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# Crowdfunding Sustainability

Natalia Maehle, Pia Piroschka Otte,
and Natalia Drozdova

## Introduction

This chapter focuses on the potential of using crowdfunding for financing sustainable projects, that is projects aiming to extend their goal beyond market success to providing benefits to wider society (Schaltegger and Wagner 2011). Modern societies are facing numerous challenges related to sustainability that are expected to become even more significant in the future. Achieving sustainability therefore represents one of the key objectives on today's agenda, as demonstrated by the recent climate change protests and prominence of the sustainability topic in the public

N. Maehle (✉)
Western Norway University of Applied Sciences, Bergen, Norway
e-mail: Natalia.Mehle@hvl.no

P. P. Otte
Ruralis – Institute for Rural and Regional Research, Trondheim, Norway
e-mail: pia.otte@ruralis.no

N. Drozdova
Norwegian School of Economics, Bergen, Norway
e-mail: natalia.drozdova@nhh.no


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debate. As a universal call to action, the UN member states adopted in 2015 the UN Sustainable Development Goals (SDGs) addressing some of the most pressing issues such as global warming, poverty, and migration. Growing focus on sustainability among policymakers and consumers encourages businesses to embrace sustainability as their working practice and strive to develop sustainable innovations. Entrepreneurs represent an important driving force for sustainable transitions by exploiting the opportunities provided by market imperfections and developing innovative business solutions that resolve environmental and societal challenges (Cohen and Winn 2007). The innovative power of entrepreneurship can therefore help move economic systems towards sustainability (Cohen and Winn 2007; Dean and McMullen 2007).

Despite their increasing importance, sustainable entrepreneurs often experience problems getting funding from traditional sources due to the higher complexity of their value propositions (Ortas et al. 2013). By incorporating a triple bottom line approach (including economic, environmental, and societal concerns) sustainable entrepreneurs consider a wide range of stakeholder interests (Bocken et al. 2014; Belz and Binder 2017). However, this can add ambiguity and complexity to the sustainable projects leading to higher risk perceptions among conventional investors. Thus, it is important to find alternative solutions for financing sustainable initiatives. Bocken et al. (2014) identify crowdfunding as an example of a business model that can help develop and scale up sustainable innovations by bringing together like-minded individuals, firms, and investors. Furthermore, Belz and Binder (2017) demonstrate that crowdfunding is an ideal source of funds for sustainable entrepreneurs, as their focus on socially relevant aspects is likely to attract interest from a large number of backers, who are motivated to invest in the social good.

Recent developments in the crowdfunding market support this idea. Several platforms catering only to sustainable projects have been recently established and most mainstream crowdfunding platforms have a considerable proportion of sustainable projects. Crowdfunding for sustainability has also become an emerging research area. Lately, the topic has attracted considerable interest among researchers (Motylska-Kuzma 2018; Testa et al. 2019; Wehnert et al. 2019; Petruzzelli et al. 2019). However, ongoing discussion around success of sustainable

crowdfunding campaigns has displayed rather contradictory findings (Hörisch 2015; Calic and Mosakowski 2016) and more research in this field is necessary.

The current chapter aims to address this need. To begin with, we discuss the definition and dimensions of sustainable development and sustainable entrepreneurship. Then we provide an overview of the existing literature on crowdfunding of sustainable projects, with special focus on the peculiarities of sustainable entrepreneurial ventures and success and challenges related to their crowdfunding activities. To illustrate which dimensions of sustainability and SDGs are addressed in crowdfunding and which crowdfunding models can be used for sustainable projects, we review four European sustainability-oriented crowdfunding platforms representing different crowdfunding models. Finally, we discuss our main findings and suggest future research directions for crowdfunding of sustainable projects.

## Sustainable Development: Definition and Dimensions

The terms "Sustainable Development" and "Sustainability"—often used interchangeably[1]—emerged from the environmental movement in the late 1960s/early 1970s, a movement rooted in a strong criticism of the traditional economic growth theories that dominated the immediate post-WWII period. Sustainable development was institutionalized in the Brundtland report in 1987 and was followed by the Rio Declaration in 1992 and the 2030 Agenda for Sustainable Development in 2015 (Purvis et al. 2018). The agenda includes 17 goals addressing the different dimensions of sustainable development (e.g. reduction of inequalities, spur economic growth while at the same time tackling environmental challenges like climate change) (UN 2019). The SDGs are universal and thus concern all countries and not only developing countries as the prior Millennium Development Goals did (Halisçelik and Soytas 2019).

Sustainable development is a widely used concept. The most commonly used definition comes from the (Brundtland) report "Our

Common Future". Here sustainable development was defined as the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987, p. 51). This definition follows a strong normative, ethical approach by advocating for a kind of social contract between contemporary and future generations (Hansmann et al. 2012). Some scholars have argued for a revision of the definition to further emphasize the environmental relevancy. In this view, sustainable development is defined as "Development that meets the needs of the present while safeguarding Earth's life-support system, on which the welfare of current and future generations depends" (Griggs et al. 2013, p. 306). This view argues for policies that place a value on environmentally friendly choices and costs on environmentally unsustainable actions (Griggs et al. 2013, p. 307).

Sustainable development originally captures three dimensions: economic, social, and environmental sustainability, with the environmental dimension most frequently referred to in research and among practitioners (Soini and Birkeland 2014). Some have expanded the existing framework with an additional institutional (Hosseini and Kaneko 2012; Spangenberg 2004) or cultural dimension (Hawkes 2001; Soini and Birkeland 2014).

In broad terms, the **economic dimension** focuses on maintaining economic growth and encompasses high levels of income (Halisçelik and Soytas 2019) and growing GDP. Economic growth has long been a key concern for nations across the world but has also been highly criticized due to the pressure it places on the environment. Hence, economic sustainability is about changing the current approach to economic growth and finding ways of developing a new economy based on sustainable development (Moldan et al. 2012) that allows for economic growth within our environmental limits.

The **social dimension** is the least defined (Dempsey et al. 2011; Murphy 2012). It tends to address issues related to social justice and social inclusion such as better education and health (Halisçelik and Soytas 2019). Spangenberg (2004) draws a difference between macro (e.g. distribution of income and assets) and micro (e.g. education, training, social contacts) levels of the social dimension. Most approaches focus on the social dimension in terms of achieving national welfare but it is also

possible to incorporate an international and intergenerational perspective (Murphy 2012). Murphy (2012, p. 20) suggests a policy framework that connects the social with the environmental dimension. The framework captures 13 policy objectives grouped under 4 conceptual classifications including equity, awareness for sustainability, participation, and social cohesion.

As with the other dimensions, the **environmental dimension** has been defined in many different ways. Overall, it is "based on a notion of ecosystem services—both renewable and non-renewable resources and waste absorptive capacity that provide benefits to humans and thus improve their welfare" (Moldan et al. 2012, p. 11). Environmental sustainability involves maintaining these services and, consequently, living within the limitations of the biophysical environment (ibid.). Energy consumption, material flows, and land use are three categories that form the centre of the environmental dimension and are used as indicators for measuring environmental sustainability (Spangenberg 2004). In the academic literature, there has been a strong focus on cleaner production within sustainable development (see, e.g., Jegatheesan et al. 2009; Dovì et al. 2009).

Table 17.1 illustrates how the 17 SDGs relate to the three dimensions of sustainable development and provides examples of the key targets within each SDG. We can see that many of the SDGs address more than one dimension, which illustrates the interconnection between the three dimensions and complexity of sustainable development due to the need to balance different interests (Hansmann et al. 2012). This interconnection is crucial because economic growth alone cannot be considered as a success if it does not lead to a more equal income distribution (Halisçelik and Soytas 2019) or exceeds the planet's ecological limits. Only economic growth that is utilized for public wealth in the form of a welfare state is socially sustainable (Spangenberg 2004).

## Sustainable Entrepreneurship

The relationship between entrepreneurship and sustainable development has been addressed by various streams of literature, including the concepts of ecopreneurship (Cohen 2006; Schaltegger 2002), social

**Table 17.1** Dimensions of sustainable development (to be achieved by 2030) in relation to SDGs

| SDGs | Economic dimension: examples of targets | Social dimension: examples of targets | Environmental dimension: examples of targets |
|---|---|---|---|
| SDG 1: End poverty in all its forms everywhere | Eradicate extreme poverty; reduce at least by half the proportion of living in poverty; ensure equal rights to economic resources | Implement nationally appropriate social protection systems; achieve substantial coverage of the poor and the vulnerable | Build resilience of the poor and those in vulnerable situations, reduce their exposure and vulnerability to climate-related extreme events |
| SDG 2: Zero hunger | Double the agricultural productivity and incomes of small-scale food producers; increase investments in rural infrastructure | End hunger and ensure access to food by all people; end all forms of malnutrition | Ensure resilient agricultural practices that help maintain ecosystems and strengthen capacity for adaptation to climate change |
| SDG 3: Good health and well-being | Support the research and development of vaccines and medicines; provide access to affordable essential medicines and vaccines | Reduce the global maternal mortality ratio to less than 70 per 100,000 live births; end preventable deaths of newborns and children | |
| SDG 4: Quality education | Ensure that all girls and boys complete free, equitable, and quality primary and secondary education | Eliminate gender disparities in education; adults and children achieve literacy and numeracy | |

(*continued*)

**Table 17.1** (continued)

| SDGs | Economic dimension: examples of targets | Social dimension: examples of targets | Environmental dimension: examples of targets |
|---|---|---|---|
| SDG 5: Gender equality | Give women access to ownership and control over land and other forms of property, financial services, and natural resources | End all forms of discrimination against all women and girls everywhere; eliminate all forms of violence against all women and girls | |
| SDG 6: Clean water and sanitation | Implement integrated water resources management at all levels, including through transboundary cooperation as appropriate | Achieve universal and equitable access to safe and affordable drinking water sanitation and hygiene for all | Improve water quality by reducing pollution; increase water-use efficiency across all sectors; protect and restore water-related ecosystems |
| SDG7: Affordable and clean energy | Promote investment in energy infrastructure and clean energy technology; upgrade technology for supplying modern and sustainable energy services | Universal access to affordable, reliable, and modern energy services | Increase share of renewable energy |

(*continued*)

**Table 17.1** (continued)

| SDGs | Economic dimension: examples of targets | Social dimension: examples of targets | Environmental dimension: examples of targets |
|---|---|---|---|
| SDG 8: Decent work and economic growth | Sustain per capita economic growth in accordance with national circumstances; achieve higher levels of economic productivity | Achieve full and productive employment and decent work for all with equal pay; eradicate forced labour and human trafficking | Improve global resource efficiency and endeavour to decouple economic growth from environmental degradation |
| SDG 9: Industry, innovation, and infrastructure | Develop quality, reliable, sustainable, and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being; increase the access of small-scale industrial and other enterprises | | Upgrade infrastructure and retrofit industries to make them sustainable, with greater adoption of clean and environmentally sound technologies and industrial processes |
| SDG 10: Reduced inequalities | Progressively achieve and sustain income growth of the bottom 40% of the population | Empower and promote the social, economic, and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion | |
| SDG 11: Sustainable cities and communities | Decrease the direct economic losses relative to GDP caused by disasters | Ensure access for all to adequate, safe, and affordable housing; enhance inclusive and sustainable urbanization | Protect and safeguard the world's cultural and natural heritage; reduce the adverse per capita environmental impact of cities |

(*continued*)

**Table 17.1** (continued)

| SDGs | Economic dimension: examples of targets | Social dimension: examples of targets | Environmental dimension: examples of targets |
|---|---|---|---|
| SDG 12: Responsible consumption and production | Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions | Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production | Achieve the sustainable management and efficient use of natural resources; halve per capita global food waste at the retail and consumer levels |
| SDG 13: Climate action | Fully operationalize the Green Climate Fund through its capitalization as soon as possible | Improve education, awareness-raising and human and institutional capacity on climate change mitigation and adaptation | Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters |
| SDG 14: Life below water | Increase the economic benefits to least developed countries from the sustainable use of marine resources | Increase scientific knowledge, develop research capacity, and transfer marine technology | Prevent and significantly reduce marine pollution of all kinds; effectively regulate harvesting and end overfishing |
| SDG 15: Life on land | Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems | Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources | Ensure the conservation, restoration, and sustainable use of terrestrial and inland freshwater ecosystems and their services |

(*continued*)

**Table 17.1** (continued)

| SDGs | Economic dimension: examples of targets | Social dimension: examples of targets | Environmental dimension: examples of targets |
|---|---|---|---|
| SDG 16: Peace, justice, and strong institutions | Significantly reduce illicit financial and arms flows; substantially reduce corruption and bribery of all forms | Significantly reduce all forms of violence and related death rates everywhere; end abuse, exploitation, trafficking, and all forms of violence against and torture of children | |
| SDG 17: Partnerships | Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection | Encourage and promote effective public, public-private, and civil society partnerships, building on the experience and resourcing strategies of partnerships | |

entrepreneurship (Nicolls 2006; Ridley-Duff 2008), institutional entrepreneurship (DiMaggio 1988), and sustainable entrepreneurship (Schaltegger and Wagner 2011).

Sustainable entrepreneurship is defined as "the process of discovering, evaluating, and exploiting economic opportunities that are present in market failures which detract from sustainability, including those that are environmentally relevant" (Dean and McMullen 2007, p. 58). Unlike conventional entrepreneurship, sustainable entrepreneurship extends the goal beyond market success to initiating societal change and changing

market conditions and regulations. The main goal of sustainable entrepreneurship is to contribute to sustainable development of the market and society as a whole (Schaltegger and Wagner 2011). While pursuing this goal, sustainable entrepreneurship aims at balancing economic, social, and ecological objectives (Cohen et al. 2008; Schaltegger and Wagner 2011; Thompson et al. 2011) by replacing existing production methods, products, market structure, and consumption patterns with products and services with superior environmental and social impacts. Sustainable entrepreneurship includes focusing on sustainability performance (combining social and environmental performance) as a core business goal combined with large market influence and large social or political influence. This distinguishes it from related concepts such as ecopreneurship, institutional entrepreneurship, and traditional social entrepreneurship (Schaltegger 2002; Schaltegger and Wagner 2011).

Research shows that while there are some similarities between conventional and sustainable entrepreneurship, there are also important differences in the mission and performance measurement systems (Austin et al. 2006; Schaltegger and Wagner 2011). While conventional entrepreneurship tends to focus on business success and the economic interests of shareholders, the core motivation of sustainable entrepreneurs is to contribute to solving societal and environmental problems, thus addressing the demands of a larger group of stakeholders (Schaltegger and Wagner 2011). Moreover, as sustainable entrepreneurs address commercial market failures, problems for conventional entrepreneurs may represent opportunities for sustainable entrepreneurs. As for measuring performance, it is challenging to measure the societal and environmental impact of sustainable entrepreneurial ventures, while conventional entrepreneur can rely on relatively tangible and quantifiable measures such as financial indicators, market share, and customer satisfaction (Austin et al. 2006).

However, the distinction between sustainable and conventional entrepreneurship is not dichotomous but can be represented as a continuum ranging from purely sustainable to purely economic (Austin et al. 2006): conventional entrepreneurs also provide benefits to society in the form of new products, services, and jobs, while sustainable entrepreneurs must still create economic value. Therefore, in most cases entrepreneurial ventures include both sustainable and commercial value creation.

## Funding and Forming a Sustainable Business

The process of sustainable entrepreneurship consists of six phases: recognizing a social or ecological problem; recognizing a social or ecological opportunity; developing a double bottom line solution (balancing between economic and social or ecological goals); developing a triple bottom line solution (balancing between economic, social, and ecological goals); funding and forming a sustainable enterprise; and creating or entering a sustainable market (Belz and Binder 2017).

Current research on the process of sustainable entrepreneurship is rather limited, with the majority of studies focusing on the first phase of the process, including opportunity recognition, development, and exploitation (Belz and Binder 2017). While funding an entrepreneurial venture is a critical activity in the formation of a new business (Shane 2003), there is little research on the funding of sustainable businesses.

Sustainable entrepreneurs often lack access to adequate funding. Ortas et al. (2013) describe the lack of funding as a central obstacle that hinders sustainable development. The need for sustainable entrepreneurs to balance between economic, social, and ecological goals creates constraints in the early funding phases because investors may perceive those objectives to be not as attractive as purely profit-oriented undertakings. It may also take longer for sustainable projects to become profitable due to the multiplicity of project goals. Moreover, the majority of sustainable entrepreneurs have very limited business experience, which can lead to difficulties in attracting funding from banks or professional investors (Choi and Gray 2008).

Later studies, however, have demonstrated that it is possible for sustainable enterprises to receive various types of seed capital, such as bank loans, crowdfunding, personal assets, and private funding from family and friends, as well as public funding (Belz and Binder 2017). For example, a focus on environmental and societal value creation helps social entrepreneurs to obtain public funding. In addition, venture capitalists are showing more interest in the development of sustainable start-ups as they are balancing financial with social and environmental returns (Bocken 2015).

## Success of Sustainable Crowdfunding Campaigns

Crowdfunding liberates access to finance for entrepreneurs and, at the same time, enables consumers to decide which products or services they want to see on the market. In this way, crowdfunding helps to "democratise" innovation as it allows entrepreneurs who would otherwise lack the resources to find funding and markets, to erase geographic, social, and economic boundaries of innovation (Mollick and Robb 2016). Testa et al. (2019) argue that crowdfunding represents a novel socio-technical practice with the potential to upscale and transform financial and (potentially) sustainable regimes.

Recent studies have suggested that non-profits that primarily engage in prosocial activities are more successful at crowdfunding than for-profit entities (Belleflamme et al. 2013). Backers value the social orientations of the projects and are often driven by normative or altruistic motives (Gerber and Hui 2013). Therefore, socially oriented organizations may find it easier to attract money via crowdfunding for initiatives that are of interest to the general public due to their reduced focus on profits. In particular, crowdfunding is an appropriate source of funding for sustainable entrepreneurs who not only focus on the profit-seeking goal but also have to balance between economic, social, and ecological goals (Belz and Binder 2017).

However, empirical studies provide ambiguous results on the appropriateness of crowdfunding for financing sustainable entrepreneurship. For example, Calic and Mosakowski (2016) find that a sustainability orientation positively affects funding success for crowdfunding projects on the Kickstarter platform. In particular, they provide evidence that projects with either social or environmental orientation, relative to commercially oriented projects, are not only more likely to achieve their funding goals but also more likely to receive higher total pledge amounts. A study conducted by Vismara (2019) also provides evidence of the benefits of sustainability-oriented ventures (in equity crowdfunding in particular).

Conversely, Hörisch (2015) did not find any positive correlation between ventures' sustainability orientation and crowdfunding success. The results of this study even suggest that environmental orientation can *negatively* affect the success of crowdfunding projects. Furthermore, Moss et al. (2015) claim that crowd-investors often act like traditional investors and mainly focus on profit-seeking opportunities. Further studies could provide a deeper understanding of the success criteria for crowdfunding as an instrument for financing sustainable ventures.

## Challenges Associated with Sustainable Crowdfunding Campaigns

A number of challenges are associated with crowdfunding for sustainable ventures.

First, some studies doubted the success of crowdfunded ventures after the funding process ended. For example, Lambert and Schwienbacher (2010) claim that ventures resorting to crowdfunding might have already failed to receive funding from conventional sources and thus have (potentially) failed to fulfil criteria that are important for long-term entrepreneurial success. This claim, combined with the notion that the majority of sustainable entrepreneurs have very limited business experience (Choi and Gray 2008), illustrates some important challenges for the post-funding stage of crowdfunding for sustainable entrepreneurs, as backers "typically do not look much at collaterals or business plans, but the ideas and core values of the firms" (Lehner 2013, p. 290). Therefore, they may end up funding projects that have few prospects for growth and, eventually, survival.

Second, an empirical investigation of environmental crowdfunding projects shows that many projects failed to disclose information on the actual environmental benefits created (Hörisch 2019). For that reason, backers are often unable to evaluate whether the environmental benefits are actually realized. Interestingly, in a study of 57 environmentally

oriented projects, only 2 projects provided quantitative information on the environmental effects, and, based on the disclosed information, both projects had higher energy consumption in the post-funding phase than the target energy consumption established during the crowdfunding campaign (Hörisch 2019). Moreover, this study highlights that project owners are more likely to disclose the financial results rather than environmental effects of the project. Inadequate communication around environmental effects can have several explanations. First, entrepreneurs do not document environmental effects in detail, as neither backers nor platforms (even the environmental ones) require this kind of information. In many cases, it is difficult to measure the environmental impact, and it is a very demanding job to include all sources of emissions. An alternative explanation is that many environmental projects simply have not achieved their claimed goals (Hörisch 2019). Petruzzelli et al. (2019) suggest that, in order to cope with this challenge, owners of sustainability-oriented projects should pay significantly higher attention to communication with backers and the preparation of follow-up activities.

## Sustainability-Oriented Platforms

To understand the landscape of sustainability-oriented crowdfunding and which dimensions of sustainable development and SDGs are addressed in the projects seeking crowdfunding, we review four large European sustainability-oriented platforms. As a part of the selection process, we conducted an extensive search among the European platforms based on the following criteria: sustainability orientation and platform size (larger and more established platforms were preferred). The platforms also should have represented different crowdfunding models to provide a comprehensive overview of the sustainability-oriented crowdfunding projects. As a result, we selected four platforms: one loan-based, one reward-based, one donation-based, and one hybrid platform combining various crowdfunding models. The review was conducted in three periods: December 2017, May 2019, and October 2019.

## Platform A: Loan-Based

Platform A is a UK-based peer-to-peer lending platform. Since its establishment in 2012, it has been connecting developers of sustainable, eco-friendly energy infrastructure projects with investors interested in long-term income, filling the niche of long-term debt markets underserved by the banks. Platform A acts as an arranger, distributor, and approving authority for debentures—that is, a type of debt instrument that is not secured by physical assets or collateral and instead only backed by the general creditworthiness and reputation of the issuer—issued by the projects hosted on the platform. In addition, Platform A hosts a digital marketplace for debentures of the projects that were successfully funded on the platform, where Platform A's users can trade their investments among themselves.

Due to the strict project selection procedure, only a handful of projects are published annually. On average, five to six projects per annum collect funds, usually with no more than two—three campaigns active at any given moment. Projects on Platform A can be categorized based on the type of renewable energy technology where 52% of projects focus on solar technology, 28% on wind technology, 4% on hydro technology, and 16% on biomass technology. Platform A also divides projects into three categories based on their risk level. Projects classified as established debentures (52%) are associated with the lowest risk as they are issued by businesses that are already operational and whose revenues come from relatively stable and predictable sources. The second category, growth projects (36% of the projects), consists of projects that involve a greater risk, but also higher expected returns. These are the investments into the development of a new generation of sustainable power generation technologies where the revenues are less predictable. Finally, construction projects seek, as the name suggests, funding for construction of new assets (plants, wind turbines, etc.). These projects comprise the smallest category with only 12% of funds. Thus, it seems that during its selection process Platform A gives priority to the established projects associated with the lowest risk.

**Table 17.2** Examples of the projects on Platform A

| | | Sustainable development | |
|---|---|---|---|
| Project | Details | Dimensions | SDGs |
| Developing waste gasification facilities to divert waste from landfill and generate lower carbon energy | £5.91 M; 10% a year; 4 year 6 month investment | Environmental, economic | 7, 9, 13 |
| Supplying sustainable and renewable electricity and heat to small businesses | £4.55 M; 5% IRR; 18 year investment | Environmental, social, economic | 7, 8, 9, 13 |
| Building a 2MW floating tidal stream turbine | £7 M; 12% a year; 2 year 6 month investment | Environmental, economic | 7, 9, 13 |
| Housing developer building quality social housing and affordable homes | £3.1 M; 7% a year; 1 year 7 month investment | Environmental, social, economic | 1, 11, 13 |
| Generating sustainable heat for a group of outdoor adventure centres and other businesses | £780 K; 6% IRR; 17 year investment | Environmental, social, economic | 7, 3, 9, 13 |
| Developing pumped storage hydro plants | £1.6 M; 10% a year; 3 year 2 month investment | Environmental, economic | 7, 9, 13 |
| Using whisky production residues to make biochemicals and biofuels | £4.38 M; 15% a year; 2 year investment | Environmental, economic | 7, 9, 13 |
| Helping homeowners to install rooftop solar panels | £675 K; 7.5% IRR; 15 year investment | Environmental, social, economic | 7, 9, 11, 13 |
| Building a geothermal power plant | £4.4 M; 2% a year; 1 year 2 month investment | Environmental, economic | 7, 9, 13 |

The projects on Platform A consider all three dimensions of sustainable development (see Table 17.2 for examples of the projects) but focus on the environmental and economic dimensions. Most of the projects aim to combine the goal of developing sustainable, eco-friendly energy infrastructure with the goal of securing economic growth and providing economic returns to their investors. This combination (and careful project selection procedure) leads to the unprecedented success of the crowdfunding campaigns as all the projects published on the Platform A manage

to collect the target amount. As for the SDGs, all the projects focus on sustainable energy, innovation, and climate change mitigation practices and therefore address goals 7, 9, and 13. We find some variations among the projects with a social dimension, which also concentrate on the SDGs related to poverty, health, and sustainable communities.

## Platform B: Reward-Based

Platform B, founded in October 2014, is a German reward-based crowdfunding platform exclusively for sustainable projects. A very inclusive platform at its core, Platform B does not cater to a narrow range of sustainable initiatives, but welcomes any project that scores high on two axes—sustainability of inputs and outputs. The definition of sustainable input or output is very broad. Inputs, or resources employed in the realization of the project, have to be one or more of the following: "green", eco-, or fair trade-certified, of local origin, used sparingly, recycled, or renewable. As for the outputs, the project has to benefit climate, environment, flora and fauna, cultural property, natural resources, or people.

Being a reward-based platform, Platform B prohibits its projects from offering rewards with a financial return and most of the rewards are purely symbolic with little to no tangible value, for example, a jute bag with project logo or a visit to an animal shelter. However, some projects offer more tangible rewards (particularly pre-sale type crowdfunding campaigns). Platform B uses a flexible funding model, that is, projects can keep the money even if they have not reached a target amount. Only 24% of projects manage to collect 100% or more of their target amount.

Due to its broad definition of sustainability, the projects on Platform B are characterized by a very high degree of heterogeneity and address all the dimensions of sustainable development (see Table 17.3 for examples of the projects). Most of the projects emphasize environmental sustainability, sometimes in combination with social sustainability. However, some of the projects also address sustainable economic growth. The main SDGs targeted are those related to environmental protection and climate change (12, 13, and 15), sometimes in combination with the SDGs related to the social and economic dimensions.

**Table 17.3** Examples of the projects on Platform B

| | | Sustainable development | |
|---|---|---|---|
| Project | Details | Dimensions | SDGs |
| Establishing an organic farm | €9672 raised of €11,000 target by 5 backers | Environmental, economic | 12, 13, 15 |
| Opening a shop for ecologically and fairly produced products | €3904 raised of €10,000 target by 62 backers | Environmental, social, economic | 1, 8, 12, 13, 15 |
| Sustainable educational game on protection of marine environment | €8422 raised of €9000 target by 318 backers | Environmental | 4, 13, 14 |
| Beach clean-up for plastics | €687 raised of €686 target by 22 backers | Environmental | 13, 14 |
| Company organizing sustainable clothing rental | €1027 raised of €978 target by 32 backers | Environmental, economic | 9, 12, 13 |
| Extending a café selling organic produce | €1886 raised of €3000 target by 24 backers | Environmental, economic | 12, 13, 15 |
| Production of a magazine about local heroes contributing to more sustainable and fair local community | €6752 raised of €6498 target by 122 backers | Environmental, social | 1, 8, 11, 12, 13 |
| Non-profit organization taking care of native and exotic wildlife | €22,646 raised of €30,000 target by 639 backers | Environmental | 13, 15 |

## Platform C: Donation-Based

Platform C is a donation-based crowdfunding platform headquartered in the United Kingdom. Platform C serves as a two-sided platform that connects donors to good causes with three types of beneficiaries: charities, corporations, and individuals. A charity can set up a personalized webpage with information about the organization and the good causes it is working on, as well as buttons offering visitors the opportunity to donate to the charity or organize fundraisers in its name. Additionally, charities can set up campaigns to gather funds for specific purposes (e.g.

provision of humanitarian aid to those affected by a natural disaster). A company can similarly create its own branded webpage to showcase charitable efforts by company employees and the amount of funding they raise. Finally, individuals can use Platform C not only for making donations but also for fundraising purposes. They can start their own donation-based crowdfunding campaign (e.g. asking help in financing an operation for a relative) or link their fundraising initiative to one of the charities/causes represented on the platform.

Platform C hosts a variety of projects and campaigns across a wide variety of themes. Major thematic categories include health and medical causes; animals and pets; art and culture; local community; education; sports; disability; and international aid (see Table 17.4 for examples of the projects). There is no special category for environmental initiatives but they are represented as part of other categories (e.g. animals, local community). Charities that focus on health and medical issues are by far the most popular of all the categories and score at least two times the number of "Care" hits compared to the environmental charities. The latter do seem to draw more attention than culture-focused charities, but cannot compete with organizations gathering funds for cancer research or helping children in need of medical assistance. Thus, Platform C mostly addresses the SDGs related to the social dimension of sustainable development; however, the environmental dimension is also present (often in combination with a social one). The economic dimension is underrepresented on this platform.

## Platform D: Hybrid

Platform D is a European crowdfunding platform for sustainable projects based in the Netherlands and Germany. One of the main requirements for publication on the platform is that the project has to be focused on sustainability; however, the platform does not provide an exact definition of what is considered to be sustainable. Platform D has a hybrid crowdfunding model, giving project owners the ability to choose between multiple types of crowdfunding: reward-, donation-, lending-, and equity-based models, as well as almost any combination of the four. All

**Table 17.4** Examples of the projects on Platform C

| | | Sustainable development | |
|---|---|---|---|
| Project | Details | Dimensions | SDGs |
| Supporting a domestic violence refuge for women and young girls | £2160 raised of £1200 target by 63 backers | Social | 5, 11 |
| The London Marathon for Prostate Cancer UK | £57,290 raised of £40,000 target by 233 backers | Social | 3 |
| Create a home for someone in housing need in the UK | £5763 raised of £6000 target by 18 backers | Social | 1, 10 |
| Renovating the community garden to benefit the local community and wildlife within it | £993 raised of £1000 target by 58 backers | Social, environmental | 11, 15 |
| Beach clean-up | £1168.00 raised of £1000 target by 44 backers | Environmental | 13, 14 |
| Building clean, energy-efficient cook stoves to reduce harmful emissions in India | £1600.00 raised of £1600 target by 8 backers | Social, environmental | 9, 11, 13 |
| Fundraising for WWF-UK by running Tough Mudder | £3333.39 raised of £3250 target by 128 backers | Environmental | 13, 14, 15 |
| Support children and young people's mental health on World Mental Health Day | £7508.86 raised of £7500 target by 82 backers | Social | 3 |
| Raising money for a local children's hospice | £18,204.76 raised of £15,000 target by 43 backers | Social | 3 |

types of campaigns employ all-or-nothing funding logic, meaning that if the funding goal is not reached by the end of the funding period, Platform D will refund all contributions within 14 working days.

Platform D's interpretation of the reward-based campaigns is similar to a pre-sale type of crowdfunding, and a typical reward-based campaign is usually initiated by an up-and-coming entrepreneur who is about to launch a new product. In return for funding for manufacturing the product, entrepreneurs give backers a significant discount off the eventual

market price and/or additional services or benefits. Donation-based campaigns may also offer small tangible rewards for backers willing to support them. Lending-based campaigns are tailored to established companies generating turnover that would allow them to repay the debt. Normally, the loan runs for a period of between 12 and 60 months (longer for some energy projects) and offers an interest rate between 4 and 10%. Finally, Platform D offers a twist on the concept of equity crowdfunding with its subordinated convertible loan campaigns. Convertible loans are particularly suitable for young companies whose products are still in development, with very limited turnover and no foreseeable cash flow in the near future. Convertible loans have an average duration of five years and provide backers with the option of converting the outstanding loan balance and interest into share certificates at the company whose campaign they funded, thus becoming a minor shareholder. The backers get the option of converting the loan into shares once a substantial (as determined by Platform D) new investor acquires a part of the company. The optional conversion then follows the same terms as the ones between the company and the new investor, but, as a reward for the risk they took, backers receive a discount off the negotiated share price. Investment by backers that opt to forego conversion into shares is treated as a loan with an interest rate of approximately 4–10%. Platform D also allows project owners to create hybrid campaigns, for example, reward + loan or convertible loan + donation + reward combinations. Only loans and convertible loans are mutually exclusive for self-evident reasons.

The most widely represented group of projects on Platform D is the reward and reward + donation campaigns, which together comprise 56% of the projects hosted on the platform. The next cluster comprises the loan + reward combination (11%), followed by loan (9%), donation (9%), and convertible loan (6%). Finally, various hybrids (e.g. convertible loan + reward, loan + donation) conclude the list, with only 1–3% of campaigns attributed to each of these types.

As for the success rates, pure loan campaigns are the most successful with an impressive success rate of 90%, followed by convertible loan + reward (86%), loan + reward (80%), and loan + donation + reward (80%). Pure convertible loan campaigns have a success rate of 77%. Reward and reward + donation campaigns have an average success rate of

approximately 69% (very high for this type of crowdfunding), while pure donation campaigns have a success rate of 74%.

As for the dimensions of sustainable development, projects on Platform D are quite heterogeneous and may represent all the three dimensions (see Table 17.5 for examples of the projects). Most of them however focus on environmental and economic sustainability and address the SDGs related to innovation and environmental protection (9, 12, and 13). There are also differences depending on the crowdfunding model, for example, the projects using a donation model usually have less focus on the economic sustainability.

## Discussion

The current study demonstrates that crowdfunding can help sustainable entrepreneurs to handle the lack of finance—a critical issue for sustainable ventures (Ortas et al. 2013). The review of the sustainability-oriented platforms reveals that sustainable projects have rather high success rates in crowdfunding and manage to appeal to a wide backer audience. In this way, we provide additional support to Belz and Binder (2017) who demonstrate that crowdfunding fits well as a funding source for sustainable entrepreneurs. Moreover, several studies suggest that prosocial and sustainable orientations positively affect funding success for crowdfunding projects (Belleflamme et al. 2013; Calic and Mosakowski 2016). However, there is still some disagreement among researchers regarding this issue (Hörisch 2015; Moss et al. 2015), and the literature identifies a number of potential challenges in sustainability-oriented crowdfunding (Hörisch 2019; Petruzzelli et al. 2019). One of the main concerns is measuring and communicating their environmental impact (Hörisch 2019). While reviewing the projects on the sustainability-oriented crowdfunding platforms, we observed a lack of detailed information about projects' environmental and societal effects. Petruzzelli et al. (2019) suggest that communication with backers is essential to address this challenge. We believe that one way to demonstrate the project's impact is to highlight how it addresses sustainability dimensions and fulfils different SDGs (by anecdotal evidence and by numbers). This can help capture additional

project's benefits beyond market success and illustrate for backers the positive environmental and societal outcomes. The overview of the projects in Tables 17.2, 17.3, 17.4, and 17.5 demonstrates this approach.

Sustainable entrepreneurs often struggle to balance a triple bottom line of economic, social, and environmental goals (Belz and Binder 2017). Therefore, it is interesting to explore which dimensions of sustainable development (economic, social, or environmental) and SDGs are

**Table 17.5** Examples of the projects on Platform D

| | | Sustainable development | |
|---|---|---|---|
| Project | Details | Dimensions | SDGs |
| Company developing a circular solution for discarded goods | Convertible loan; €820,250 raised of €750,000 target by 200 backers | Environmental, economic | 9, 13 |
| A sustainable travel agency | Convertible loan; €885,650 raised of €750,000 target by 511 backers | Environmental, economic | 9, 12, 13 |
| A company producing sustainable rainwear | Loan; €125,000 raised of €100,000 target by 108 backers | Environmental, economic | 9, 12, 13 |
| Developing infrared heat cushions that are more energy efficient than ordinary heating | Loan; €250,500 raised of €150,000 target by 170 backers | Environmental, economic | 7, 9, 13 |
| Pre-sale of the handmade scarves produced by the seniors | Reward; €1130 raised of €1000 target by 14 backers | Social, economic | 3, 8 |
| Pre-sale of a waste separating stackable boxes made from recycled plastics | Reward; €40,730 raised of €40,000 target by 163 backers | Environmental, economic | 9, 12, 13 |
| Renting out dresses to address sustainability and poverty | Donation; €5331 raised of €5000 target by 80 backers | Environmental, social, economic | 1, 9, 12, 13 |
| Supporting a sailing trip made without the use of fossil fuels | Donation; €8173 raised of €7500 target by 121 backers | Environmental | 13, 14 |

addressed in sustainability-oriented crowdfunding and how entrepreneurs manage to merge these sometimes conflicting goals while organizing their crowdfunding campaigns. As we see from the review of the sustainability-oriented platforms, there is a great heterogeneity among the sustainable projects seeking crowdfunding. They may address all the three dimensions of sustainable development and often combine several dimensions. However, the environmental dimension gets the most attention, which is not surprising due to its appeal to more general backer audience. The social dimension is less represented and is mostly relevant for the projects using donation-based crowdfunding. As for the economic dimension, it is integral to projects using loan- and equity-based crowdfunding as they need to provide economic benefits to their backers. In addition, the projects using reward-based crowdfunding of pre-sale type tend to include the economic dimension.

We can therefore conclude that all the crowdfunding models are relevant for sustainable projects and may be used successfully. However, loan-based crowdfunding seems to have the highest success rate. Moreover, focus on a particular dimension of sustainability may influence the choice of the crowdfunding model, for example, it is necessary to emphasize the potential of economic growth even for sustainable projects if they plan to use loan- or equity-based crowdfunding.

## Conclusion

The current chapter provides an overview of the existing literature on crowdfunding of sustainable projects and reviews four European sustainability-oriented crowdfunding platforms. As a result, we illustrate how crowdfunding enables entrepreneurs to address the three dimensions of sustainability and various SDGs. In this way, we demonstrate the role of crowdfunding in moving towards a sustainable society and contribute to the emerging research field of sustainable crowdfunding (Testa et al. 2019). In addition, we add to the literature on sustainable entrepreneurship by contributing to the limited research on funding of sustainable ventures and identifying an alternative solution for their access to adequate funding.

Moreover, the current study has a number of practical implications. Sustainable entrepreneurs may find our findings useful when deciding which crowdfunding model best suits their projects. We also provide suggestions that can help them to solve the critical challenge of communicating the sustainability orientation of their projects to potential backers. In addition, the general overview of the field of sustainable crowdfunding can give valuable insights for crowdfunding platforms seeking to embrace sustainable projects as part of their business portfolio.

Nevertheless, a number of important issues in sustainability-oriented crowdfunding still require further exploration. For example, the role of platforms in sustainability-oriented crowdfunding has remained largely untouched (Testa et al. 2019). Another issue that requires further examination is the success factors that contribute to sustainability-oriented crowdfunding. Existing research has not reached a consensus on whether sustainability orientation increases the probability of crowdfunding success or not (Belleflamme et al. 2013; Calic and Mosakowski 2016; Hörisch 2015; Moss et al. 2015). It may also be interesting to see if there is a relationship between the dimensions of sustainable development addressed by the project and the project's crowdfunding success. Finally, we invite future studies to further investigate how using different models (i.e. donation, reward, loan, equity, or their combinations) influences the crowdfunding success.

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## Note

1. Although some authors argue that sustainability departs from people's needs while people's well-being is at the base of sustainable development (Moldan et al. 2012).

## References

Austin, J., Stevenson, H., & Wei-Skillern, J. J. (2006). Social and Commercial Entrepreneurship: Same, Different, or Both? *Entrepreneurship Theory and Practice, 30*(1), 1–22.

Belleflamme, P., Lambert, T., & Schwienbacher, A. (2013). Individual Crowdfunding Practices. *Venture Capital, 15*(4), 313–333.

Belz, F. M., & Binder, J. K. (2017). Sustainability Entrepreneurship: A Convergent Process Model. *Business Strategy and the Environment, 26*(1), 1–17.

Bocken, N. M. (2015). Sustainable Venture Capital – Catalyst for Sustainable Start-Up Success? *Journal of Cleaner Production, 108*, 647–658.

Bocken, N. M. P., Samuel W. S., Padmakshi R., & Steve E. (2014). A Literature and Practice Review to Develop Sustainable Business Model Archetypes. *Journal of Cleaner Production, 65*, 42–56.

Calic, G., & Mosakowski, E. (2016). Kicking Off Social Entrepreneurship: How a Sustainability Orientation Influences Crowdfunding Success. *Journal of Management Studies, 53*(5), 738–767.

Choi, D. Y., & Gray, E. R. (2008). The Venture Development Processes of 'Sustainable' Entrepreneurs. *Management Research News, 8*(31), 558–569.

Cohen, B. (2006). Sustainable Valley Entrepreneurial Ecosystems. *Business Strategy and the Environment, 15*(1), 1–14.

Cohen, B., & Winn, M. I. (2007). Market Imperfections, Opportunity and Sustainability Entrepreneurship. *Journal of Business Venturing, 22*(1), 29–49.

Cohen, B., Smith, B., & Mitchell, R. (2008). Towards a Sustainable Conceptualization of Dependent Variables in Entrepreneurship Research. *Business Strategy and the Environment, 17*(2), 107–119.

Dean, T. J., & McMullen, J. S. (2007). Toward a Theory of Sustainability Entrepreneurship: Reducing Environmental Degradation Through Entrepreneurial Action. *Journal of Business Venturing, 22*(1), 50–76.

Dempsey, N., Bramley, G., Powers, S., & Brown, C. (2011). The Social Dimension of Sustainable Development: Defining Urban Social Sustainability. *Sustainable Development, 19*(5), 289–300.

DiMaggio, P. J. (1988). Interest and Agency in Institutional Theory. In L. G. Zucker (Ed.), *Institutional Patterns and Organizations: Culture and Environment* (pp. 3–23). Cambridge: Ballinger.

Dovì, V. G., Friedler, F., Huisingh, D., & Klemeš, J. J. (2009). Cleaner Energy for Sustainable Future. *Journal of Cleaner Production, 17*(10), 889–895.

Gerber, E. M., & Hui, J. (2013). Crowdfunding: Motivations and Deterrents for Participation. *ACM Transactions on Computer-Human Interaction, 20*(6), 1–32.

Griggs, D. J., Smith, M. S., Gaffney, O., Rockström, J., Öhman, M. C., Shyamsundar, P., Steffen, W., Glaser, G., Kanie, N., & Noble, I. (2013). Sustainable Development Goals for People and Planet. *Nature, 495*, 305–307.

Halisçelik, E., & Soytas, M. A. (2019). Sustainable Development from Millennium 2015 to Sustainable Development Goals 2030. *Sustainable Development, 27*(4), 545–572.

Hansmann, R., Mieg, H. A., & Frischknecht, P. (2012). Principal Sustainability Components: Empirical Analysis of Synergies Between the Three Pillars of Sustainability. *International Journal of Sustainable Development & World Ecology, 19*(5), 451–459.

Hawkes, J. (2001). *The Fourth Pillar of Sustainability: Culture's Essential Role in Public Planning*. Melbourne: Common Ground P/L.

Hörisch, J. (2015). Crowdfunding for Environmental Ventures: An Empirical Analysis of the Influence of Environmental Orientation on the Success of Crowdfunding Initiatives. *Journal of Cleaner Production, 107*, 636–645.

Hörisch, J. (2019). Take the Money and Run? Implementation and Disclosure of Environmentally-Oriented Crowdfunding Projects. *Journal of Cleaner Production, 223*, 127–135.

Hosseini, H. M., & Kaneko, S. (2012). Causality Between Pillars of Sustainable Development: Global Stylized Facts or Regional Phenomena? *Ecological Indicators, 14* (1), 197–201.

Jegatheesan, V., Liow, J. L., Shu, L., Kim, S. H., & Visvanathan, C. (2009). The Need for Global Coordination in Sustainable Development. *Journal of Cleaner Production, 17*(7), 637–643.

Lambert, T., & Schwienbacher, A. (2010). An Empirical Analysis of Crowdfunding. Retrieved May 15, 2019, from http://www.crowdsourcing.org/document/an-empirical-analysis-of-crowdfunding-/2458.

Lehner, O. M. (2013). Crowdfunding Social Ventures: A Model and Research Agenda. *Venture Capital, 15*(4), 289–311.

Moldan, B., Janoušková, S., & Hák, T. (2012). How to Understand and Measure Environmental Sustainability: Indicators and Targets. *Ecological Indicators, 17*, 4–13.

Mollick, E., & Robb, A. (2016). Democratizing Innovation and Capital Access: The Role of Crowdfunding. *California Management Review, 58*(2), 72–87.

Moss, T. W., Neubaum, D. O., & Meyskens, M. (2015). The Effect of Virtuous and Entrepreneurial Orientations on Microfinance Lending and Repayment: A Signaling Theory Perspective. *Entrepreneurship Theory and Practice, 39*(1), 27–52.

Motylska-Kuzma, A. (2018). Crowdfunding and Sustainable Development. *Sustainability, 10*(12), 4650.

Murphy, K. (2012). The Social Pillar of Sustainable Development: A Literature Review and Framework for Policy Analysis. *Sustainability: Science, Practice and Policy, 8*(1), 15–29.

Nicolls, A. (2006). *Social Entrepreneurship – New Models of Sustainable Social Change*. Oxford: Oxford University Press.

Ortas, E., Burritt, R. R., & Moneva, J. M. (2013). Socially Responsible Investment and Cleaner Production in the Asia Pacific: Does It Pay to Be Good? *Journal of Cleaner Production, 52*, 272–280.

Petruzzelli, A. M., Natalicchio, A., Panniello, U., et al. (2019). Understanding the Crowdfunding Phenomenon and Its Implications for Sustainability. *Technological Forecasting and Social Change, 141*, 138–148.

Purvis, B., Mao, Y., & Robinson, D. (2018). Three Pillars of Sustainability: In Search of Conceptual Origins. Sustainability Science. Retrieved May 9, 2019, from http://eprints.whiterose.ac.uk/136715/7/Purvis2018_Article_ThreePillarsOfSustainabilityIn.pdf.

Ridley-Duff, R. (2008). Social Enterprise as a Socially Rational Business. *International Journal of Entrepreneurial Behaviour and Research, 14*(5), 291–312.

Schaltegger, S. (2002). A Framework for Ecopreneurship. Leading Bioneers and Environmental Managers to Ecopreneurship. *Greener Management, 38*, 45–58.

Schaltegger, S., & Wagner, M. (2011). Sustainability Entrepreneurship and Sustainability Innovation: Categories and Interactions. *Business Strategy and the Environment, 20*(4), 222–237.

Shane, S. A. (2003). *A General Theory of Entrepreneurship: The Individual–Opportunity Nexus*. Cheltenham, UK: Edward Elgar Publishing.

Soini, K., & Birkeland, I. (2014). Exploring the Scientific Discourse on Cultural Sustainability. *Geoforum, 51*, 213–223.

Spangenberg, J. H. (2004). Reconciling Sustainability and Growth: Criteria, Indicators, Policy. *Sustainable Development, 12*(2), 74–86.

Testa, S., Nielsen, K. R., Bogers, M., et al. (2019). The Role of Crowdfunding in Moving Towards a Sustainable Society. *Technological Forecasting and Social Change, 141*, 66–73.

Thompson, N., Kiefer, K., & York, J. G. (2011). Distinctions Not Dichotomies: Exploring Social, Sustainable, and Environmental Entrepreneurship. *Advances in Entrepreneurship, Firm Emergence and Growth, 13*, 205–233.

UN. (2019). Sustainable Development Goals. Retrieved May 15, 2019, from https://sustainabledevelopment.un.org/?menu=1300.

Vismara, S. (2019). Sustainability in Equity Crowdfunding. *Technological Forecasting and Social Change, 141*, 98–106.

WCED. (1987). *Our Common Future, Report of the World Commission on Environment and Development*. Oxford and New York: Oxford University Press.

Wehnert, P., Christian V. B., & Markus B. (2019). In Crowdfunding We Trust? Investigating Crowdfunding Success as a Signal for Enhancing Trust in Sustainable Product Features. *Technological Forecasting and Social Change, 141*, 128–137.