is typically applied to small and intermediate-size Ns (for example 5-50) providing in-depth knowledge of how various causal conditions and combinations hereof might generate one of the two outcomes (Ragin 1987; Rihoux & Ragin 2008).

Thirdly and finally, the dissertation is primarily focused (empirically) on the funder perspective of crowdfunding; examining how funding is distributed and what motivates individuals to invest in a given campaign. This perspective assumes that sustainable entrepreneurs would be interested in this form of alternative finance, which may not necessarily be the case. Reward-based crowdfunding requires such an investment in communication and expectation management that if mishandled could cause undue stress to especially novice entrepreneurs or young start-ups (Colombo et al. 2014; Francesco 2017). The dissertation tacitly assumes that reward-based crowdfunding fills a needed funding gap for entrepreneurs based on prior literature; however empirically, it remains to be seen whether this form of finance is actually in demand or is merely a last resort.

10.4 | Theoretical Contributions and Future Research

The dissertation contributes to a number of research disciplines that is driven forth by its phenomenon-driven research approach. In the following section the dissertation will firstly highlight the four primary insights that have been derived from the respective papers. It will then present how they relate to theory in addition to including short term recommended future research. Subsequently it will seek to propose more blue sky thinking in terms of its overall contributions and propose similar future research; research that is more abstract and less grounded in convention. The two sections are respectively labelled first and second order insights and future research.

First order insights and future research

Firstly and within the interdisciplinary field of sustainable innovation, the dissertation systematically presents a range of insights into the ways in which end-users can actively, rather than passively, drive sustainable innovation, including a taxonomic framework for classifying these actors and the respective barriers and drivers they face. In doing so, the dissertation contributes to the literature with insights regarding the motivations that drive end-user innovation; noting that end-users appear to be not only motivated to innovate on the basis of personal experiences and needs (as commonly noted in the user innovation literature) but also to do so based on the needs of others. This finding contributes directly to the literature on user innovation by proposing that individual specific experiences and needs do not fully cover the spectra of reasons for why end-users innovate as they can also do so on the basis of observed social needs and experiences. Additionally, the paper contributes to the field of sustainable innovation by systematically cataloguing the numerous ways through which end-users (or consumers) can also innovate themselves rather than being passive recipients of innovation.

Secondly, the subsequent conceptualized model of the crowdfunding process contributes to the crowdfunding literature by providing – to the best of my knowledge – the first systematic attempt to theorize the organization of crowdfunding. The paper presents a model of crowdfunding where the crowdfunding platform organizationally speaking is not easily distinguishable from the project campaigns and the funders, they bring together. Instead, crowdfunding appears to be organized and succeeding due to a co-dependence in which external actors (founder campaigns and crowdfunders) are embedded within the organizing space of the

platform. The dissertation thus notes that by examining these respective actors individually, a static perspective of crowdfunding emerges in which the co-dependence that characterises the organization of the crowdfunding process is lost. From an organization perspective, the notion that a diffuse and fluid crowd can be exploited in an organized capacity arguably represents a novel observation to theory as well.

Thirdly, the case-study of the crowdfunding platform IndieGoGo contributes with insights regarding the distributed qualities of reward-based crowdfunding. The study observes that while crowdfunding does appear to expand innovation finance, this could be a temporary result of the argued deinstitutionalization of the innovation finance field, rather being than a permanent situation. Reward-based crowdfunding could thus begin to mimic other forms of innovation finance in which successful campaign founders increasingly mirror the people seeking funding; resulting in a concentration of wealth around certain regions and groups (Sorenson et al. 2016). If so this confirms the work of Greenwood et al. (2002) on institutional change as processes of de- and (eventual) re-institutionalization of fields; in this case the innovation finance field. The paper thus serves as caution to students of crowdfunding who perhaps given its novelty assign it qualities that may not be lasting. Crowdfunding is indeed a fascinating phenomenon, but scholars and practitioners should be wary of conceiving of it as a tool through which significant shifts in demand come about or as source of finance that radically changes funding opportunities. We thus echo a similar warning voiced by Stewart (2002) on the topic of the Internet and e-commerce (and the eventual Internet bubble): Be curious, yes, but also critical so that the attraction of the new and hyped does not cloud the topic.

Finally, the crowdfunding experiment paper illustrates that campaign specifics and – most importantly – product type have a significant influence on which of the respective value frames affect consumers' willingness to pledge. For the crowdfunding literature, this illustrates that there is significant need to focus on campaign specific characteristics if we wish to understand the antecedents of crowdfunding success. Current consumer behavior models also appear generally ill-equipped to handle the significant influence of products on choice especially when seeking to predict sustainable consumer behavior. Specifically, the current scholarly debate remains highly focused on an internalist versus externalist discussion; both of which fail to fully capture the observed significant effect that product type has on behavior. The dissertation

proposes instead that just as choice architecture is seen to influence behavior at large (Thaler & Sunstein 2008) – we may also observe that products themselves activate different values and motivations. One person may thus act sustainably in one purchasing situation and unsustainably in another. An example hereof would be to buy fair trade coffee and consuming less meat, while also purchasing fast fashion and electronics on the basis of, for instance, aesthetics or the latest trends. Individuals may in a supermarket situation even oscillate numerous times between sustainable and unsustainable purchasing behavior based on how different products activate different behavioral intentions. Furthermore, the dissertation also confirms the finding by de Groot & Steg (2008) who observed that altruistic (social) and biospheric (environmental) values, while correlating, can also diverge significantly in purchasing behavior. The experiment of the dissertation suggests that in certain circumstances consumers purchase on the basis of a social component (for example fair working conditions), while in other circumstances it is environmental consideration (for example sustainable farming techniques) that attract consumers. The lack of correlation between these two values could also explain, for example, why the VBN-theory at times fails to predict environmentally significant behaviour (ESB). This could be because altruistically motivated behaviour, which is typically seen as an antecedent of ESB, may not necessarily do so. Rather individuals may care for the improvement of a social conditions and less so to improve and environmental one. Finally, the dissertation argues that the experiment method itself represents a unique and highly scalable method for observing causality; not only at the intersecting fields of sustainability and crowdfunding, but also in larger areas, including online consumer behavior.

In terms of future research, the novelty of the phenomenon of crowdfunding leaves a wide range of areas open for future research, with the current literature primarily focused on uncovering the comparably simple antecedents of funding success and failure. The dissertation proposes five topics as the most relevant short-term areas for future research. Firstly, we need more studies to focus on how various models of crowdfunding may influence crowdfunder motivations and pledging behavior differently. The simple fact that one is donating, pledging, lending and investing could arguably influence behavior in significant way. Secondly, it would be a worthwhile pursuit to explore the commonly noted differences between crowdfunders and professional investors (see for example Gerber & Hui 2013; Lehner 2013) as the proposition itself rests on a arguably weak empirical footing. The dissertation therefore proposes that future

research should not only seek to account for variation across the different models of crowdfunding but ideally also uncover whether (and how) they truly are different from for example professional investors, angel investors, and venture capitalists. From a sustainability perspective, this is especially pertinent in order to understand how the various models of crowdfunding can be best leveraged to support sustainable entrepreneurship and innovation. Thirdly, more research is needed in order to explore for which ventures crowdfunding is a suitable financing alternative. For example, it is still commonly assumed that crowdfunding reflects a last resort avenue for financing; however as the phenomenon continues to grow rapidly it may increasingly become one of a host of funding options available for entrepreneurs rather than simply the final option after all other alternatives have been exhausted (Ahlers et al. 2015). In addition to this, the potentially positive and negative spillover effects of successful and unsuccessful crowdfunding could also be explored with relation to future success with venture capitalists or other innovation financiers. Fourthly, the dissertation also notes that there is a need for significantly more research on the entrepreneurs (and ventures) who have achieved funding success and how they translate this into a (un)successful business model. Finally, there is an overwhelming amount of research within the field that builds upon large datasets (similar to Paper 3) and while they contribute greatly to our knowledge of the phenomenon, important details are arguably lost. There is therefore a need for more in-depth qualitative methods to be employed potentially in combination with these larger datasets that could provide more explanatory power.

Second order insights and future research

In addition to these first order observations, there are also a number of other areas that worth considering further but require the reader to accept a more abstract and less grounded approach. Firstly, the insights regarding the factors that influence a person's willingness to support a given crowdfunding campaign may also be transferable to the literature on crowdsourcing. Crowdsourcing is "the act of outsourcing a task to a 'crowd', rather than to a designated 'agent' (an organization, informal or formal team, or individual), such as a contractor, in the form of an open call" (Afuah & Tucci 2012, p.355). Crowdsourcing thus seeks to garner external sources of knowledge, while crowdfunding is primarily aimed at garnering financial resources. Nonetheless in many respects the means of organizing the crowdsourcing process appear similar to the organization of crowdfunding processes. Crowdsourcing typically depends on a

facilitating platform (e.g. Innocentive) that seeks to ameliorate the connection between actors in need of solutions to a problem with a large disperse and diverse crowd who self-select to provide solutions (Howe 2006; Jeppesen & Lakhani 2010). The observations of this disseration regarding the antecedents of crowdfunding success may therefore be transferable to the field of crowdsourcing, for example, with regards to how different value frames may be more or less successful in insuring crowd engagement. These value frames could even affect the types of persons who engage; similar to earlier studies, which show that participants have different incentives for partaking in crowdsourcing and that these different incentives subsequently result in differing types of contribution behavior (Füller et al. 2012). Additionally and in line with the second paper of this dissertation, a similar critique may also be directed at the crowdsourcing literature, which also appears to be similarly phenomenon-driven with research built upon a diversity of case studies including Netflix, Goldcorp, Wikipedia, InnoCentive and Facebook (see Tapscott & Williams 2006; Jeppesen & Lakhani 2010; Villarroel et al. 2013). The available literature thereby provides an arguably similar static view of the process of crowdsourcing that; a view furthermore depends on the specific aims of the given paper. However, significant differences also exist between the two processes: For example while crowdfunding seeks to engage as many actors as possible to donate, pledge, invest or lend in return for (non)material rewards for all backers, crowdsourcing typically only rewards the winning solution. In addition, crowdsourcing is arguably more labour intensive as it requires participants to provide often detailed solutions to a given problem without any guarantee of success. Conversely, reward-based crowdfunding is often less arduous and often represents a simple financial transaction.

Furthermore, the dissertation proposes that many of the current models of consumer behavior could potentially benefit from a revision; especially when considering the significant effect that product type had on (un)sustainable purchasing behavior. This proposal is strengthened by the fact that the effect of specific product types on behavior remains to the best of my knowledge largely unexplored within the literature. There is therefore an need to at the very least observe how different product types may affect purchasing behavior. This could start with an initial analysis of how different everyday products may result in different degrees of willingness-to-pay based on a number of sustainability factors. It may, for example, not be unreasonable to assume that fashion and electronics goods are less influenced by sustainability factors (compared to other more egocentric factors), while conversely food items may be affected

differently. At the moment and to the best of my knowledge, this remains largely unexamined; arguably to the detriment of theory at least if the experimental outcome from Paper 4 are replicated in follow-up studies.

For future research the dissertation proposes researchers actively collaborate with organizations that promote sustainable entrepreneurship in creating a crowdfunding platform aimed at enabling this form of entrepreneurship. Such organizations are exemplified by the Danish NGO Sustainia, which has compiled a large database of sustainable ideas and projects and in turn promotes them each year through their Sustainia Awards (Sustainia 2017). If coupled with a dedicated crowdfunding platform, it could serve as a year round source of financing for the many initiatives identified. From a research perspective, having an established platform would allow researchers to identify various techniques and methods to identify how best to enable more projects to succeed; for example, identifying how layout affect behavior or how information can be presented in a way that inspires action. Social media analyses could also be carried out in order to discern how the crowd interacts and is organized. The research could thus serve as a real world proof-of-concept and become an active component in enabling more sustainable entrepreneurship. Finally, the dissertation proposes as previously noted that a future sustainable business model, which could also emerge is one where crowdsourcing and crowdfunding become linked in one platform. The platform would employ crowdsourcing to find solutions to a given sustainability issue and crowdfunding could subsequently be employed to finance these initiatives. Questions of ownership, responsibility and general market fairness would be important aspects to consider in regards to these models. If the crowd, for example, creates the knowledge necessary to enable a given service or products and subsequently finances it through a crowdfunding process, who then owns the idea? Could a crowd manage itself and if so, how would it be organized when there are no boundaries, hierarchy, or clear notion of membership?

Chapter 11 | Conclusion

Having outlined under which conditions and to what degree reward-based crowdfunding can be employed to help drive forth sustainable entrepreneurship in the former chapter we reach what at first appears to be an unsatisfying answer: It depends. It depends on the purpose of the endeavor that sustainable entrepreneurs pursue, the sum of money they seek, where they are located, their social capital and network, their prior experience, and in no small part the product they are pursuing. Furthermore, for all these attributes outlined numerous of others are unaccounted for. As with any other human activity, there is a complexity that cannot simply be unspun in the span of a single dissertation, nor can we detangle consumption in crowdfunding from the larger drivers of consumer behavior. The fact that innovation finance is now driven by consumers rather than professional investors does not in itself change consumer demands; demands which more often than not fail to correlate well with sustainable behavior (Sanne 2002; Jackson & Michaelis 2003; Devinney et al. 2010). While one may argue that the motivations of funders for pledging towards a campaign may be different from those of a professional investor, the user-consumer will most likely continue to follow prior consumption behaviors in a reward-based crowdfunding context, rather than adopting a significantly different behavior. However, this does not imply a lack of significant potential within reward-based crowdfunding; especially because of the increasing recognition that individual behavior is strongly affected by, for example, the choice architecture inhabited by the individual (see Thaler & Sunstein 2008; Sunstein & Reisch 2014). There is thus an evident potential for utilizing these insights in online crowdfunding platforms as well. Individual behavior is neither linear nor is it written in stone. It is rather shaped by a multitude of factors as illustrated in the dissertation; hence it is a matter of constructing a context that encourages the better angels of our nature. The message which the dissertation seeks to instill in the reader is then that while reward-based crowdfunding is not a silver-bullet to solving the funding concerns of sustainable entrepreneurship, there lies at heart of what we call “the crowd” a potential that remains largely untapped.

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