

Can the Crowd Save the World?
**An Empirical Analysis of Investment-Based Crowdfunding and
Sustainability**

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Abstract

The academic literature holds high expectations of crowdfunding to foster sustainable development by closing the funding gap for sustainable entrepreneurs. In particular, crowdfunding has great potential to transform existing socio-technical regimes by contributing to the realisation of radical innovations. However, this potential has not yet been fully explored. Large knowledge gaps exist especially in the area of investment-based crowdfunding. Therefore, this framework paper addresses the question of how sustainable entrepreneurs can exploit the full potential of investment-based crowdfunding to develop from niche operators to actors in the socio-technical regime. The insights of the articles derived from this dissertation are conceptually evaluated on a meta-level by applying the multi-level perspective. The findings can be assigned to four categories, which are the financing and marketing function, the target group, and the project presentation. A key finding is the suitability of investment-based crowdfunding to equally fund and market the business ideas of environmental entrepreneurs, since the quest for entering the mass market is highest for such ventures. Furthermore, the display of environmental effects and financial incentives of the crowdfunding project as well as the effective approach of the target group are important success factors for project initiators. A best practice example is used to demonstrate how crowdfunding can be a stepping stone for sustainability-oriented niche actors to enter the mass market. Implications for research and practice are drawn based on the results of this dissertation.

Keywords

Crowdfunding; sustainability; sustainable entrepreneurship; investment; multi-level perspective

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1. Motivation and Background

Crowdfunding is a relatively new financing instrument aimed at democratising access to financial resources for start-ups and small- and medium-sized enterprises (Baumgardner et al., 2017). It is defined as “*the efforts by entrepreneurial individuals and groups – cultural, social, and for-profit – to fund their ventures by drawing on relatively small contributions from a relatively large number of individuals using the internet, without standard financial intermediaries*” (Mollick, 2014, p. 2). Generally, four types of crowdfunding can be distinguished, differing by the type of return offered to the crowd (i.e. the group of individuals financially supporting a crowdfunding project). The most common type is reward-based crowdfunding, in which supporters receive a non-monetary, material reward on their investment (Mollick, 2014). In donation-based crowdfunding, supporters do not receive any reward in return for their money (Lehner & Harrer, 2019). Equity- and lending-based crowdfunding offer monetary rewards to investors. Both types can be summarised under the term ‘investment-based crowdfunding’ (European Commission, 2016). Similar to the stock market, investors receive profit shares in equity crowdfunding, whereas lending-based crowdfunding works with predefined interest rates in return for credits given by the crowd (Tenner & Hörisch, 2020a). While donation- and reward-based crowdfunding are suited to finance small-scale projects in the early stages, investment-based types of crowdfunding provide the opportunity to collect higher sums for ventures in a more mature stage (Lam & Law, 2016).

The scientific literature expresses great expectations of crowdfunding in terms of its contribution to sustainable development (Böckel et al., 2020; Tenner, 2021). Many scholars assume that crowdfunding can close the financing gap for sustainable entrepreneurs, who are frequently confronted with difficulties in receiving financial assets for their business ideas (Calic & Mosakowski, 2016; Cumming et al., 2017; Ridley-Duff, 2009). Sustainable entrepreneurship is regarded as central driver in tackling environmental and social issues (Hörisch, 2015b; Johnson & Schaltegger, 2020; Schaltegger et al., 2018). It is considered “*the recognition, development and exploitation of opportunities by individuals to bring into existence future goods and services with economic, social and ecological gains*” (Belz & Binder, 2017, p. 2). Accordingly, by acting as a supplemental source of financing for sustainable entrepreneurs, innovations for social and environmental concerns can be realised. In addition to sustainable entrepreneurs, social entrepreneurs (Allison et al., 2015; Lehner, 2013) and environmental entrepreneurs (Hörisch & Tenner, 2020; Penz et al., 2022; Vasileiadou et al., 2016) benefit equally from this new form of financing. In comparison to sustainable entrepreneurs following the triple bottom line, social entrepreneurs pursue a social

mission of helping people, whereas environmental entrepreneurs identify market failures as business opportunities for environmental innovations (Thompson et al., 2011).

The phenomenon of crowdfunding was chosen as the subject of investigation for this dissertation, as it represents an innovative tool for sustainable entrepreneurs, which goes beyond the mere function of receiving financing. In fact, crowdfunding can also be used as a marketing tool, market test, or legitimising instrument (Lehner, 2013; Mollick, 2014; Tenner & Hörisch, 2020a). Through its strong reliance on social media and its proximity to individuals of the general public, a supportive community around sustainability-oriented innovation can be created (Baumgardner et al., 2017). Single individuals get a chance to invest their money in ideas they perceive as important and future-oriented. Therefore, the crowd has the opportunity to turn even small, radical, and possibly utopian ideas into reality. Since radical innovations hold particular potential to tackle global sustainability issues (Kennedy et al., 2017; Schaltegger & Wagner, 2011), the question arises of how the full potential of crowdfunding for sustainable entrepreneurs can be unleashed. In line with Hörisch (2015a), it can be assumed that this potential is not fully exploited yet. My dissertation addresses this knowledge gap by paying particular attention to investment-based crowdfunding. New insights regarding the financing and marketing function, the target group, and the project presentation of sustainability-oriented crowdfunding projects will be presented. The multi-level perspective (MLP) (Geels, 2002, 2004) serves as the theoretical framework for this endeavour. In particular, I will analyse how sustainable entrepreneurs operating in the niche can use crowdfunding to develop into actors in the socio-technical regime.

2. Current State of Research

2.1. Crowdfunding Sustainability-Oriented Ventures

The scientific research field on the intersection of crowdfunding and sustainability is still very young, although a steadily growing number of articles are published each year (Böckel et al. 2020). In general, the literature shows that crowdfunding is a promising tool for financing projects with a sustainability orientation. Early studies, for instance, recognised the potential of crowdfunding for social ventures (e.g. Lehner, 2013; 2014). Allison et al. (2013; 2015) focused on the effect of framing on funding success in socially oriented microlending. Their findings provide evidence for the warm-glow effect (i.e. personal satisfaction) among supporters after spending their money to help others (Allison et al., 2015). Other studies have also confirmed the suitability of crowdfunding (especially investment-based models) for closing the funding gap of renewable energy projects (Bonzanini et al., 2016; Bourcet & Bovari, 2020; Nigam et

al., 2018; Vasileiadou et al., 2016). However, contrasting results were reported by Hörisch (2015a), who did not identify higher success rates for environmentally oriented ventures in reward-based crowdfunding. Nevertheless, ventures with a sustainability orientation generally tend to enjoy higher success rates than conventional ventures (Bento et al., 2019; Calic & Mosakowski, 2016; Hörisch, 2018). According to Calic and Mosakowski (2016), the positive influence of sustainability orientation on financial success is partially mediated by third-party endorsements and project creativity. Bento et al. (2019) indicated that 70% of successfully funded sustainable entrepreneurs were still operating after one year, suggesting a good survival rate for crowdfunded ventures. Hörisch (2018) conducted an analysis on two German crowdfunding platforms, which are specified towards sustainability-oriented ventures (i.e. no comparison with conventionally oriented crowdfunding projects). His findings indicate that the success rate of 63.6% is far higher compared to thematically open platforms (cf. Calic & Mosakowski, 2016; Mollick, 2014). He argued that this is possibly due to the preselection of projects with a sustainability impact. Recent research articles have dealt with the minor role that sustainability-oriented ventures play in social media (Laurell et al., 2019), the positive effect of signalling crowdfunding success on the trustworthiness of the sustainability features of crowdfunding projects (Wehnert et al., 2019), and the importance of non-governmental seals for sustainability-oriented crowdfunding projects (Pabst et al., 2021).

The previously mentioned studies have been conducted primarily in the areas of donation-based and reward-based crowdfunding. Only in recent years has academic research increasingly dealt with the role of investment-based types of crowdfunding for sustainability-oriented ventures. Vismara (2019) conducted a quantitative analysis on the British equity crowdfunding platform Crowdcube. His findings indicate a higher number of private (i.e. restricted) investors for sustainability-oriented crowdfunding projects compared to conventionally oriented projects. By contrast, no such effects of projects with a sustainability orientation have been found among professional investors. Another study by Ben Slimane and Rousseau (2020) identified the success factors of renewable energy projects on French lending-based crowdfunding platforms. The authors emphasised that in the lending-based model, the investors' goal remains a good return on investment, even if the projects are sustainability-oriented. By contrast, investors on German-speaking equity crowdfunding platforms place a higher focus on non-financial returns and generally invest higher amounts than conventional investors (Hornuf et al., 2021). Equity crowdfunding has also recently been examined as a source of receiving knowledge-based inputs from the crowd for the sake of implementing and enhancing sustainability innovations (Troise et al., 2021). Insights into the post-funding phase of environmentally oriented ventures in

lending-based crowdfunding have been provided by Hörisch (2018), who found that the majority of projects use the funds to implement the measures that are promised to its supporters in advance.

2.2. Theoretical Framework: The Multi-Level Perspective

Each article included in this dissertation follows a separate theoretical or conceptual framework. For the purpose of analysing the findings of the key articles on a meta-level, the MLP (Geels, 2002, 2004) will be applied as a theoretical lens in this framework paper. The MLP was developed to explain changes (i.e. transitions) in socio-technical systems (Geels, 2004, 2011). Transitions are processes that usually involve numerous actors and are characterised by complexity and a long-term nature (Geels, 2011). According to the MLP, these processes involve interactions on three different levels: the macro, meso, and micro level (Geels, 2002; Schot & Geels, 2008).

The macro level refers to the socio-technical *landscape*, which is driven by “*deep structural trends*” (Geels, 2002, p. 1260), in which change happens slowly. As highlighted by Geels (2011), the landscape comprises external factors, such as political views, demographical trends, social values, and macro-economic aspects. This level is characterised by high stability, in which actors cannot willingly influence or force change (Geels, 2004). The meso level of the MLP are socio-technical *regimes*, which consist of a set of rules (Rip & Kemp, 1998). Such rules might imply “*cognitive routines and shared beliefs, capabilities and competences, lifestyles and user practices, favourable institutional arrangements and regulations, and legally binding contracts*” (Geels, 2011, p. 27). The rules of a regime are also of high stability and allow incremental innovations with small modifications (Geels, 2011). Raith and Siebold (2018) stress that the selection of sustainable business models is easier for nascent entrepreneurs than established companies with existent business models. Therefore, radical innovations are mainly attributed to young entrepreneurs entering the market, whereas large incumbents focus on incremental innovations (Schaltegger & Wagner, 2011). Protected *niches* at the micro level provide a secure setting for the development of radical innovations (Geels, 2002, 2011). Niches can be protected from mass market selection, for example, through subsidised projects, strategic investments of large companies, or public authorities (Geels, 2004; Smith et al., 2010). Geels (2004) underlined the importance of niches as spaces for learning processes (e.g. for technical novelties or consumer preferences) without the rigid set of rules in socio-technical regimes. This is particularly important for radical innovations, which are often expensive and arduous (Geels, 2002). Moreover, niches provide the chance to create social networks and communities,

such as relationships between producers and consumers (Geels, 2004). However, in the case of high economic, institutional, or cultural stability at the regime level (Geels, 2004), it is hard for entrepreneurs to settle down radical innovations in the mass market. Instabilities at the regime level increase the chances of radical innovations breaking through. Generally speaking, niche actors strive to introduce and establish their innovations in the socio-technical regime by using the so-called ‘windows of opportunity’, which occurs after instabilities on the regime level or pressures from the landscape level (Geels, 2002; Schot & Geels, 2008). In the context of sustainability, examples of pressures on the landscape level are climate change, loss of biodiversity, and pollution. Instabilities at the regime level might include changing consumer preferences, business rivalry, or technical problems (Geels, 2004).

The academic literature has shown that the MLP can successfully be applied in the context of sustainability transitions (e.g. Geels 2011, 2013, 2019; Smith et al., 2010) and is even regarded as a “*core framework*” (Geels, 2019, p. 187) in this literature stream. Sustainability transitions are special in several ways (Geels, 2011): (1) they are goal-driven towards specific, existing environmental and/or social problems; (2) they often require regulation and policy changes (such as subsidies or taxes), although their benefits for users might not be visible at first sight (with possible sacrifices in service or price); and (3) they are crucial in sectors characterised by large corporations (e.g. food, transport, energy), which entail a “*strategic reorientation of incumbents who presently still defend existing systems and regimes*” (Geels, 2011, p. 25). As mentioned above, large corporations in existing regimes focus on incremental innovations. In a study on large German corporations, Hörisch et al. (2019) found a positive growth of sustainability actions over time, strongly linked to an increasing awareness of consequences. However, this progress is characterised by incremental changes.

Multiple authors have used the MLP to examine sustainable entrepreneurs as protected niche actors (e.g. Gibbs & O'Neill, 2014; Hörisch, 2015b; Schaltegger & Wagner, 2011). Such entrepreneurs have the potential to foster sustainability transitions “*both through their own business activities as well as through lobbying for wider system change*” (Gibbs & O'Neill, 2014, p. 1092). Their potential to alter and transform the mass market is huge. Due to their interest in sustainable innovations, actors in sustainability-oriented niches, both entrepreneurs and consumers, tend to show a higher tolerance towards teething problems and other difficulties compared to their counterparts in socio-technical regimes (Smith et al., 2010). Sustainable entrepreneurs with growing businesses are faced with fears concerning displacement and marginalisation by larger, more established organisations in the socio-technical regime

(Hörisch, 2015b). Thus, the transition from sustainability-oriented niche operators to actors in the socio-technical regime involves multiple impediments.

Thus far, the MLP has only enjoyed scant attention in the crowdfunding literature. Vasileiadou et al. (2016) applied the MLP to investigate crowdfunding for renewable energy projects. The authors viewed crowdfunding as “*a novel socio-technical practice developed in a niche, with the potential to upscale and transform both the energy regime, as well as the financial regime*” (Vasileiadou et al., 2016, p. 143). To this end, Vasileiadou and colleagues regarded crowdfunding not only as an accelerator for renewable energy projects but also as a novel actor in the financial sphere. Different variables that acted as indicators for the stabilisation of the niche were examined. The authors’ main conclusion was that, until now, learning processes and support from niche actors are still limited, indicating a weak stabilisation of the niche in consideration of the renewable energy sector. However, the heterogeneity of supporters’ motivation is promising (Vasileiadou et al., 2016). Another study by Testa et al. (2019) employed the MLP in terms of crowdfunding and its ability to transform financial and sustainability regimes. The authors considered crowdfunding a novel financing form that enables a wider range of ideas and projects while overcoming geographical limits. Particular attention was paid to the strong interaction between producers and consumers in the crowdfunding process. Consumers break out of their passive role into active engagement during the innovation phase of an entrepreneurial venture (Testa et al., 2019).

2.3. Research Gaps and the Research Question

The MLP offers a promising theoretical approach with regard to crowdfunding and its potential for sustainable entrepreneurs. So far, only a few articles exist that have applied the MLP in the crowdfunding context. Vasileiadou et al. (2016) and Testa et al. (2019) viewed crowdfunding as a novel player in transforming sustainability and financial regimes. However, the potential of this new financing mechanism for sustainable entrepreneurs has not yet been fully explored. There are still some knowledge gaps on how sustainable entrepreneurs can use crowdfunding to enter and transform existing socio-technical regimes. Therefore, the role of crowdfunding in transforming sustainability regimes was investigated. For this purpose, the following research question was addressed in this study:

How can sustainable entrepreneurs exploit the full potential of investment-based crowdfunding to develop from niche operators to actors in the socio-technical regime?

By addressing this research question, and to shed light on the multifarious aspects of crowdfunding for sustainable entrepreneurship, several research gaps identified in recent systematic literature reviews are approached in this framework paper. First, compared to its market volume, donation-based and reward-based crowdfunding seem to be overrepresented in scientific research (Böckel et al., 2020). Although lending-based crowdfunding covers 76% of the global market volume (Massolution, 2015), it finds a representation of only 16% in scientific research (Böckel et al., 2020). Given that supporters in reward-based crowdfunding are predominantly driven by non-financial interests, the funding amount remains small compared to lending-based or equity crowdfunding (Lam & Law, 2016). For this reason, the latter offers high potential to fund large-scale projects with a high contribution to sustainable development. Therefore, Wehnert and Beckmann (2021) stressed the need for more research in equity- and lending-based crowdfunding, particularly with reference to success factors of crowdfunding campaigns. This dissertation follows the aforementioned recommendations and focuses mainly on investment-based crowdfunding.

A second research gap highlighted by Böckel et al. (2020) is the emphasis on different sustainability dimensions: studies concentrating on the social dimension clearly dominate those with an environmental or an interconnected (i.e. environmental and social) focus. Therefore, two studies of this dissertation contain a more fine-grained differentiation of the sustainability dimension (Hörisch & Tenner, 2020; Tenner, 2021), while another two articles put environmentally oriented crowdfunding projects in the spotlight (Penz et al., 2022; Tenner & Hörisch, 2021).

Third, Wehnert and Beckmann (2021) proposed more research on crowdfunding platforms that specialise in entrepreneurial ventures with a sustainability orientation. Tenner and Hörisch (2020b) addressed this call for research by examining supporters on Ecocrowd and LeihDeinerUmweltGeld, both German crowdfunding platforms.

Fourth, Böckel et al. (2020) also highlighted that the majority of studies have focused on the financing function of crowdfunding while neglecting the marketing function. For this reason, Tenner (2021) paid special attention to crowdfunding as an instrument for marketing new projects or ideas.

Fifth, a knowledge gap exists concerning the characteristics of the supporters of crowdfunding campaigns (Böckel et al., 2020; Wehnert & Beckmann, 2021). This research gap was addressed

using a survey design (Tenner & Hörisch, 2020b) and an experimental design (Penz et al., 2022).

3. Methodology

3.1. Analysis of the Key Articles on a Meta-Level

The purpose of this study was to build a conceptual framework around the key journal articles derived from this dissertation. In line with the guidelines by Jaakkola (2020), the knowledge acquired in the different journal articles were processed and linked in a novel way under the lens of a method theory. Accordingly, the MLP was chosen as a theoretical frame. The insights were analysed on a meta-level to address the overarching research question presented in the previous section. In particular, the key findings of each article are reviewed and assigned to four categories (i.e. the financing function, the marketing function, the target group, and the project presentation), which partly build on each other. To this end, and in line with Edmondson and McManus (2007), this dissertation contributes to the maturation of the research field of crowdfunding for sustainable entrepreneurship. The outcomes of the meta-level analysis were further clarified using a best-practice example. The case of *fairafrik*, a sustainable entrepreneur who conducted several successful crowdfunding campaigns, is demonstrated.

3.2. Methodology Used in the Key Articles

To examine the potential of crowdfunding for sustainable entrepreneurship from different angles, the six key articles derived from this dissertation use different methodologies. First, a systematic literature review was conducted in the work entitled “*A systematic literature review of crowdfunding and sustainability: highlighting what really matters*” by Böckel et al. (2020), in accordance with the guidelines by Tranfield et al. (2003). Scopus was chosen as a scientific database by including several keywords capturing the fields of sustainability and crowdfunding. Previously trained coders thematically scanned each article by including peer-reviewed journal articles published by the end of 2018 and written in the English language. The sample for the systematic literature review consisted of 83 papers. The systematic literature identified several research gaps with reference to crowdfunding and sustainability and, thus, built the basis for the following key papers of this dissertation.

The second key article, entitled “*How environmental and social orientations influence the funding success of investment-based crowdfunding: The mediating role of the number of funders and the average funding amount*,” is by Hörisch and Tenner (2020). The work followed a quantitative research design based on a dataset of 318 investment-based crowdfunding projects. The project information was manually captured from the project sites of two German

(i.e. Seedmatch and Companisto) and two crowdfunding platforms from the United States (i.e. First Democracy VC and Start Engine) during April 2018. Mediated ordinary least squares regressions were applied as a statistical method.

The third key work entitled “*Crowdfunding for Responsible Entrepreneurship*”, was conducted by Tenner and Hörisch (2020a). This book chapter reviews existing literature on crowdfunding for responsible entrepreneurship by specifically examining the success factors and typical funding phases of crowdfunding campaigns. The insights derived from the review are clarified in more detail using a practical example.

The work “*Crowdfunding sustainable entrepreneurship: What are the characteristics of crowdfunding investors?*” was written by Tenner and Hörisch (2020b) and represents the fourth key paper of this dissertation. In contrast to the previously mentioned article by Hörisch and Tenner (2020), which analysed crowdfunding from the project perspective, this work focused on the supporters’ perspective. It used an online survey to quantitatively analyse 282 respondents from two different data sources (i.e. individuals representing the German population according to socio-demographic factors as well as active supporters on two sustainability-oriented crowdfunding platforms from Germany). The data were analysed using binary logistic regression analyses.

The fifth key article, “*The potential of crowdfunding for sustainable development: a comparison of sustainable and conventional crowdfunding projects*” (Tenner (2021) is a single-authored paper that draws on the same dataset as Hörisch and Tenner (2020). After excluding extreme values of the dependent variables, the sample for this study decreased to 282 cases. The data were quantitatively analysed by conducting a multinomial logistic regression analysis and a multivariate analysis of covariance, followed by post-hoc tests.

The sixth key article entitled “*Investors in environmental ventures want good money - and a clean conscience: How framing, interest rates and the environmental impact of crowdlending projects influence funding decisions*” written by Penz et al. (2022) is the second study in this dissertation to focus on the supporters’ perspective. In contrast to the aforementioned articles, this study used an experimental research design. The authors conducted a real choice-based conjoint analysis by simulating lending-based crowdfunding investments. The sample of 497 participants was recruited with the help of an online panel provider and represents crowdfunding investors according to their socio-demographic characteristics (based on Tenner

& Hörisch, 2020b). Hierarchical Bayes analysis was applied to estimate the part-worth utilities of the included attribute levels.

4. Discussion of the Key Findings

Crowdfunding is a relatively new mechanism that holds a high potential to transform financial and sustainability regimes (Testa et al., 2019; Vasileiadou et al., 2016). A quantitative study on investment-based crowdfunding platforms has shown that the majority of the funded projects are oriented towards one of both of the sustainability dimensions (environmental/ social), even when the platforms are thematically open and not exclusively focused on sustainable projects (Tenner, 2021). This is the first indicator of the huge potential crowdfunding offers for sustainable entrepreneurs. This section addresses the research question of how sustainable entrepreneurs can fully exploit the potential of investment-based crowdfunding to develop from niche operators to actors in the socio-technical regime. To address this research question, the findings of the six key articles of this framework paper are outlined and discussed in the following paragraphs. These findings are clustered into four categories: the financing function, the marketing function, the target group, and the presentation of the project idea.

4.1. The Financing Function: Closing the Funding Gap

A strong emphasis in the crowdfunding literature is placed on the effect of the sustainability orientation of crowdfunding projects on their funding success. Some researchers have highlighted the positive influence of sustainability orientation (environmental and/or social orientation) on the chance of reaching or even exceeding their funding goal, particularly in reward-based and donation-based crowdfunding (e.g. Allison et al., 2013; Calic & Mosakowski, 2016; Cecere et al., 2017). In their scientific literature review, Böckel and colleagues lend support to this assumption. The authors found that out of 20 articles that examined the effect of sustainability orientation on financial crowdfunding success, 65% confirmed a positive influence (Böckel et al., 2020). In terms of investment-based crowdfunding, Hörisch and Tenner (2020) also reported a positive effect of environmental orientation on funding success. Thus, it can be concluded that the financing function of investment-based crowdfunding is particularly relevant for environmental entrepreneurs. According to Tenner (2021) and based on insights by Thompson et al. (2011), entrepreneurial ventures following an environmental orientation are assumed to profit from the financing function of investment-based crowdfunding for introducing new products and services into the market.

Conversely, no effect for social orientation on the likelihood of receiving funding was found (Hörisch & Tenner, 2020). In line with this finding, Tenner (2021) assigned a small-scale nature to socially oriented crowdfunding projects in investment-based crowdfunding, as they aimed for the lowest funding targets. The difference between social and environmental entrepreneurs in investment-based crowdfunding might be explained by the fact that environmental entrepreneurs are more strongly related to profit-making, whereas social entrepreneurs are often located in the non-profit sector and follow altruistic motivations (cf. Tenner, 2021; Thompson et al., 2011). Given that funders in investment-based crowdfunding receive monetary rewards in return for their support, projects generating profits might be more attractive investment opportunities. Nevertheless, Tenner (2021) emphasised that investment-based crowdfunding still holds funding potential for social entrepreneurs who seek small-scale funding. Further, Hörisch and Tenner (2020) stressed that funders in investment-based crowdfunding are not merely oriented towards financial return but also strive for the feeling of a ‘warm glow’ by supporting innovations that benefit the general public. Hence, for environmentally oriented projects, monetary rewards in investment-based crowdfunding are not expected to crowd out the likelihood of receiving funding compared to conventionally oriented crowdfunding projects (as initially assumed by Cecere et al., 2017).

In accordance with these insights, environmental entrepreneurs who aim to enter the regime level by using the financing and marketing potential of crowdfunding are well advised to use investment-based crowdfunding for large-scale funding. By contrast, investment-based crowdfunding is not a promising option for social entrepreneurs, although small-scale projects still have a certain chance of success.

4.2. The Marketing Function: Building a Community

Apart from receiving financial resources, initiators of crowdfunding campaigns also benefit from the marketing function of crowdfunding (Belleflamme et al., 2014; Brown et al., 2017; Gerber & Hui, 2013). The goal is to build a community and reach as many supporters as possible (Tenner & Hörisch, 2020a). It can be assumed that the higher the number of supporters, the higher the marketing effect (Tenner, 2021). Hence, the marketing function is commonly measured as the number of individuals financially supporting a crowdfunding project (Hörisch, 2018; Lukkarinen et al., 2016; Pitschner & Pitschner-Finn, 2014; Tenner, 2021). The academic literature suggests that some entrepreneurs use crowdfunding as a marketing tool better than others. However, with regard to crowdfunding sustainable entrepreneurship, scientific studies on the marketing success of sustainability-oriented crowdfunding projects are rare (Böckel et

al., 2020). In their analysis of investment-based crowdfunding platforms in Germany and the United States, Hörisch and Tenner (2020) found the highest number of supporters for environmentally oriented crowdfunding projects. Similar findings have been reported by Vismara (2019) in terms of equity crowdfunding projects in the United Kingdom. However, the author did not distinguish between social and environmental orientations. In Tenner's (2021) empirical study, it also became evident that environmentally oriented crowdfunding projects are the most successful in using crowdfunding as a marketing tool. In particular, compared to conventionally oriented projects, they showed a significantly higher number of supporters. By assuming that environmental entrepreneurs address market failures with novel product and service innovations (Thompson et al., 2011), the community support is of high relevance for such ventures for receiving "*public awareness and acceptance*" (Tenner, 2021, p. 521). Interestingly, the marketing function seems not as relevant for socially oriented entrepreneurs (Hörisch & Tenner, 2020; Tenner, 2021). Similarly to the financing function, environmental entrepreneurs are highly encouraged to use investment-based crowdfunding as a marketing tool for their radical innovations, whereas reward- or donation-based crowdfunding platforms are suitable for social entrepreneurs (cf. Allison et al., 2013; Cecere et al., 2017; Hörisch & Tenner, 2020).

4.3. Addressing the Right Target Group

As emphasised in the previous sub-section, the success of a crowdfunding campaign strongly depends on the ability to create a committed community. Initiators and supporters of crowdfunding projects "*are motivated to learn from each other, receive feedback, and expand awareness of their work in a social setting*" (Gerber & Hui, 2013, p. 24). Inspiring and engaging a high number of supporters is also key for exploiting the full marketing and financing potential of crowdfunding. Therefore, it is crucial for initiators of crowdfunding projects to know their target groups and address them in the best possible way. Several studies have investigated the characteristics of crowdfunding investors in general (e.g. Bretschneider & Leimeister, 2017; Gerber & Hui, 2013). However, the typical supporters of sustainability-oriented crowdfunding projects remain to be identified. Tenner and Hörisch (2020b) addressed this research gap by identifying socio-demographics and individual values of supporters of sustainability-oriented projects in reward-based and lending-based crowdfunding. The results of this study showed that such supporters are typically younger than 50 years and hold a university entrance degree or higher. Furthermore, an individual's familiarity with the concept of crowdfunding increases the likelihood to invest, probably to break down trust issues concerning the promised reward (Tenner & Hörisch, 2020b). The authors also found that high levels of self-enhancement values

and conservative values reduce the likelihood of individuals investing in sustainability-oriented crowdfunding projects. The reasons given were that self-enhancement values are strongly connected to power and status, while conservative values represent the need for security and tradition (Schwartz, 2012). These traits practically contradict the nature of crowdfunding, a novel, internet-based funding mechanism (Ordanini et al., 2011; cf. Tenner & Hörisch, 2020b), which entails financial risks and information asymmetries between entrepreneurs and supporters (Agrawal et al., 2013), as well as altruistic motives among supporters (Allison et al., 2013; Cecere et al., 2017; Hörisch & Tenner, 2020).

These insights are particularly relevant for sustainable entrepreneurs to connect with the crowd and build a strong community in advance of the funding phase. The project presentation on the platform and on social and traditional media channels can be tailored towards the target group to find as many supporters as possible. This is an important prerequisite for exploiting the full potential of the financing and marketing functions of the crowdfunding campaign.

4.4. Presenting the Project Idea

As stressed in the previous sub-sections, there is huge potential, particularly for environmental entrepreneurs, to use the marketing and financing functions of investment-based crowdfunding to develop out of the niche and into the mass market. Together with knowing the target group, another important step is the eye-catching and informative presentation and visualisation of the project content on the crowdfunding platform (Kamatham et al., 2020; Lagazio & Querci, 2018; Nielsen & Binder, 2020). Potential investors must be convinced that the financial support of the respective projects is worth the risk. Supporters might lose the invested money, not receive the promised reward, or fall victim to fraud concerning the promised outcome of the project (Agrawal et al., 2013; Mollick, 2014). Moreover, potential supporters need to feel enthusiastic and benevolent about the project idea. Since entrepreneurial ventures following an environmental orientation are particularly attractive to supporters (Hörisch & Tenner, 2020; Tenner, 2021), Hörisch and Tenner (2020) recommended that project initiators provide a detailed description of the environmental benefits of their business idea on the project site. This might enhance the attractiveness of the project to potential supporters. Moreover, in an investigation of entrepreneurial ventures that sought funding via investment-based crowdfunding, Tenner and Hörisch (2021) found that the higher the gender diversity among founding teams, the higher their environmental orientation. Therefore, ventures with a gender-diverse founding team (i.e. equal representation of women and men) are well advised to communicate this fact openly on the project site. This might signal openness as well as broad

expertise and caches of knowledge to potential investors (cf. Harrison & Klein, 2007; Tenner & Hörisch, 2021).

Nonetheless, empirical studies on how environmentally oriented crowdfunding projects should be presented to reach as many supporters as possible are still missing (Mochkabadi & Volkmann, 2018; Testa et al., 2019). This research gap was addressed by Penz et al. (2022). In an experimental study, the authors explored how the linguistic framing of the project description, the interest rate, and the promised environmental impact of environmentally oriented crowdfunding projects influence the investment decisions of potential supporters in investment-based crowdfunding. To this end, the authors distinguished between ‘egoistic’, ‘altruistic’, and ‘warm glow’ framing, because individuals are expected to hold different motivations to support a project. Penz et al. (2022) provided empirical evidence for the positive effect of environmental and financial incentives on supporter’s decisions to invest in environmentally oriented crowdfunding projects. In particular, the participants were attracted by high interest rates, confirming the findings of previous studies (Ben Slimane & Rousseau, 2020; Pierrakis, 2019). Moreover, the magnitude of the environmental impact plays a significant role in receiving pledges - in this case, the compensation of CO₂ (Penz et al., 2022). Hence, egoistic and altruistic motives are coexistent among supporters of investment-based crowdfunding, as already suggested by the warm glow theory (see Andreoni, 1989, 1990; cf. Penz et al., 2022). Interestingly, the framing of the project description did not show consistent effects among the total sample. This aspect is only relevant for specific sub-groups (Penz et al., 2022). This finding differs from earlier studies on reward-based (Nielsen & Binder, 2020) and donation-based crowdfunding (Kamatham et al., 2020). By being attentive to these aspects when creating the project site on the platform, environmental entrepreneurs increase their chances of fully taking advantage of the benefits that crowdfunding has to offer.

5. *fairafric*: A Best Practice Example

To underline the potential of crowdfunding as an accelerator for sustainable entrepreneurs to develop out of the niche into the mass market, the case of *fairafric* is described as a best practice example in this framework paper. The information used in this section is partly based on the insights provided by Tenner and Hörisch (2020a), who conducted a semi-structured interview with Julia Gause, the sales manager at *fairafric*.

fairafric was launched in the year 2016 and is a manufacturer of fairly traded and organic chocolate with the idea of producing chocolate almost entirely in Ghana, Africa. The goal is to process cacao locally and shift value creation to the country of origin. In this way, *fairafric*

supports the creation of new jobs and the increase in local income in Ghana, thus encouraging access to healthcare and education. The result is an enormous social impact compared to simply exporting cacao beans for further processing. As stated on the company’s website, *fairafri*c’s goal is “to revolutionise the chocolate world and to break new, truly fair ground in the cooperation between the Global North and the Global South” (Fairafri, 2022c; translated from German). Next to the social benefits, the chocolate is certified organic and CO₂ neutral. Part of the product range is vegan and unpackaged. Therefore, *fairafri*c combines both the social and environmental dimensions in its mission. In view of this, it is a showcase for truly sustainable entrepreneurship.

What makes the case of *fairafri*c particularly interesting for this framework paper is that it has undergone several crowdfunding campaigns, which enabled the company to grow and build a strong community of proponents. Between the years 2016 and 2020, *fairafri*c realised four successful crowdfunding campaigns on the donation- and reward-based platform Kickstarter. A total of 257,176 EUR in funding and 5,188 supporters were accumulated during these campaigns (Kickstarter, 2022). Additionally, *fairafri*c conducted two campaigns on the equity crowdfunding platform Seedrs between 2018 and 2019. Both campaigns were supported by a total of 429 investors, with a funding amount of 232,083 EUR (excluding 1,150,000 EUR, which were invested by two capital investors) (Tenner & Hörisch, 2020a). A total sum of 489,259 EUR was collected by the crowd. An overview of *fairafri*c’s crowdfunding campaigns can be found in Table 1.

Table 1. Overview of *fairafri*c’s crowdfunding campaigns

No.	Campaign goal	Platform	Year	Funding amount	Number of supporters
1	Production/proof of concept	Kickstarter	2016	29,516 EUR	843
2	Organic certification	Kickstarter	2017	49,222 EUR	1,152
3	Climate neutrality/ foundation	Kickstarter	2018	61,638 EUR	1,130
4	Raise capital	Seedrs	2018	138,113 EUR	264
5	Raise capital	Seedrs	2019	93,970 EUR	165
				(from the crowd)	
6	Solar powered chocolate factory	Kickstarter	2020	116,800 EUR	2,063
Total				489,259 EUR	5,617

Apart from the official crowdfunding projects, there are three other ways for private individuals to invest their money in the company (FairafriC, 2022a). First, *fairafriC* has been officially listed as a stock company since April 2021 with the goal of issuing preference shares (with no voting rights) to individuals who share the same values; thus, large investors who may jeopardise the company's mission can be avoided. The second option is a bond in the form of securities with a fixed interest rate of 3.5% per year. The purchase of so-called 'chocolate notes' is the third way to invest. An interest rate of 7% is paid annually in the form of chocolate (i.e. vouchers for the online shop). The various investment opportunities for private individuals demonstrate the closeness of *fairafriC* to the crowd, who eventually become their supporters, investors, and customers.

With reference to the key findings in section four, *fairafriC* has used crowdfunding equally as a financing and marketing instrument. Each of the six crowdfunding campaigns was completed successfully. The funding targets were not only achieved but even exceeded. Except for the last crowdfunding campaign in 2020, it is noticeable that the funding volume on Seedrs (an investment-based crowdfunding platform) tends to be higher than the campaigns on Kickstarter (a donation- and reward-based crowdfunding platform). Based on this fact, it can be concluded that investment-based crowdfunding is more suited to the pure funding function. In fact, this was the main goal for the two campaigns on Seedrs (Tenner & Hörisch, 2020a). However, the campaigns on Kickstarter received a much higher number of supporters. Thus, *fairafriC* attached great value to the marketing effect of reward-based crowdfunding. Given that *fairafriC* holds a two-sided nature (i.e. social and environmental dimension), it is equally suited for both types of crowdfunding (cf. Hörisch & Tenner, 2020). Either way, it is noticeable that the radically new idea of producing chocolate entirely in Africa (from bean to bar) attracts many supporters. The way *fairafriC* has communicated this idea during its crowdfunding projects has moved the crowd and built a strong community.

Since *fairafriC* has grown together with its community during several crowdfunding campaigns, it can be assumed that the company has a good understanding of its target group. According to Tenner and Hörisch (2020a), (potential) supporters are attracted to participate in the company's crowdfunding campaign by using professional project videos, storytelling, and purpose-oriented communication on social media sites. Furthermore, *fairafriC* provides a detailed description of the environmental and social benefits the respective crowdfunding campaign aims to achieve, for instance, the proof of concept and start of the production (Campaign 1), the organic certification of the products (Campaign 2), climate neutrality and the launch of the

foundation (Campaign 3), or the building of a new solar-powered chocolate factory in Ghana (Campaign 6). With regard to the two investment-based crowdfunding projects (Campaigns 4 and 5) on Seedrs, a high interest rate is advantageous for addressing as many high-paying investors as possible. *fairafrik* has proven that it can display the social, environmental, and financial incentives for its supporters successfully and target-oriented in each crowdfunding project.

Applying the lens of the MLP to the case of *fairafrik* revealed pressures from the landscape involving social inequalities, such as bad working conditions, unemployment rates, and poor access to health care and education in the global south. Further, environmentally-related concerns have become increasingly urgent to address, among others, climate change, factory farming, and the pollution of the seas. Changing consumer preferences for ethically acceptable chocolate and higher demands for a sustainable value chain (Silva et al., 2017; Vecchio & Annunziata, 2015; Vlaeminck et al., 2016) also create instabilities on the regime level. These factors put pressure on large, conventional chocolate manufacturers, such as Ferrero, Hershey, and Nestlé, which are currently dominating the socio-technical regime (Voora et al., 2019). Innovations in the routines and practices of incumbents towards addressing the above-mentioned pressures are of a rather incremental nature (Langen & Hartmann, 2016; Thorlakson, 2018). As a result, windows of opportunity open for radical niche innovators, such as *fairafrik*. With the idea of tackling social inequalities in the global south by moving the value creation process almost entirely to the country of origin, *fairafrik* follows a radically new idea and acts as a pioneer in the sustainable chocolate industry. It has used the protected niche to build a large community of loyal consumers and supporters. In the meantime, *fairafrik*'s chocolate products have reached the mass market. They can be found not only in the product portfolio of organic markets, health food shops, coffee shops, and delicatessen but also in conventional German supermarkets (such as REWE and Edeka) (Fairafrik, 2022b). In this process, each successfully completed crowdfunding campaign has been an important tool for spreading the idea and receiving direct input from the crowd. In the case of *fairafrik*, crowdfunding fulfilled the function of a “*financing instrument, marketing tool and market test similarly*” (Tenner & Hörisch, 2020a, p. 128). The company has relied on this fairly new financing mechanism from the very beginning and has thus managed to develop from a niche operator to an actor in the socio-technical regime.

6. Conclusion and Implications

Crowdfunding is considered a promising instrument for transforming existing socio-technical regimes by financing radical innovations of environmental, social, and sustainable entrepreneurs (Testa et al., 2019; Vasileiadou et al., 2016). This framework paper addresses the question of how such entrepreneurs can exploit the full potential of investment-based crowdfunding to develop from niche operators to actors in the socio-technical regime. Several implications for practitioners can be drawn from the insights of this framework paper. Indeed, four areas were identified as important for project initiators to consider when implementing a thoroughly successful crowdfunding campaign. These areas include the optimal use of crowdfunding as a financing and marketing instrument, the effective approach of the target group, and the attractive presentation of project content on the crowdfunding platform.

One key finding is the suitability of investment-based crowdfunding to equally fund and market the business ideas of environmental entrepreneurs. To exploit the full potential of the marketing and financing functions, environmental entrepreneurs should pay attention to addressing the target group and creating the project description in the best possible way. In this respect, environmental effects (e.g. the amount of compensated greenhouse gases) and financial incentives (e.g. high interest rates) have a high impact on the investment decision of individuals on investment-based crowdfunding platforms. I highly recommend that future project initiators display this sort of information that is highly visible on their campaign site. Investment-based crowdfunding also holds potential for social entrepreneurs but not to such a large extent as those with an environmental orientation (including sustainable entrepreneurs). Purely social entrepreneurs are often driven by altruistic motives, tend to remain small scale, and probably aim to stay in the niche. Nevertheless, social entrepreneurs who are profit-oriented are still encouraged to use investment-based crowdfunding for funding and marketing purposes. The best practice example of *fairafriq*, a company that combines social and environmental values, has demonstrated that crowdfunding can be a stepping stone for sustainability-oriented niche actors to enter the mass market.

Sustainable entrepreneurs who aim to initiate a crowdfunding project are also advised to tailor the project content on the platform and on social media channels to the target group. The goal is to attract as many supporters as possible. The findings of a key article in this dissertation indicate that the typical supporter of sustainability-oriented crowdfunding projects (in both reward-based and investment-based crowdfunding) is younger than 50 years and has achieved

at least a university degree. He or she holds low self-enhancement and conservative values and is familiar with the concept of crowdfunding.

Besides the aforementioned practical implications, there are a certain number of implications for research and theory. As stressed by Böckel et al. (2020) and Wehnert and Beckmann (2021), the potential of investment-based crowdfunding for sustainable entrepreneurs is underrated and scarcely researched so far. The key papers of this dissertation have addressed this research gap and provided evidence for the huge potential of investment-based crowdfunding to translate the radical ideas of environmental entrepreneurs into reality. Moreover, a detailed comparison between different entrepreneurial orientations (i.e. social, environmental, and sustainable) allows a better understanding of their suitability in consideration of different types of crowdfunding. Another research implication involves the focus on the marketing function of crowdfunding, which is often underestimated and consequently not sufficiently studied. The findings of this framework paper show that the marketing effect is comparably strong in investment-based crowdfunding, especially for environmental entrepreneurs. These outcomes build upon a great variety of different quantitative research methodologies in the key papers of this dissertation, including a systematic literature review, survey, experimental design, and the systematic coding of project descriptions on crowdfunding platforms. The broad selection of data enabled the achievement of reliable and strong insights into this research field.

A relevant implication for theory is the successful application of the MLP in the field of investment-based crowdfunding. Until now, only a few research articles have applied the MLP to clarify the potential of crowdfunding to transform existing socio-technical regimes (Testa et al., 2019; Vasileiadou et al., 2016). This contribution goes even further by analysing the career path of an existing sustainable entrepreneur (i.e. *fairafric*), who has used various types of crowdfunding to develop from the micro to the meso level. The framework paper has addressed the question of how investment-based crowdfunding can ideally be applied by sustainable entrepreneurs to fulfil this transformation.

7. Limitations and Directions for Future Research

This dissertation has several limitations, which will be stressed in the following paragraphs, together with some proposals for future research. First, by analysing not only the financing function but also the marketing function of investment-based crowdfunding, new insights were gained into the benefits crowdfunding has for project initiators. However, this study did not focus on the use of crowdfunding as a market test and the legitimisation of new business ideas. The value of these functions must not be underestimated, as they might play a central role for

sustainable entrepreneurs. Future researchers are encouraged to focus on the legitimising and market test function, particularly for investment-based crowdfunding and against the background of the MLP. By this means, the question of how these functions can help niche actors on their way to the mass market should be addressed.

Second, supporters of crowdfunding campaigns were predominantly assigned the role as funders merely investing their money into the crowdfunding project. However, they are not regarded as active participants in the development and innovation process of a business (cf. Testa et al., 2019; Troise et al., 2021). The potential of the crowd as a community in which opinions, experiences, and ideas can be easily exchanged with the entrepreneur is rather neglected in the articles derived from this dissertation. The possibility for supporters to actively engage in the innovation process represents a major difference from traditional financing mechanisms. Therefore, future studies are highly recommended to analyse this characteristic in more detail.

Third, although a wide range of quantitative methods were used (such as surveys, experiments, and content analyses), another limitation is the unilateral use of quantitative research designs in this dissertation. For the purpose of gaining an even deeper understanding of the processes, motivators, and success factors involved in investment-based crowdfunding, supplemental qualitative research is advantageous. Furthermore, the data mainly represent the German and partly the US contexts. There is a need to validate the findings for other nations and continents, especially countries in the global south.

Fourth, with regard to the applied theoretical framework, little attention was paid to the macro level of the MLP. The question arises regarding the extent to which pressures from the landscape, such as climate change and the need for better working conditions in the global south, influence the success of crowdfunding projects addressing these issues. A recommendation for future researchers is to examine the interplay of all three levels in more detail.

Fifth, not all of the actors involved in the crowdfunding process were examined with equal rigour. For instance, little emphasis was placed on the characteristics of the initiators behind the crowdfunding project. Rather, the campaign itself and its supporters were in the foreground of this dissertation. Promising insights are expected with regard to the qualities sustainable entrepreneurs should possess to exploit the full potential of crowdfunding to develop from niche operators to actors at the regime level.

Sixth, future studies should pay special attention to the post-funding phase of sustainability-oriented crowdfunding projects, which did not enjoy sufficient consideration in this analysis. A key aspect of the post funding phase is the realisation of the promised project goals, in particular the anticipated positive effects for nature and society. Furthermore, the delivery of the promised returns (either material or financial) and the ongoing communication about successes and failures must not be neglected by the project initiator (Tenner & Hörisch, 2020a). Insights into the post-funding phase are particularly interesting for practitioners who are about to start an investment-based crowdfunding project.

Seventh, against the backdrop of the MLP, crowdfunding can take on two different roles (Testa et al., 2019; Vasileiadou et al., 2016): On the one hand, it can benefit sustainability innovations (in different industries or transition processes) at the niche level to reach the regime level. On the other hand, crowdfunding itself is a niche-level innovation with promising potential to alter financial regimes. In this framework paper, reference has been made only to the first role. Hence, another call for future research is to examine the potential of different crowdfunding types to change existing financial regimes.

Finally, future studies are highly encouraged to develop a ‘theory of crowdfunding’ that is tailored towards the decision-making process of individuals to financially support a crowdfunding project. Such a theory should include influencing factors, such as shared values, promised return (either material, immaterial, or monetary), anticipated project goals (e.g., positive effects for nature or society), project presentation and communication, as well as socio-demographics and other characteristics of the actors involved. Phenomena such as the warm glow effect (Allison et al., 2013; Gleasure & Feller, 2016; Hörisch & Tenner, 2020), trust issues and information asymmetries between entrepreneurs and supporters (Agrawal et al., 2013; Dorfleitner & Oswald, 2016; Wehnert et al., 2019), and herding behaviour (Cecere et al., 2017; Hornuf & Neuenkirch, 2017) are also applicable elements. A theory of crowdfunding can benefit both research and practice for a better understanding of the processes behind the crowd’s investment decisions. Thus, the financing and marketing effects of crowdfunding can be optimised, and sustainable entrepreneurs have a higher chance of using crowdfunding for scaling effects.

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Appendix

Full research papers derived from this dissertation:

- (A) Böckel, A., Hörisch, J., & Tenner, I. (2020). A systematic literature review of crowdfunding and sustainability: highlighting what really matters. *Management Review Quarterly*, 138(2), 111210.
- (B) Hörisch, J., & Tenner, I. (2020). How environmental and social orientations influence the funding success of investment-based crowdfunding: The mediating role of the number of funders and the average funding amount. *Technological Forecasting and Social Change*, 161, 120311.
- (C) Hörisch, J., Wulfsberg, I., & Schaltegger, S. (2019). The influence of feedback and awareness of consequences on the development of corporate sustainability action over time. *Business Strategy and the Environment*, 28(2), 263.
- (D) Penz, F., Hörisch, J., & Tenner, I. (2022, minor revisions). Investors in environmental ventures want good money - and a clean conscience: How framing, interest rates and the environmental impact of crowdlending projects influence funding decisions. *Technological Forecasting and Social Change* (xxx), xxx-xxx.³
- (E) Tenner, I. (2021). The Potential of Crowdfunding for Sustainable Development: A Comparison of Sustainable and Conventional Crowdfunding Projects. *International Journal of Entrepreneurial Venturing*, 13(5), Article 10042586, 1.
- (F) Tenner, I., & Hörisch, J. (2020). Crowdfunding for Responsible Entrepreneurship. In H. Pechlaner & S. Speer (Eds.), *Responsible Entrepreneurship* (pp. 117–134). Springer Fachmedien Wiesbaden.
- (G) Tenner, I., & Hörisch, J. (2020). Crowdfunding Sustainable Entrepreneurship: What Are the Characteristics of Crowdfunding Investors? *Journal of Cleaner Production*, 125667.
- (H) Tenner, I., & Hörisch, J. (2021). Diversity matters: the influence of gender diversity on the environmental orientation of entrepreneurial ventures. *Journal of Business Economics*, 93(4), 797.

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A systematic literature review of crowdfunding and sustainability: highlighting what really matters

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Abstract

This article systematically reviews literature at the intersection of crowdfunding and sustainability. It analyzes the extent to which the current research foci in crowdfunding and sustainability contribute to unleashing the potential of crowdfunding for sustainable development. The findings highlight that the research field has a relatively short history but already shows signs of growing maturity. With regard to the research foci, the results reveal misbalances between the relevance ascribed to various aspects in research and in practice. For example, the research primarily deals with the types of crowdfunding that make up the smallest shares of the crowdfunding volume. Likewise, a research gap related to the post-funding phase as well as to environmental oriented projects is identified. On this basis, it is recommended to focus future research on the impact of crowdfunding projects on staying within the planetary boundaries and on crowdfunding projects dealing with environmental issues or integrating the social and environmental dimension of sustainability. Additionally, the potential of crowdfunding as a legitimizing function for sustainable ventures needs to be researched.

Keywords Crowdfunding · Sustainability · Systematic literature review · Sustainable development · Sustainable entrepreneurship

JEL Classification G24 · G29 · Q56 · Q59

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1 Introduction

There is increasing agreement about the high relevance of addressing urgent environmental and social problems, such as climate change, biodiversity loss, and global injustice (e.g., Rockström et al. 2009; Tan 2014; Dempsey 2015). Sustainable entrepreneurs aim at addressing such challenges by introducing innovative products, services, or processes that benefit the environment and communities (Shepherd and Patzelt 2011). However, due to the higher associated risk of these ventures, such entrepreneurs often face difficulty in financing their activities (e.g., Calic and Mosakowski 2016; Lehner 2013; Ridley-Duff 2009). As a relatively new financing mechanism, crowdfunding is increasingly expected to be able to close this funding gap and, thus, to contribute to sustainable development (e.g., Hörisch 2015; Jovanovic 2018). *Crowdfunding* is most commonly defined as “the efforts by entrepreneurial individuals and groups—cultural, social, and for-profit—to fund their ventures by drawing on relatively small contributions from a relatively large number of individuals using the internet, without standard financial intermediaries” (Mollick 2014, p. 2). Hence, using crowdfunding can be perceived as an entrepreneurial act in itself (Mollick 2014). Generally, the empirical importance of crowdfunding in financing new ventures (whether sustainability-oriented or conventional) is growing rapidly, and crowdfunding is expected to reach a global volume of USD 90 billion in 2020 (Messeni Petruzzelli et al. 2019).

Acknowledging the growing relevance of crowdfunding, crowdfunding research has recently been synthesized in systematic literature reviews. Jovanovic (2018) drew on 90 scientific papers to identify research gaps and, in doing so, revealed that eight percent of all research on crowdfunding is related to sustainability, thus highlighting the importance of this intersection but not analyzing it in depth. Another systematic literature review, by Bouncken et al. (2015), provided a general overview of the crowdfunding literature published between 2000 and 2014 by explaining the basic concepts and common understandings of crowdfunding. Further, systematic literature reviews have been conducted on specific aspects or types of crowdfunding, such as on decision-making processes (Hoegen et al. 2018), financial motivations in reward- and donation-based crowdfunding (Alegre and Moleskis 2019), and the benefits of crowdfunding (De Luca et al. 2019). However, in the existing literature reviews on crowdfunding, no references have been made to financing sustainability-oriented projects, although Messeni Petruzzelli et al. (2019), in their conceptual paper, did analyze crowdfunding specifically to draw implications for sustainable entrepreneurship.

Similar to the field of crowdfunding, previous research has also systematically reviewed literature on social entrepreneurship (Lehner and Kansikas 2013; Kraus et al. 2014), sustainable entrepreneurship (Johnson and Schaltegger 2019), and, more specifically, ecological sustainability entrepreneurship (Gast et al. 2017). These works revealed that the potential of sustainable entrepreneurship is increasingly reflected by a growing body of relevant academic literature. Furthermore, the systematic literature reviews helped to overcome the pre-paradigmatic status of the research field (Lehner and Kansikas 2013). However, they also highlighted that a

lack of financing is a key obstacle that keeps the potential of sustainable entrepreneurship from being unleashed.

Crowdfunding is expected by many to remove this obstacle. Consequently, studies on the link between crowdfunding and sustainability are gaining ground in the academic literature. In line with the great expectations that crowdfunding is confronted with in the context of sustainability, two motivations arise for conducting a systematic literature review in this research field: on the one hand, the interface between the research fields of crowdfunding and sustainable entrepreneurship has not yet been systematically mapped, and researchers as well as practitioners face the challenge of making use of the insight gained by prior research. On the other hand, the importance of efficiently and effectively making use of crowdfunding for sustainable development is becoming increasingly apparent. Many sustainability problems are becoming even more pressing (e.g., Steffen et al. 2015), and successfully addressing these problems will require vast financial means (e.g., Casado and de Molina 2009; Barosh et al. 2014; Tseng and Hung 2014; Akerboom et al. 2020). As such, this study addresses the following research question by systematically analyzing the extant literature on crowdfunding and sustainability.

To what extent do the research foci in the scientific literature on crowdfunding and sustainability contribute to unleashing the potential of crowdfunding to facilitate sustainable development?

Based on the understanding of systematic literature reviews brought forward by Tranfield et al. (2003, p. 208), this article serves “to map and to assess the existing intellectual territory” of crowdfunding in the realm of sustainability. As no systematic literature review of crowdfunding and sustainability currently exists, researchers and practitioners who aim to make use of the growing body of (potentially contradictory) knowledge face difficulties in gaining a comprehensive picture (cf. Tranfield et al. 2003). Likewise, academics in the field run the risk of overlooking existing patterns, re-inventing the wheel, or choosing inappropriate methods when conducting further research in the field (cf. Edmondson and McManus 2007). Consequently, this study aims to combine the research fields of sustainable entrepreneurship and crowdfunding in a systematic literature review, as these fields not been linked in such a review so far.

The remainder of this paper is structured according to prior systematic literature reviews and guidelines (e.g., Fisch and Block 2018; Buchheim et al. 2019; Heidingsfelder and Beckmann 2019). Section 2 summarizes the relevant literature and its concepts, which inform the structure of this review. The methodology of the systematic literature review is described in Sect. 3, while Sect. 4 presents the results of the analysis. Finally, the results are discussed in relation to prior research, and conclusions for academia and practice are drawn in Sect. 5.

2 Relevant concepts in the research field

Crowdfunding offers a number of benefits for entrepreneurs. The most prominent function of crowdfunding is financing new ideas or existing ventures (Lehner 2013). Yet, crowdfunding can also serve marketing purposes (Hörisch 2018), as it may increase attention among potential customers, the general public, and the media (Burtch et al. 2014; Lambert and Schwienbacher 2010; Mollick 2014). Likewise, crowdfunding can be used as a market test that signals whether potential users are interested in the respective offering of a crowdfunding campaign (Belleflamme et al. 2014; Lam and Law 2016). Moreover, crowdfunding can fulfil a legitimizing function if the support by the crowd is used to signal public approval of the cause (Martin 2012; Lehner and Nicholls 2014; Vasileiadou et al. 2016).

In the academic literature, four different types of crowdfunding are differentiated. In donation-based crowdfunding, supporters receive no reward in return for their financial support. It is mostly non-profit and non-governmental organizations that make use of this original form of crowdfunding (Hörisch 2015; Lehner 2013). Supporters in reward-based crowdfunding receive material or immaterial returns on their investments, commonly in form of the product to be funded. As explained forward by Mollick (2014), reward-based crowdfunding is the most frequently used form of crowdfunding. Furthermore, two investment-based types of crowdfunding exist, in which monetary returns are disbursed among the investors. In equity-based crowdfunding (also called *crowdinvesting*), investors receive financial returns on their investment in the case that the venture is profitable (Mochkabadi and Volkmann 2018). Similar to investments in the stock market, this type of crowdfunding is associated with the highest risk for investors (Bapna 2019). Last, lending-based crowdfunding (also called *debt-based crowdfunding* or *crowdlending*) is comparable to a bank loan, as supporters act as lenders and receive a previously defined interest rate within a certain period of time (Bruton et al. 2015). Lending-based crowdfunding holds the largest share of the global funding volume derived from crowdfunding (Massolution 2015).

Two different funding phases in the crowdfunding process can be differentiated, which are similar for each of the aforementioned crowdfunding types. The scientific literature distinguishes between the pre-funding phase and the post-funding phase (e.g., see Jovanovic 2018; Hörisch 2019). The pre-funding phase describes the period lasting until the funding on the crowdfunding platform is completed; it includes the preparation of the campaign, communication and marketing among the target groups, and the actual funding period. In contrast, the post-funding phase begins after the crowdfunding campaign has finished. In this phase, the project initiators must communicate its successes or failures to supporters, distribute promised returns, and, above all, realize the project by implementing the advertised measures.

Various players are active in the crowdfunding process, which, from an academic perspective, also represent different potential research foci. Jovanovic (2018) and Messeni Petruzzelli et al. (2019) identified four important players: (1) the project creator, who launches the crowdfunding campaign and collects money for the purpose of realizing the specific cause or offering, (2) the campaign to be funded,

representing its cause or offering, (3) the supporters (i.e., the crowd) backing the project with small sums of money, and (4) the crowdfunding platform, which acts as an internet-based intermediary between the project creator and its supporters.

Past crowdfunding studies have predominantly focused on factors influencing the success of crowdfunding campaigns in the pre-funding phase. In particular, Mollick (2014) revealed that the network of the project initiator is relevant, as is the signaled quality of the project to be funded. Further, it was found that early financial contributions to crowdfunding campaigns can lead to a higher chance of success (Colombo et al. 2015). With regard to sustainability, numerous studies have investigated the influence of the sustainability orientation of crowdfunding campaigns on their funding success in different contexts (e.g., Vismara 2019; Calic and Mosakowski 2016; Hörisch 2015). A sustainability orientation in equity crowdfunding can lead to more restricted investors (Vismara 2019) but not necessarily to increased funding success in equity- and reward-based crowdfunding (Vismara 2019; Hörisch 2015). In contrast, Calic and Mosakowski (2016) found that in reward-based crowdfunding, social-orientated campaigns lead to higher success rates, as do environmental-oriented campaigns that fund technology projects. In some contexts, project creativity is a mediating factor, while in others, third-party endorsements lead to greater resource acquisition (Calic and Mosakowski 2016). Another explanation for the positive impact of a sustainability orientation may be the community logic that restricted investors follow in equity-based crowdfunding: as restricted investors in crowdfunding only acquire a marginal share of the company, not only are they profit-driven but they also pursue community values and a cooperative capitalism approach (Vismara 2019).

Regarding the post-funding phase, less aspects have been analyzed so far. As an exception, Cumming et al. (2019) examined how ownership impacts post-offering outcomes, such as long-run success of the crowdfunded ventures. Another study on the long-run success of equity crowdfunding campaigns was conducted by Signori and Vismara (2018). The degree of involvement of investors is found to have a strong impact on long-run success in the post-funding phase (Signori and Vismara 2018). In the context of crowdfunding for sustainable projects, Hörisch (2019) revealed that only a minority of crowdfunding campaigns disclose information on their actual contribution to sustainable development in the post-funding phase.

According to Mollick (2014, p. 2), crowdfunding is considered an opportunity for “entrepreneurial financing” and thus can itself be regarded as an entrepreneurial act. It serves as a supplement to existing financing mechanisms, such as banks, credit institutes, and angel investors, and thus provides a novel way in which entrepreneurs can access financial assets. In particular, sustainable entrepreneurs, who often face difficulties in receiving funds, are expected to benefit from this new phenomenon (Lehner 2013; Calic and Mosakowski 2016; Hörisch 2018). As described by Shepherd and Patzelt (2011, p. 142), sustainable entrepreneurs focus “on the preservation of nature, life support, and community in the pursuit of perceived opportunities to bring into existence future products, processes, and services for gain, where gain is broadly construed to include economic and non-economic gains to individuals, the economy, and society.” Thus,

sustainable entrepreneurs follow the “triple bottom line” as they simultaneously focus on the economic, environmental, and social dimensions of sustainability (Thompson et al. 2011). While the environmental dimension is mostly concerned with the biosphere, the conservation of nature and the development of the natural landscape, the social dimension covers aspects such as living conditions of humans, cultures, traditions and well-being of different groups (Pawłowski 2008). Against this backdrop, sustainable entrepreneurship is a driving force toward sustainable development, as it contributes to the solution of environmental-, social-, or sustainability-related problems (Kardos 2012).

3 Methodology

The systematic literature review was conducted according to the guidelines brought forward by Tranfield et al. (2003) and adapted by Hansen and Schaltegger (2016). It comprised six steps, including (1) the identification of research, (2) the development of inclusion and exclusion criteria, (3) the selection of studies, (4) the assessment of study quality, (5) data extraction, and (6) data synthesis.

3.1 Data collection process

Within the scope of the first step of the data collection process – that is, the identification of research (1) Tranfield et al. (2003)—all relevant keywords were identified in order to cover the research field in its entirety. The keywords for the search string included two aspects, covering the sustainability orientation and the realm of crowdfunding. To capture the first aspect, the search terms “sustainab*”, “eco*”, “environment*”, “social”, “prosocial”, “pro-social”, or “ethic*” were used. In so doing, the economic dimension of sustainability was purposefully excluded from the search string, because economic reviews of crowdfunding have already been conducted (cf. Bouncken et al. 2015; Jovanovic 2018) and crowdfunding, by definition, contains an economic dimension (cf. Mollick 2014). This first aspect was combined with a second, relating to crowdfunding, which included the search terms “crowd invest*”, “crowdinvest*”, “crowd fund*”, or “crowdfund*” (Table 1). Therefore, the second search string ensured that all possible crowdfunding types were captured, including donation-based crowdfunding, reward-based crowdfunding, lending-based, and equity-based crowdfunding. This search string led to 383 articles on Scopus that mentioned the search terms in their titles, abstracts, or keywords. Scopus was chosen as the search engine because it is the world’s largest database of peer-reviewed literature. Additionally, it covers multiple disciplines, thus reflecting the interdisciplinary nature of the research field. Alternative databases, such as Web of Sciences, were not considered because applying the same search string in these databases led to the identification of fewer articles.

With regard to the development of inclusion and exclusion criteria (2), only journal articles written in English were included. Additionally, these articles were

Table 1 Sustainability- and crowdfunding-related search terms

Sustainability-related search terms	Crowdfunding-related search terms
“sustainab*”, “eco*”, “environment*”, “social”, “prosocial”, “pro-social”, “ethic*”	AND “crowd invest*”, “crowdinvest*”, “crowd fund*”, “crowdfund*”

restricted to articles published by the end of the year 2018 (and articles in press, in cases where they had been accepted for publication by the end of the year 2018). The criteria for inclusion and exclusion were kept deliberately open to fully capture the emerging field (2). Nevertheless, the focus of the research had to be on sustainability-related topics or projects and crowdfunding within the same article.

The selection of studies (3) was conducted by three coders. All coders participated in a coding workshop. First, each abstract was separately coded by two researchers, who assessed whether the paper addressed crowdfunding (coded as 1 if so and 0 if not) and sustainability-related topics (coded as 1 if so and 0 if not). The percentage of agreement between the coders (96.8% for crowdfunding and 85.7% for sustainability) reflected a high level of inter-coder reliability. If both coders disagreed, a third researcher coded the abstracts independently to decide upon the inclusion or exclusion of the respective articles. After all the abstracts were coded, 105 articles met the mentioned criteria and were read and analyzed. Of these, 22 had to be excluded after reading the entire article due to a missing focus on either sustainability or crowdfunding that was not observable based on the article's abstract. Hence, the final sample (see Appendix I in ESM) for this systematic literature review consisted of 83 papers (Fig. 1). Thus, the sample size was only slightly smaller than that of the literature review by Jovanovic (2018), which focused on crowdfunding in general ($n=90$).

As all the included papers were published in peer-reviewed journals and the goal of this systematic literature review was to capture the entire field of research, no further assessment of the studies' quality was applied (4).

3.2 Data analysis

The first step in extracting data from the selected articles (5) was to design a coding scheme. MAXQDA was the software program used for the computer-assisted qualitative text analysis. Furthermore, to assess the emerging field of crowdfunding and sustainability and to synthesize the data (6), two steps were undertaken. First, general aspects were considered, such as geographic orientation, the applied theories and methodology used, and the maturity of the research field, which was evaluated using the concept of methodological fit outlined by Edmondson and McManus (2007) as a guideline. The concept suggests criteria for locating research fields on a continuum from a nascent to intermediate to mature state of theory and research. To construct these categories, methodological fit considers the type of research questions dealt with, the embeddedness in prior work, the methods used, and the state of theorizing in the field.

In this way, nascent theory research typically uses suggestive theories or suggests elements of theorizing for the specific research field. Furthermore, it is characterized by the use of qualitative methodologies. In contrast, mature theory research uses quantitative research methodologies. It typically relies on testing hypotheses that have been set up based on established theories, which can be confirmed or specified by the empirical work. Taking a middle position, intermediate theory research uses hybrid types of data collection, drawing on both qualitative and quantitative data. It

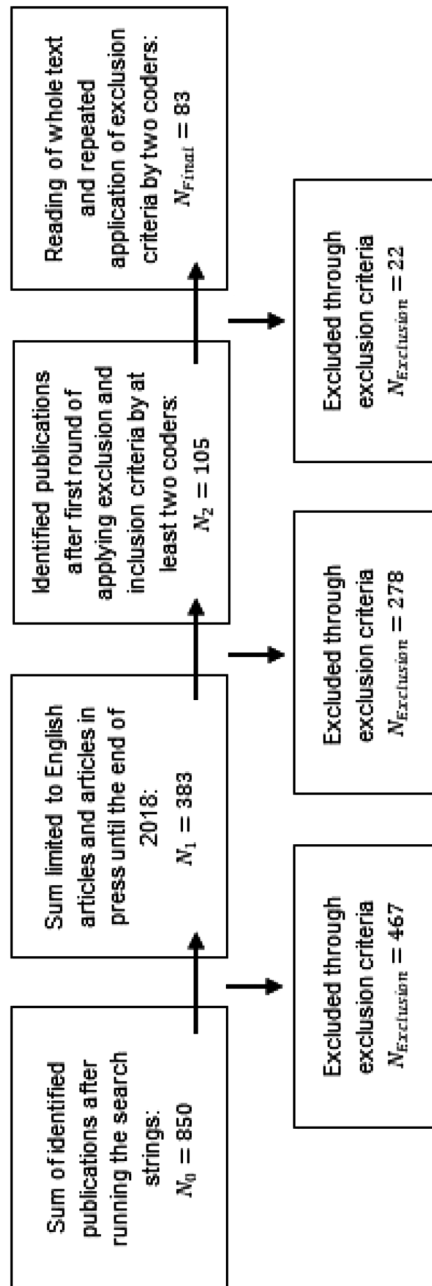


Fig. 1 Overview of the article selection process, including numbers of articles per exclusion step

frequently attempts to build provisional theorizing in the field by, for example, integrating previously separate research fields (Edmondson and McManus 2007).

Applying the methodological fit concept allows researchers to design appropriate research projects in the field of interest, helping them to ask the right questions, choose the most powerful methods, and effectively build on prior work (cf. Edmondson and McManus 2007; Bouchard 1976).

Finally, synthesis (6) was conducted, in order to answer the above-formulated research question. For this purpose, an interpretative, thematic analysis was carried out to identify the research foci and potential contributions of crowdfunding to sustainable development. The coding scheme developed in step (5) was applied, and the analysis was informed by theories and concepts from the fields as mentioned in the second section: To gain an overview of what crowdfunding types are most frequently researched, the different crowdfunding types, as defined in Sect. 2.1, were one element of the coding scheme. Further, the focus of the examined articles in terms of the different crowdfunding phases was coded (i.e., pre-funding, post-funding, or no focus), as was the focus of the articles in terms of research objects (i.e., a focus on supporters, a crowdfunding campaign, a platform, a project creator, the phenomenon of crowdfunding in general, or other research objects).

Based on the debate about whether (and how) a sustainability orientation influences the success of crowdfunding campaigns, three different categories were established. The first category of analysis assessed whether success was examined at all in the research article. The second category covered whether an assumption concerning sustainability orientation was provided, while the third category determined whether the study found evidence of the positive or negative influence of a sustainability orientation on crowdfunding success.

4 Results of the systematic review

4.1 Bibliographic results

The temporal evolution of the research field unfolded as follows: The first article addressing the intersection between sustainability and crowdfunding was published in 2011; however, no further paper on sustainability and crowdfunding was published until 2013 (Fig. 2). Hence, the research field on crowdfunding and sustainability is still in its early phase, but the number of papers published per year is constantly increasing. With regard to the research methods used, before 2017, most of the studies were qualitative, while the use of mixed-method studies was increasing. Quantitative methods gained dominance only recently, in 2018; as such, there is still a dominance of qualitative and conceptual approaches, which is typical for nascent theory research (Edmondson and McManus 2007).

Regarding the application of theories, only a few signs of growing maturity could be found. Of the 83 articles analyzed, only 47 made use of theories. Remarkably, the theories employed were not specifically developed for the field of crowdfunding or sustainability (or their intersection) but were rather general theories from neighboring research disciplines. Among these, no dominant theoretical approach could be

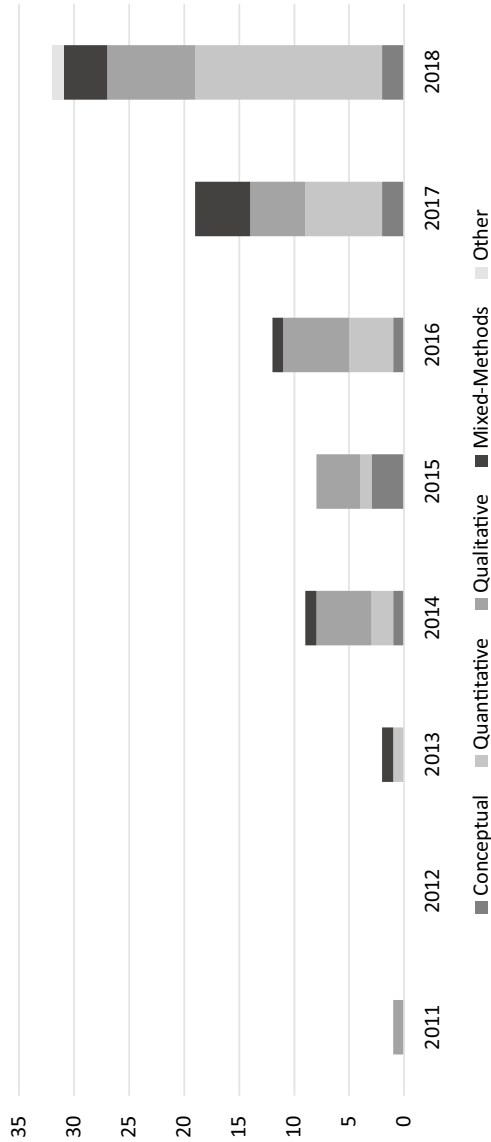


Fig. 2 Number of publications per year, differentiated by research method

identified. With only five applications, the theory of warm-glow giving was the most frequently applied approach, followed by altruism and signaling theory (applied four times each).

Likewise, it was not possible to identify a leading journal in the field, as no journal was found to host more than four publications on sustainability and crowdfunding. Interestingly, while three journals published at least three relevant articles, two of these journals were rather broad, sustainability-oriented journals (*Sustainability*; *Journal of Cleaner Production*), whereas one (*New Media & Society*) was more specialized. The analysis of the publication outlets also suggested that research in the field is only scarcely published in top-ranked management journals, as only five articles in the final sample were published in journals ranked in the top categories (i.e., 4* or 4) according to the Chartered Association of Business Schools Academic Journal Guide 2018 (cf. Harzing 2019).

4.2 Focus of the literature

With regard to the question of which current research foci could be identified in the scientific literature on crowdfunding and sustainability, Fig. 3 provides an overview of the crowdfunding types examined in research in comparison to the practical relevance of the respective crowdfunding types by funding volume in 2015 (cf. Massolution 2015). Interestingly, donation-based crowdfunding received the highest level of attention in the research (29% of all examined papers dealt with donation-based crowdfunding), while this crowdfunding type currently constitutes only 8% of the market volume of global crowdfunding (Massolution 2015). Similarly, reward-based crowdfunding seemed to be overrepresented in research (16%), compared to its market share of 8%. In contrast, lending-based crowdfunding is by far the most relevant type of crowdfunding in practice, if assessed by market volume (76%), but it was only addressed in 16% of the publications. This imbalance was also reflected in the crowdfunding platforms examined. Overall, 55 of the 83 papers examined specific platforms. Among these, Kickstarter, a reward-based crowdfunding platform, was the most frequently chosen data source (16 publications). With regard to geographical distribution, a relatively even spread was found in the current literature on crowdfunding and sustainability, with 72% of all publications demonstrating a geographical focus. Of these, 38 publications focused on a single country, five publications compared two countries and 17 focused on more than two countries. Interestingly, the most frequently chosen geographic focus was on European countries (in ten publications), followed by a focus on the United States (US) (in six publications).

In terms of the research objects analyzed, 33% of the publications studied the phenomenon of crowdfunding in general, e.g. how crowdfunding can function as a financing mechanisms in different contexts (e.g. Elkuch et al. 2013; Zeng 2018). Another frequent research object was crowdfunding campaigns (25%), such as in studies that focused on the success factors of campaign design or the type of campaigns conducted. Likewise, the supporters of crowdfunding (20%) were frequently analyzed, such as in studies that reviewed their motivations or attitudes. In contrast,

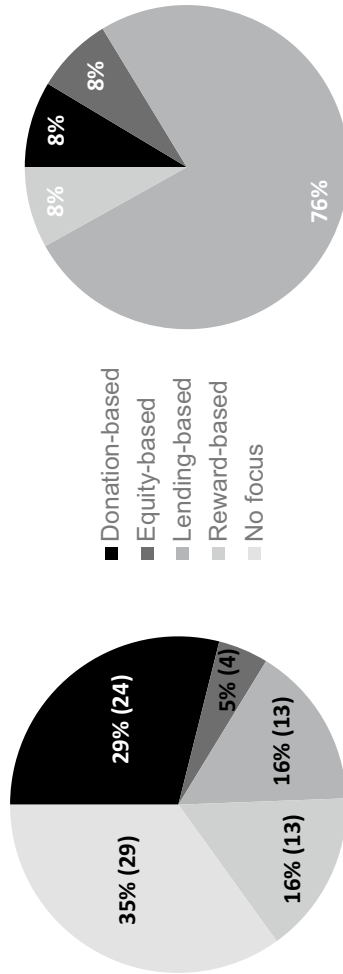


Fig. 3 Share of papers about different types of crowdfunding with absolute numbers in brackets (left), and share of market volume of different types of crowdfunding (right) (based on Massolution 2015)

Table 2 Number of articles examining different research objects

Research object	Number of articles	Percentage of articles (%)
Crowdfunding as a phenomenon	27	33
Campaign	21	25
Supporters/backers/funders	17	20
Others	8	10
Project creator/founder	7	8
Platform	3	4

Table 3 Number of articles examining different sustainability dimensions

Sustainability dimension	Number of articles	Percentage of articles (%)
Social	61	74
Ecological	11	13
Social and ecological	11	13

Table 4 Number of articles assuming and examining the influence of a sustainability orientation on success

Assumption	Number of articles	Percentage of articles (%)
Positive	20	24
Negative	0	0
Result		
Positive influence on success	13	16
No influence on success	3	4
Negative influence on success	2	2

the initiators of crowdfunding projects (8%) and the different crowdfunding platforms available (4%) have so far received only scant attention, despite their centrality to the crowdfunding process. The remaining 10% of publications chose other research objects or combined multiple research objects in their analyses, e.g. different crowdfunding types and different platforms and how they contribute to the financing of social ventures (Meyskens and Bird 2015). The absolute numbers as well as the relative shares relating to the examined papers' research objects are displayed in Table 2, below.

Regarding articles' focus on the different dimensions of sustainability, as shown in Table 3, a clear dominance of the social dimension can be observed, as 61 of the 83 publications focused on social aspects. In contrast, only eleven publications showed an emphasis on environmental aspects, with the remaining 11 papers combining the environmental with the social dimension of sustainability.

If academia strives to contribute to unleashing the potential of crowdfunding for sustainable development, it is crucial to analyze how successful sustainability-oriented crowdfunding projects are (Calic and Mosakowski 2016). Therefore, it is unsurprising that the success rate of crowdfunding initiatives was analyzed in 35% of the examined publications (i.e., 29 publications) on sustainability and crowdfunding. Among these, 23 publications focused on success in terms of the financing function of crowdfunding, while only one investigated success based on the number of supporters of a campaign, which is an indicator of marketing success. An additional five papers analyzed success in general (see Table 4).

Interestingly, 20 publications dealing with success assumed the positive influence of a sustainability orientation (or one of its sub-dimensions) on crowdfunding success, while no articles assumed a negative or neutral influence. The majority of the papers actually investigating this link between sustainability orientation and crowdfunding success largely confirmed this view; 13 papers revealed a positive influence, whereas only two found a negative influence of sustainability orientation on crowdfunding success and three observed no influence.

In addition to the examination of success, another important leverage point for unleashing the potential of crowdfunding for sustainable development is researching the post-funding phase of crowdfunding (Hörisch 2019)—that is, investigating the extent to which the financial resources acquired by sustainable entrepreneurship via crowdfunding are used to create actual contributions to sustainable development once the funding is completed. However, only two of the 83 papers in the sample dealt with the post-funding phase. The absolute numbers of papers examining the respective crowdfunding phases are summarized in Table 5.

5 Discussion and conclusions for future research

The results of this systematic literature review demonstrate that the research field at the interface of crowdfunding and sustainability has not yet been extensively studied. The number of papers published per year indicates that the field is still in development but that it is growing. Additionally, the lack of theories originating from the field of crowdfunding and sustainability and the rather small percentage of papers applying theories at all suggest that the research field is in a nascent stage, if assessed against the criteria suggested by Edmondson and McManus (2007). According to the concept of methodological fit, in this state of research and theory in particular, qualitative methods, open-ended inquiries, the identification of

Table 5 Number of articles researching different crowdfunding phases

Crowdfunding phase	Number of articles	Percentage of articles (%)
Pre-funding phase	39	47
Post-funding phase	2	2
No focus on any phase	42	51

patterns, thematic content analysis, and suggestive theories are useful to expand the insight in the field (Edmondson and McManus 2007).

Still, the shift toward applying quantitative methods signals a development of the field in a more mature direction, even though the history of the research field is remarkably short. Comparing the latter with the similarly short history of the broader research field of crowdfunding in general, it becomes apparent that the connection of crowdfunding and sustainability has been considered since the beginning of the study of crowdfunding. Remarkably, the oldest publication on crowdfunding and sustainability included in this systematic literature review was published in 2011—the same year in which the first paper on crowdfunding in general was published, as identified in Jovanovic's (2018) systematic literature review. Likewise, the scant use of theories was found in Jovanovic's (2018) review, as was the recent shift toward quantitative methods. In accordance with the latter, Bouncken et al. (2015) also reported a lack of quantitative crowdfunding studies until the year 2014.

Furthermore, the above analysis identifies clear foci in the current research on crowdfunding and sustainability; in other words, certain aspects of crowdfunding or sustainability experience particularly high levels of academic attention. If these foci are contrasted with the relevance of these aspects in practice or to earlier research in the broader fields of crowdfunding or sustainability science, some substantial deviations become visible. First, with regard to the dimensions of sustainability considered in crowdfunding research, there is a substantial dominance of social aspects. In the systematic literature review by Jovanovic (2018), the environmental dimension was not even mentioned among the various foci identified. This dominance of social aspects seems to be inconsistent with the general research on sustainability and its definitions, which emphasizes the equal importance and balance of the social and environmental dimensions. In an analysis of frequently used terms in definitions of *sustainability*, White (2013) found that references to the terms *environment* and *social* are not only the most common but also occur at nearly equal frequencies, with environmental aspects being mentioned even slightly more frequently than social aspects. This suggests that the dominance of the social dimension is by no means embodied in the definition of *sustainability* but is specific to the research field focusing on crowdfunding and sustainability. Future research at this intersection could therefore more strongly focus on aspects of environmental sustainability, such as relating to the concept of planetary boundaries and complementarily testing whether this dominance of the social dimension in research is also prevalent in practice. In addition, while current descriptions of the concept of sustainability highlight the interconnectedness of the different dimensions embodied in the concept (e.g., Bañón Gomis et al. 2011; Adams 2006), only 13% of the papers in the sample of the current review integrated the social and environmental dimensions of sustainability. This demonstrates a need for future research that accounts for the interconnected nature of the dimensions of sustainability.

Regarding the various types of crowdfunding, the dominance of lending-based crowdfunding in practice is not reflected in current research at the intersection between sustainability and crowdfunding (only 13 articles in the current review focused on lending-based crowdfunding). In contrast, donation-based crowdfunding received the highest level of attention in the research. Consequently, future research

is challenged with overcoming this imbalance by conducting more research on lending-based crowdfunding. Interestingly, in her review of crowdfunding research in general, Jovanovic (2018) observed a dominance of research on reward-based crowdfunding and found lending-based crowdfunding to be the least-researched type of crowdfunding (only five articles focused on lending-based crowdfunding). This suggests that while the lack of research on lending-based crowdfunding is not specific to the research field at the intersection of crowdfunding and sustainability, the dominance of research on donation-based crowdfunding is specific to this field.

Concerning the different functions of crowdfunding, the scarcity of research on the marketing function and the absence of research on the legitimizing function of crowdfunding is surprising. Particularly, the latter research gap offers interesting avenues for future inquiries, as sustainable entrepreneurship bears great potential for securing legitimacy (e.g., Cho 2009; Milanés-Montero and Perez-Calderon 2011; Schaltegger and Hörisch 2017) and it remains open for investigation as to whether crowdfunding could help to unleash this potential.

A sharp contrast between the current state of research on crowdfunding and sustainability and research on crowdfunding in general can also be observed in terms of the phases of crowdfunding analyzed (i.e., the pre- and post-funding phases). In terms of crowdfunding in general, research that explores the ethical questions of fraudulent and failing crowdfunding projects in the post-funding phase has experienced substantial attention (e.g., Hossain and Oparaocha 2017; Snyder et al. 2016); however, this post-funding phase remains scarcely investigated in the context of sustainability-oriented crowdfunding projects. Analyzing the post-funding phase in this context will be crucial to more realistically assess the practical contribution of crowdfunding to sustainable development. In this respect, contrasting the actual contributions of successfully financed crowdfunding projects with relevant reference points such as the United Nations Sustainable Development Goals (UN 2015) or planetary boundaries (Rockström et al. 2009; Steffen et al. 2015) seem particularly promising approaches. Without the assessment of the sustainability impact of sustainable crowdfunding campaigns, the extent of the contribution of crowdfunding for sustainable development can hardly be estimated. Investigating the post-funding phase may also indicate the extent to which sustainability-oriented crowdfunding projects sensitize society to environmental and social issues (cf. Messeni Petruzzelli et al. 2019).

Furthermore, future studies are advised to more deeply analyze and compare the suitability of specific crowdfunding types and platforms for financing environmental- and social-oriented crowdfunding projects. This could be implemented by comparing different crowdfunding types or thematic platforms (i.e., conventional versus sustainability-oriented platforms) within one dataset. In recent years, studies focusing on crowdfunding platforms in general emerged (e.g., Rossi and Vismara 2018; Rossi et al. 2019), and among the papers analyzed for this review, three investigated different aspects of crowdfunding platforms. Still, it has not yet been researched whether sustainability-oriented platforms (e.g. ecocrowd, bettervest) show higher success rates for sustainability-oriented campaigns than do thematically open platforms (e.g. kickstarter, seedmatch, indiegogo or startnext). Last, for the purpose of enhancing the potential of crowdfunding for sustainable development,

future research on sustainability and crowdfunding should pay more attention to less frequently analyzed research objects, such the initiators of sustainability-oriented crowdfunding projects (on which only seven articles in the current review focused).

In earlier analyses, inconsistent findings were reported with regard to the research foci of the general crowdfunding literature. For example, Jovanovic (2018) identified only two studies within the studied database that conducted research on project initiators. In contrast, Messeni Petruzzelli et al. (2019) found that several studies had already addressed the characteristics of project initiators and their influence on the success of a crowdfunding campaign. Based on the results of this literature review, more research is recommended with regard to the initiators of environmental- or social-oriented crowdfunding campaigns. Furthermore, the existing and potential target groups of sustainability-oriented crowdfunding projects remain to be identified; doing so could help facilitate the search for new supporters of sustainability-oriented crowdfunding projects. In this respect, future investigations should choose supporters of crowdfunding campaigns as their research object, as they have not attracted vast attention by past literature so far.

In addition to the relatively specific paths for future research identified above, to support the development of the field toward higher levels of maturity, more theorizing will be needed. Interestingly, no theory of crowdfunding has evolved even in the general field of crowdfunding research. However, such theory could help to explain the partly contrasting results in the current literature on crowdfunding and sustainability—for example, concerning the influence of a sustainability orientation on crowdfunding success.

Overall, we conclude that the impact of crowdfunding on sustainable development has not yet been thoroughly researched. This systematic literature review has revealed that to comprehensively assess the contribution of crowdfunding to sustainable development, the identified research gaps need to be addressed systematically. Based on earlier work (e.g., Testa et al. 2019; Wehnert et al. 2019; Vasileiadou et al. 2016), we can confirm that crowdfunding holds great potential to contribute to sustainable development. However, there is still a gap in the literature in terms of assesses how this potential can be realized.

In conclusion, this systematic literature review has shown that research on crowdfunding and sustainability is still in its early phase. Several research gaps were identified, and corresponding proposals for future research were formulated. The impact of crowdfunding on sustainable development has not yet been sufficiently researched, despite the great potential of the research area that has been identified in the literature (e.g., Testa et al. 2019; Wehnert et al. 2019; Vasileiadou et al. 2016).

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How environmental and social orientations influence the funding success of investment-based crowdfunding: The mediating role of the number of funders and the average funding amount

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ABSTRACT

Environmentally and socially oriented ventures have great potential for contributing to sustainable development. Many expect crowdfunding to be able to unleash this potential by providing financial resources for such entrepreneurs. Thus, the present research investigates how different degrees of environmental and social orientation of ventures influence their success in investment-based crowdfunding. It uses and specifies warm glow theory to quantitatively analyse 318 investment-based crowdfunding projects from the USA and Germany. The results highlight that higher levels of environmental orientation increase crowdfunding success, while no significant influence is observed concerning social orientation. This positive impact of environmental orientation is mediated by the number of funders attained by a particular project. Interestingly, the influence of environmental orientation on funding success is found to be particularly strong in the USA. Based on these findings, this research draws recommendations for environmental entrepreneurs, crowdfunding platforms and policy, as well as for future research. For example, environmental entrepreneurs are advised to prominently communicate the environmental orientation of their ventures in investment-based crowdfunding campaigns, and to increase the visibility of their campaigns, as these are potentially attractive to a huge number of funders.

1. Introduction

The journal *Technological Forecasting and Social Change* has hosted a vivid discourse on how crowdfunding can contribute to social change and particularly to sustainable development (e.g. Messeni Petruzzelli et al., 2019; Testa et al., 2019; Vismara, 2019). Still, Testa et al. (2019, p. 66) emphasise that “the novelty of the [crowdfunding] phenomenon leaves a wide range of areas open for further research”. One important aspect of this discourse is the question of the usefulness of crowdfunding for financing sustainability-oriented ventures (e.g. Testa et al., 2019; Vismara, 2019). In line with Lehner (2013, p. 2), sustainability-oriented ventures can be defined as “ventures that have a social or environmental mission as their primary goal, which aim to be financially and legally independent and strive to become self-sustainable by means of the market”. Currently, entrepreneurs in general (e.g. Allison et al., 2013; Cassar, 2004) and sustainable entrepreneurs in particular (e.g. Paetzold and Busch, 2014; Vismara, 2019) experience difficulties in gaining funding. It is commonly expected that crowdfunding may be able to close this funding gap, and to thus hold high potential for

sustainable development (Bonzanini et al., 2015; Cumming et al., 2017; Lehner, 2013). Crowdfunding “refers to the efforts by entrepreneurial individuals and groups [...] to fund their ventures by drawing on relatively small contributions from a relatively large number of individuals using the internet, without standard financial intermediaries” (Mollick, 2014, p. 2; cf. Bouncken et al., 2015).

The expectation that crowdfunding may benefit sustainability-oriented ventures assumes that funders invest in projects which promise high benefits to the general public, while individual benefit is only of secondary importance (Lam and Law, 2016). Warm glow theory provides an explanation for this assumption, arguing that supporting causes with wider benefits to society or the environment creates a personal benefit in the form of a “warm glow” (Andreoni, 1990; Hartmann et al., 2017). However, empirical evidence that an orientation towards sustainability increases the likelihood of crowdfunding success remains rare (Messeni Petruzzelli et al., 2019). Existing quantitative studies on sustainability and crowdfunding primarily address forms of crowdfunding where funders receive no return on their investment (donation-based crowdfunding) or receive material returns

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(reward-based crowdfunding) (e.g. Allison et al., 2015; Calic and Mosakowski, 2016; Hörisch, 2015). In contrast, studies of the potential for investment-based crowdfunding, including equity and debt crowdfunding, to fund sustainability-oriented ventures remain rare (Vismara, 2019). In investment-based crowdfunding, funders receive a financial return on their investments via equity or debt instruments (European Commission, 2016). The current lack of research on sustainable entrepreneurship and investment-based crowdfunding is surprising, given that this latter comprises a much larger share of the crowdfunding market and has shown much more rapid growth than crowdfunding mechanisms without monetary return (Walthoff-Borm et al., 2018). In 2015, the investment-based crowdfunding market created a global volume of funds of US\$27.7 billion, compared to US\$5.4 billion from reward-based and donation-based crowdfunding (Massolution, 2015).

Based on the research needs identified above, this paper concentrates on investment-based crowdfunding for sustainability-oriented projects, drawing on data from two major economies (USA and Germany). Building on Calic and Mosakowski (2016), it considers sustainability orientation as a two dimensional construct, consisting of environmental and social orientation. Therefore, this paper addresses the question of *how different degrees of environmental and social orientation of investment-based crowdfunding projects influence their funding success*. In so doing, it analyses the number of funders as well as the average funding amount per funder as potential mediators between environmental and social orientation on the one hand and crowdfunding success on the other.

The results reveal that environmental orientation positively influences funding success for investment-based crowdfunding, and that this influence is mediated by the number of funders. Thus, environmentally oriented crowdfunding projects reach more funders, and this outcome in turn increases funding success. In contrast, social orientation is found to exert no significant influence either on crowdfunding success or on the number of funders. Furthermore, no significant influence of environmental or social orientation on the average funding amount can be identified. The analysis provides indication that the positive influence of environmental orientation on funding success is particularly strong in the USA.

This paper makes the following contributions. Firstly, little empirical research has hitherto been conducted on the influence of environmental and social orientation on the success of investment-based crowdfunding projects. This study is the first to analyse the influence of environmental and social orientation separately in investment-based crowdfunding, and shows distinct results for the two orientations. Secondly, we apply warm glow theory in a context that combines elements of altruistic and egoistic motives. Thirdly, warm glow theory is specified based on this approach, as the analysis goes beyond testing a direct link between environmental and social orientation on the one hand and funding success on the other. Instead, the number of funders of a project is found to mediate this relationship for environmentally oriented projects. Thus, this analysis shows that the positive effect of environmental orientation on funding success cannot be explained by the average amount funded per individual, but mainly by the number of funders backing a project. Lastly, this paper addresses the frequently articulated need for crowdfunding research that draws on data from different countries. In so doing, it provides indication that the influence of social and environmental orientation on crowdfunding success differs by country.

2. Literature review and development of hypotheses

2.1. Literature review on crowdfunding for sustainable ventures

The expectation that crowdfunding is of benefit to sustainability-oriented ventures assumes that funders invest in crowdfunding projects that promise high benefits to the general public, while individual

benefit remains secondary (Belleflamme et al., 2014; Block et al., 2018; Cumming et al., 2017; Lam and Law, 2016; Lehner, 2013). However, empirical evidence for this phenomenon is still limited. Existing quantitative studies on the social and environmental orientation of ventures and crowdfunding predominantly address reward-based crowdfunding (Calic and Mosakowski, 2016; Hörisch, 2015) as well as donation-based forms of microlending, where funders lend relatively small amounts to entrepreneurs (usually via NGOs), but receive no interest on these loans (e.g. Allison et al., 2013; Allison et al., 2015). Based on a dataset of 392 reward-based crowdfunding projects, Calic and Mosakowski (2016) find that environmental as well as social orientation positively influence the funding success of technology and film/video projects financed via the Kickstarter platform. In the case of donation-based microlending (where funders lend money to entrepreneurs, but receive no interest), Allison et al. (2015) show that ventures which are presented as prosocial, that is, as an opportunity to help, are more attractive to funders. Likewise, Allison et al. (2013) find that in the context of microlending to entrepreneurial projects in impoverished, less developed countries, ventures which use rhetoric highlighting the need of those receiving the funds reach their funding targets faster. Dorfleitner and Oswald (2016) report that funders aim to maximise the social impact of their investments, for example, by supporting financially disadvantaged entrepreneurs in the context of donation-based crowdfunding. In contrast, Hörisch (2015) as well as Lagazio and Querci (2018) find no evidence that projects which are marketed as environmental or sustainable have higher rates of funding success on reward-based crowdfunding platforms.

Recently, Vismara (2019) addressed the influence of sustainability orientation (not differentiating between environmental and social orientation) on the funding success of equity crowdfunding. He distinguishes between 'restricted investors' (members of the crowd) and 'professional investors', and finds no effect for sustainability orientation on the success of funding, although such an orientation was found to attract a larger number of restricted investors. Vismara (2019) further stresses that restricted investors do not contribute amounts as high as those of professional investors, whereas the latter are reported to prefer non-sustainability-oriented ventures.

This paper extends the present research on crowdfunding for sustainability-oriented ventures in the following ways. Firstly, earlier publications have used rather simple techniques to determine the environmental or social orientation of crowdfunding campaigns, such as automatic coding based on project descriptions (e.g. Allison et al., 2013; Vismara, 2019), or taking the predefined category of a project on a crowdfunding platform as an indicator of its environmental or social orientation (e.g. Hörisch, 2015; Lagazio and Querci, 2018). Allison et al. (2013) therefore call for more research using manual coding techniques. Additionally, the coding techniques used in previous research do not distinguish between different high-level degrees of sustainability, social or environmental orientation (e.g. Calic and Mosakowski, 2016; Hörisch, 2015; Lagazio and Querci, 2018), but simply differentiate between the presence or absence of such orientation. Likewise, Vismara (2019) categorises projects solely into sustainability-oriented and non-sustainability-oriented projects using automatic coding. He thus neither differentiates between social and environmental orientation, nor between the different degrees of such orientations. Similarly, in the context of reward-based crowdfunding, Calic and Mosakowski (2016) simply distinguish between the presence or absence of social (or environmental) orientation to any degree, and thus do not capture the strength of such an orientation.

Secondly, the existing research on sustainability and crowdfunding has thus far paid little attention to investment-based crowdfunding (cf. Calic and Mosakowski, 2016; Hörisch, 2018; Vismara, 2019). Hence, there is still a strong need to further extend and develop knowledge about investment-based crowdfunding as a possible financing solution for sustainable entrepreneurs. Many authors assume that different types of crowdfunding differ fundamentally, for instance with regard to the

motives of funders and the purposes served by these types of crowdfunding. Consequently, Testa et al. (2019) call for research in the context of sustainability and crowdfunding focusing on how the motivations of funders may vary between different types of crowdfunding. Lam and Law (2016) and Vasileidou et al. (2016), for example, argue that funders in investment-based crowdfunding tend to be less altruistic than those in donation- and reward-based crowdfunding. Likewise, Bretschneider and Leimeister (2017) found no evidence of altruistic motives among funders in the field of investment-based and reward-based crowdfunding, stressing, however, that egoistic and prosocial motives may co-exist. Additionally, numerous authors believe that these different types of crowdfunding are differently suited to funding sustainability-related ventures (Hörisch, 2018; Vismara, 2019). The motivation for becoming a customer (in reward-based crowdfunding) most likely differs from that of becoming a shareholder (in equity crowdfunding) (Vismara, 2019). This argument is supported by the fact that investment-based crowdfunding projects have substantially higher funding targets and higher funding amounts per investor on average than reward-based crowdfunding projects (Vulkan et al., 2016). Consequently, Lam and Law (2016) reason that reward-based and donation-based crowdfunding mechanisms are suitable for small-scale campaigns which aim at a certain degree of market awareness and at building relationships with possible funders. In contrast, investment-based crowdfunding benefits large-scale projects with higher funding targets. Based on these insights, Vismara (2019) argues that equity crowdfunding, as a form of investment-based crowdfunding, is particularly relevant for entrepreneurial finance. Thus, in order to substantially contribute to sustainable development and to finance growth-oriented sustainable ventures, investment-based crowdfunding seems the most relevant approach. Consequently, there remains a need to more deeply analyse the potential of investment-based crowdfunding for financing sustainable ventures.

Thirdly, Allison et al. (2013, p. 704) call for more research on “entrepreneurial investment behaviours where prospective financial return is not the only criterion for deciding whether to invest” and suggest that warm glow theory should be applied to investigating how funders select their investment cases. Since investment-based crowdfunding is generally profit-oriented, the question arises as to whether warm glow effects also occur in this context or whether such effects are restricted to reward-based and donation-based crowdfunding. Consequently, Dunn et al. (2014) stress the need to investigate whether warm glow theory is also informative for contexts where the funders of social or environmental causes receive financial rewards in return for their support. So far, in the crowdfunding literature, warm glow theory has only been used to explain prosocial investments in donation-based crowdfunding, charitable microlending or reward-based crowdfunding (Allison et al., 2013; Cecere et al., 2017; Gleasure and Feller, 2016). Applying warm glow theory in the context of investment-based crowdfunding for sustainability-oriented projects is particularly informative, as in this context both principally altruistic motives (such as support for public goods) as well as egoistic motives (the desire to receive a financial return) are possible. Hence, since warm glow theory assumes that contributors hold impurely altruistic motives, it can be expected that this theoretical approach may also explain funders’ behaviour in investment-based crowdfunding.

Fourthly, earlier research highlights that success rates in crowdfunding may differ between platforms and countries (e.g. Buttice et al., 2019; Hörisch, 2018; Niemand et al., 2018; Rossi and Vismara, 2018; Vismara, 2016). However, most research is still based on data gained from a single platform in a single national context. Therefore, Allison et al. (2013) call for including multiple platforms in a single analysis and particularly emphasise the need to investigate different national contexts, including non-English-speaking cultures. By analysing different platforms from Germany and the USA, this study addresses this research need. It further allows the retesting and extension of Vismara’s (2019) work on sustainability orientation in equity

crowdfunding, which has been conducted in the context of the United Kingdom and thus includes a specific legal context for equity crowdfunding (that is, the formal differentiation between restricted and professional investors).

2.2. Warm glow theory and development of hypotheses

While many of the studies in the previous section highlight the potential of crowdfunding for sustainability-oriented projects, they do not examine potential underlying causes and theoretical explanations for a possible link between sustainability orientation and success in funding (e.g. Calic and Mosakowski, 2016; Hörisch, 2015; Vismara, 2019). In searching for potential explanations for this link, economics research on financial contributions to projects which serve the general public may be a useful starting point. Economists traditionally explain financial contribution towards public goods by either altruism or egoism (Simon, 1993). Contributors with purely altruistic motives selflessly aim at increasing the welfare of the recipient, that is, the public good. On the other hand, the goal of purely egoistic contributors is to receive individual benefit from the act of giving (Crumpler and Grossman, 2008). Since past research has shown that neither purely altruistic motives nor purely egoistic motives can serve as sole motivations for financially contributing to public goods, Andreoni (1990) introduces the concept of ‘impure altruism’. It suggests an alternative to this dichotomy, in that impurely altruistic contributors aim at helping others while simultaneously creating a benefit in the form of a ‘warm glow feeling’ for oneself (Allison et al., 2013; Andreoni, 1990). Based on warm glow theory, it can be expected that contributions to sustainable ventures are motivated by the desire to reach a “positive affective state one feels following actions taken to help” (Allison et al., 2013, p. 693; cf. Andreoni, 1990; Cialdini et al., 1973). In line with the economic assumption of maximising utility, Andreoni (1990) argues that contributors to social purposes try to maximise their warm glow. The core assumption of warm glow theory has been supported by neuroscience, which found that helping others activates the reward centres in human brains (Harbaugh et al., 2007).

Warm glow theory has previously been mainly applied and supported in contexts dealing with charitable giving, implying that contributors receive no financial return (e.g. Crumpler and Grossman, 2008; Dunn et al., 2014; Gleasure and Feller, 2016). In addition to its application in the context of contributing to socially oriented projects (e.g. Dunn et al., 2014; Simon, 1993), warm glow theory has recently also been used to explain pro-environmental behaviour (Hartmann et al., 2017).

Regarding decision-making behaviour in crowdfunding, funders of environmentally or socially oriented crowdfunding projects might receive a warm glow feeling for two reasons: their positive feelings regarding the outcome of the project (that is, its contribution to sustainable development) and their positive feelings from the act of supporting the project (Gleasure and Feller, 2016). Indeed, in the context of reward-based crowdfunding and donation-based microlending for prosocial projects, warm glow theory is found to effectively explain contributions to prosocial projects (Allison et al., 2013; Cecere et al., 2017). Cecere et al. (2017) even found that financial returns significantly reduce the probability of a project being successfully funded in reward-based crowdfunding. This can be explained by a crowding-out of intrinsic motivation. In contrast to the majority of findings, Lagazio and Querci (2018) found no support for the warm glow effect in an investigation of reward-based crowdfunding in Italy, as the financial success of environmentally or socially oriented projects was comparatively low.

Still, warm glow theory has not yet been applied to explain crowdfunders’ support for environmentally or socially oriented ventures in investment-based crowdfunding. Both altruistic and egoistic motives are relevant in the context of investment-based crowdfunding. Therefore, it can be assumed that the motives of funders in investment-

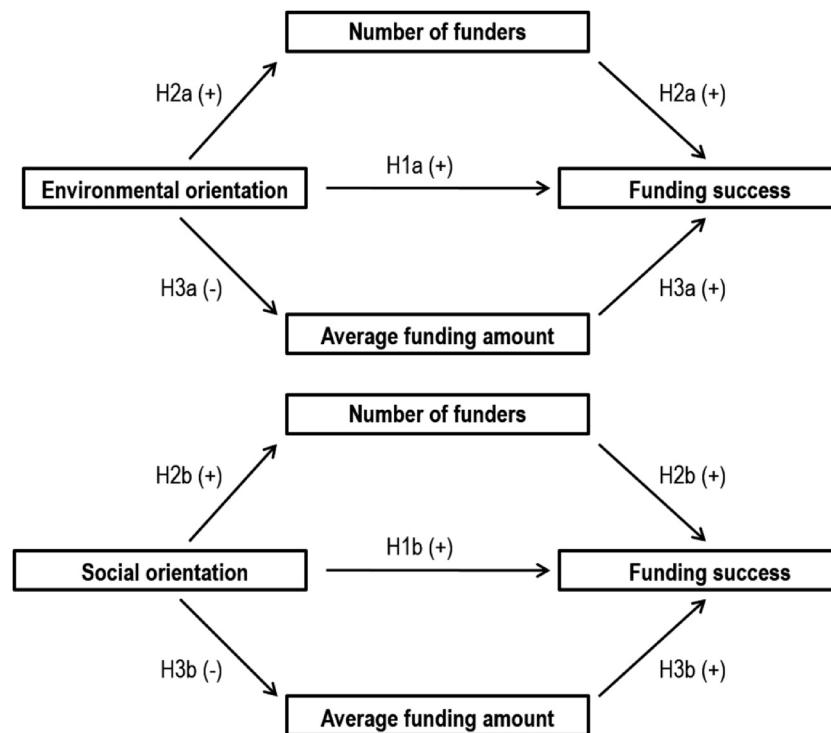


Fig. 1. Summary of hypotheses.

based crowdfunding are impurely altruistic. Thus, building on warm glow theory (Allison et al., 2013; Andreoni, 1990; Cecere et al., 2017), it can be expected that investment-based crowdfunding projects which aim to create higher levels of environmental or social benefits are more successful in receiving funding (other factors being constant). This expectation is supported by earlier research on donation-based and reward-based crowdfunding (Allison et al., 2015; Calic and Mosakowski, 2016; Cecere et al., 2017), which found a positive effect of environmental and social orientation on funding success. Thus, hypotheses H1a and H1b are as follows:

H1a. The higher the environmental orientation of a crowdfunding project, the higher will be its funding success.

H1b. The higher the social orientation of a crowdfunding project, the higher will be its funding success.

Generally, crowdfunding success can be driven by two forces: the number of funders investing in a project, and the amounts that these funders invest. Based on warm glow theory, Allison et al. (2013, p. 694) expect that the incentive of a warm glow leads funders to prefer “high warm glow” investment opportunities over “low warm glow” investment opportunities. In the context of donation-based microlending, they continue to expect that “a loan that creates more anticipation of warm glow will attract a greater number of potential investors” (Allison et al., 2013, p. 694). Empirical findings by Vismara (2019) support this expectation by showing in the case of two British equity crowdfunding platforms that sustainability-oriented projects attract a higher number of restricted investors. Thus, it can be anticipated that the number of funders supporting a project positively mediates the relationship between a project’s environmental or social orientation and its funding success, as the positive effect of environmental and social orientation can be explained by a higher number of funders of environmental and social projects. Correspondingly, hypotheses H2a and H2b are formulated below:

H2a. The number of funders supporting a project positively mediates the relationship between a project’s environmental orientation and its funding success.

H2b. The number of funders supporting a project positively mediates the relationship between a project’s social orientation and its funding success.

Warm glow theory (Andreoni, 1990) is also useful in looking at the influence of sustainability orientation on the second determinant of funding success, the average funding amount. Warm glow theory expects that even with small investments, funders of environmentally and socially oriented crowdfunding projects will receive a warm glow. Thus, there is little incentive to make large investments. The assumption that the average amount invested in sustainability-oriented crowdfunding projects is likely to be rather small is based on earlier literature on entrepreneurship and risk-taking. Sustainability and particularly environmental orientation of ventures is often expected to be associated with higher levels of uncertainties and risk of failure (Hart, 1995). While investors tend to also invest in ventures with higher levels of risk, their respective investments tend to be smaller. That is, investors are found to be less risk-averse in the case of smaller investments (Pahlke et al., 2015).

Thus, based on the theory of warm glow giving and earlier literature on entrepreneurship, risk-taking and sustainability orientation, it can be expected that the average funding amount negatively mediates the effect of environmental and social orientation on the successful funding of investment-based crowdfunding projects. Hence, hypotheses H3a and H3b are as follows:

H3a. The average funding amount of a project negatively mediates the relationship between a project’s environmental orientation and its funding success.

H3b. The average funding amount of a project negatively mediates the relationship between a project’s social orientation and its funding success.

Fig. 1 summarises the hypotheses developed above:

3. Methodology

3.1. Data collection

To address the above hypotheses, a dataset including crowdfunding projects in the largest economies of the two largest crowdfunding markets was used (USA/North America and Germany/Europe). By including crowdfunding platforms from different countries, the need for crowdfunding research which captures country differences was addressed (Wehnert et al., 2019). The German context was surveyed in order to include a non-English speaking culture as suggested by Allison et al. (2013). Additionally, Germany is considered an important crowdfunding market as the per capita crowdfunding amount is close to the European average (Hörisch, 2019) and because there is a research gap for crowdfunding in Germany (Angerer et al., 2017). As a result, both a civil law (Germany) and a common law (USA) jurisdiction have been considered (La Porta et al., 1998). The data originates from four major investment-based crowdfunding platforms which provide monetary rewards for investors, including the German platforms Seedmatch and Companisto as well as the American platforms First Democracy VC and Start Engine. Overall, the sample consists of approximately 60% German crowdfunding projects and 40% US crowdfunding projects. Of these, 105 crowdfunding projects stem from the German platform Seedmatch, 91 from Start Engine (USA), 85 from Companisto (Germany) and 37 projects from the US platform First Democracy VC.

These platforms have been chosen because they are thematically open, allowing environmentally and socially oriented as well as conventional ventures to start crowdfunding campaigns. The data was manually collected during April 2018 by conducting a full-text analysis of the project sites of each crowdfunding campaign, using a coding scheme designed in advance. All 320 projects completed on these platforms from the launch of the platforms until the 19th of April 2018 were included in the dataset. The dataset therefore consists of projects that were successfully funded as well as those that did not reach their funding target and all models conducted rely on the full dataset, including successful as well as unsuccessful projects. As two projects needed to be excluded from the dataset (as described below), the final sample consists of 318 projects.

3.2. Measures

3.2.1. Dependent variable and mediators

All the platforms investigated follow an ‘all-or-nothing’ approach, requiring that project initiators define a minimum funding target that needs to be met. If that funding target is not reached, all funds raised are returned to the funders. Since projects on the selected platforms not only define a minimum funding target, but also a maximum funding target, the minimum funding target can be overfunded by a manifold as long as the maximum funding target is not exceeded. Thus, it is important not only to differentiate projects using a dichotomous variable of whether they reached the minimum funding target or not, but to employ a quantitative measure of the success of the project. Therefore, as recommended in previous literature on crowdfunding (e.g. Hörisch, 2018; Lambert and Schwienbacher, 2010; Thies et al., 2019), a metric variable was chosen to capture funding success, measured as the ratio between the actual amount funded and the minimum funding target. Following earlier research (e.g. Dorfleitner et al., 2016; Mollick, 2014), the number of funders was operationalised as a simple count variable, capturing the number of investors (in thousands) who contributed to the funding of each project. The average funding amount per investor was assessed by dividing the total funding amount of a project (in thousand US\$) by the number of its investors (e.g. Lagazio and Querci, 2018). One project received no funds (funding amount = 0). Consequently, it was not possible to calculate an average funding amount and this outlier was excluded from the analysis.

Another project needed to be excluded from the dataset, as it set the minimum funding target equal to US\$0, thus following a different funding logic and making it impossible to assess its funding success in comparison to the other projects.

To account for skewness of the error terms, the dependent variable was logarithmized. Normal distribution of the error terms was tested and confirmed using histograms and QQ-plots. Additionally, the presence of potentially problematic heteroscedasticity was tested as recommended by Backhaus et al. (2011) and rejected.

3.2.2. Independent Variables

To capture a project's environmental and social orientation, each project was manually coded by two independent coders. All coders participated in coder training and received coding instructions in advance. The coding technique was based on Calic and Mosakowski (2016). To distinguish between different degrees of environmental and social orientation of the projects, environmental and social orientation were not operationalised as dichotomous variables (as in earlier research; cf. Calic and Mosakowski, 2016; Vismara, 2019). Instead, both variables were assessed by each coder using a 7-point-rating scale. The scale ranged from ‘-3: strong negative environmental/social effects’, for example a venture offering short luxury private plane trips (strong negative environmental effects), to ‘+3: strong positive environmental/social effects’, for example a producer of fair-trade vegan coffee offered by small retailers (strong positive social effects). Values for Krippendorff's alpha above the critical value of 0.667 (Krippendorff's $\alpha_{\text{environmental orientation}} = 0.807$; Krippendorff's $\alpha_{\text{social orientation}} = 0.722$) confirm the inter-coder-reliability of these constructs (Krippendorff, 2004). By evaluating environmental and social orientation using a manual coding technique, this paper addresses the need identified by Allison et al. (2013) for further research to apply manual coding in order to examine the influence of more complex characteristics (in this case environmental and social orientation) on funding success. Furthermore, the coding scheme described above enhances the use of quantitative methods by distinguishing between different levels of social and environmental orientation (cf. Kraus et al., 2017).

3.2.3. Control variables

As indicated in the literature review, earlier research has revealed further variables likely to influence crowdfunding success. On this basis, additional control variables were selected. Control variables include team size (number of team members; cf. Mamonov and Malaga, 2018; Vismara, 2019), third-party endorsement (number of links to third parties such as blogs or newsletters; cf. Calic and Mosakowski, 2016; Lehner, 2014), project quality (measured as the number of videos posted on a project's crowdfunding page, cf. Mollick, 2014), the national context (USA vs. Germany; cf. Allison et al., 2013; Hörisch, 2018), gender (separating purely male teams from purely female and mixed teams; cf. Greenberg and Mollick, 2017; Johnson et al., 2018; Marom et al., 2014) and whether the crowdfunding campaign was linked to social media (cf. Clauss et al., 2018; Laurell et al., 2019; Mollick, 2014). Additionally, we controlled for the minimum funding target set by the entrepreneur (in tens of thousands of US\$), as it is probable that lower funding targets are more likely to be reached or even exceeded (Hörisch, 2015; Lagazio and Querci, 2018; Mollick, 2014). Lastly, debt-crowdfunding projects were differentiated from equity-crowdfunding projects (cf. Bretschneider and Leimeister, 2017; Lam and Law, 2016; Vasileidou et al., 2016).

4. Results

Table 1 displays the descriptive statistics (means (M) and standard deviations (SD)) as well as the correlations between all variables included in the analysis. As indicated in Table 1, all correlations are well below the value of 0.8, demonstrating that the variables included in the analysis all reflect different constructs (Short et al., 2010).

Table 1
Descriptive statistics and correlations of variables.

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Env. orientation	0.476	0.991	1												
2 Social orientation	0.547	0.861	0.310**	1											
3 No. funders	0.452	0.564	0.128*	-0.001	1										
4 Av. Funding amount	0.887	0.544	0.040	0.008	0.110†	1									
5 Funding success	1.462	1.187	0.152**	0.041	0.680**	0.278**	1								
6 Third-party endorsement	0.500	0.501	0.081	0.128*	-0.115*	0.167**	0.029	1							
7 Country	0.403	0.491	-0.042	0.104†	-0.086	-0.005	0.182**	0.244**	1						
8 Videos	1.947	1.951	-0.005	0.048	0.018	0.030	0.208**	0.176**	0.335**	1					
9 Social media	0.355	0.479	-0.032	-0.064	-0.041	-0.152**	-0.142*	0.020	-0.596**	-0.148**	1				
10 Team size	4.997	3.242	0.013	0.066	0.094†	0.121*	0.282**	0.141*	0.177**	0.407**	-0.145**	1			
11 Min. target amount	7.272	7.048	0.022	-0.051	0.128*	0.199**	-0.276**	0.058	-0.403**	-0.142*	0.303**	-0.130*	1		
12 Equity vs. debt	0.296	0.457	0.033	-0.116*	-0.264**	-0.234**	0.049	-0.510**	-0.475**	-0.166**	0.066	-0.121*	0.103†	1	
13 Gender	0.522	0.500	-0.071	-0.046	-0.114*	-0.028	-0.151**	-0.101†	0.002	-0.104†	0.079	-0.413**	-0.123*	-0.056	1

** p < 0.01;

* p < 0.05;

† p < 0.1

N = 318 (Seedmatch n = 105; Companisto n = 85; First Democracy VC n = 37; Start Engine n = 91).

Table 2
Regression models.

Dependent Variable	Model 1 Funding Success	Model 2 Number of funders	Model 3 Av. funding amount	Model 4 Funding success	Model 5 Funding success
Env. Orient.	0.194** (0.065)	0.068* (0.032)	0.031 (0.031)	/	0.079* (0.040)
Soc. Orient.	-0.049 (0.075)	-0.010 (0.037)	-0.019 (0.036)	/	-0.024 (0.045)
No. of funders	/	/	/	1.457** (0.070)	1.441** (0.070)
Av. funding amount	/	/	/	0.578** (0.073)	0.572** (0.073)
Videos	0.042 (0.036)	0.004 (0.018)	-0.008 (0.017)	0.041† (0.022)	0.041† (0.022)
Min. funding target	-0.037** (0.010)	0.013** (0.005)	0.016** (0.005)	-0.066** (0.006)	-0.066** (0.006)
Third-party endorsement	0.123 (0.147)	-0.040 (0.073)	0.002 (0.070)	0.196* (0.088)	0.179* (0.088)
Social media	0.111 (0.169)	-0.039 (0.084)	0.169* (0.080)	0.056 (0.102)	0.071 (0.102)
Team size	0.081** (0.023)	0.017 (0.011)	0.023* (0.011)	0.042** (0.014)	0.043** (0.014)
Country	0.358† (0.201)	0.099 (0.100)	0.052 (0.095)	0.166 (0.121)	0.186 (0.121)
Equity vs. debt	0.505** (0.178)	0.342** (0.088)	-0.282** (0.084)	0.180 (0.112)	0.173 (0.112)
Gender	-0.007 (0.138)	-0.079 (0.068)	-0.025 (0.065)	0.115 (0.083)	0.121 (0.083)
Constant term	0.787** (0.251)	0.168 (0.124)	0.680** (0.119)	0.179 (0.157)	0.155 (0.159)
Model Fit					
Adj. r ²	0.167	0.097	0.110	0.698	0.699
Sign. model	0.000	0.000	0.000	0.000	0.000
VIF max	2.637	2.637	2.637	2.628	2.647
n	318	318	318	318	318

All models conducted rely on the full dataset including successful as well as unsuccessful projects. Unstandardised regression coefficients are displayed. Standard errors are provided in brackets.

Levels of significance:

** p < 0.01;

* p < 0.05;

† p < 0.1.

To test the hypotheses, mediated OLS regressions were performed (Table 2), based on the causal steps approach suggested by Baron and Kenny (1986). Linear regression analyses were applied as all dependent variables are metric. Each model conducted relies on the full dataset including successful as well as unsuccessful projects. Additionally, all models are significant and explain relevant shares of the variance of the dependent variable. The VIFs are all well below the critical value of 10, indicating that none of the models seem to have problems related to multicollinearity (Kennedy, 1992).

Model 1 tests whether environmental (H1a) and social (H1b) orientation influence funding success, and additionally includes the control variables. As assumed in hypothesis H1a, environmental orientation positively influences funding success (b = .194; p < 0.01). Thus, hypothesis H1a is supported. In contrast to environmental orientation, social orientation was not found to influence funding success

in model 1, meaning that hypothesis H1b cannot be confirmed. Of the control variables, the minimum funding target, team size, the country dummy variable and the equity crowdfunding dummy variable were found to influence funding success.

Model 2 uses the number of funders as the dependent variable and indicates a significant positive effect of environmental orientation (b = .068; p < 0.05) on this variable. In contrast, social orientation does not exert a significant influence on the number of funders. In addition to environmental orientation, the minimum funding target and the equity crowdfunding dummy variable significantly influence the number of funders.

Model 3 tested the influence of environmental and social orientation on the average amount invested per funder. Neither environmental nor social orientation exert a significant influence in this model. Among the control variables, the minimum funding target, link to social media,

team size and the equity crowdfunding dummy variable were found to influence the average funding amount.

Model 4 captures the influence of the number of funders and the average funding amount on funding success. As indicated by the significant regression coefficient ($b = 1.457$; $p < .01$), the number of funders is found to positively influence funding success. Likewise, the average funding amount has a positive influence on funding success ($b = .578$). The number of videos posted, the minimum funding target, third-party endorsement and team size all also influence funding success in this model.

Lastly, model 5 analyses the influence of both environmental and social orientation as well as the number of funders and the average funding amount on funding success. Again, a significant positive influence of the number of funders ($b = 1.441$; $p < .01$) and of the average funding amount ($b = .572$; $p < .01$) is observed. As in model 1, environmental orientation exerts a significant influence on funding success, even though the strength of this effect is lower due to the inclusion of the mediators. This means that the influence of environmental orientation is partly mediated by the number of funders. Hence, hypothesis H2a is supported. Among the control variables, the number of videos posted, third party endorsement, team size and the minimum funding target were found to significantly influence the dependent variable. In contrast, social orientation exerts no significant influence either on the number of funders or on funding success. Therefore, no support can be found for hypothesis H2b. Moreover, as neither environmental orientation nor social orientation have a significant influence on the average funding amount (see model 3 and model 5), hypotheses H3a and H3b cannot be supported.

To address the need for research on crowdfunding comparing different national contexts, the full model (model 5 in Table 2), was also tested including an interaction term of environmental orientation and country. Like the models in Table 2, the interaction model is significant and explains a high share of the variance of the dependent variable. Given that the model displayed in Table 3 contains an interaction effect, the VIFs are all remarkably low ($VIF_{max} = 2.984$) and well below the critical threshold of 10 (Kennedy, 1992).

As indicated in Table 3, this interaction effect is significant (with $p = .064$). If the interaction effect is added, the main effect of

Table 3
Full regression model including interaction effect of environmental orientation and country

Dependent Variable	Funding success
Env. Orient.	0.017 (0.051)
Soc. Orient.	-0.026 (0.045)
No. of funders	1.433** (0.070)
Av. funding amount	0.578** (0.073)
Videos	0.043* (0.022)
Min. funding target	-0.065** (0.006)
Third-party endors.	0.187* (0.088)
Social media	0.052 (0.102)
Team size	0.043** (0.014)
Country	0.110 (0.127)
Country * Environmental Orientation	0.140† (0.075)
Equity vs. debt	0.171 (0.112)
Gender	0.131 (0.083)
Constant term	0.182 (0.159)
Model Fit	
Adj. r^2	0.702
Sign. model	0.000
VIF max	2.948
n	318

Unstandardised regression coefficients are displayed. Standard errors are provided in brackets.

Levels of significance:

** $p < 0.01$

* $p < 0.05$;

† $p < 0.1$.

environmental orientation becomes insignificant. This finding provides indication that the effect of environmental orientation on funding success does indeed strongly depend on the national context. Figure 2 displays this interaction effect and highlights that while no consistent effect of environmental orientation on crowdfunding success can be observed for Germany, there is a consistently positive effect for the USA. This finding provides indication that the effect of environmental orientation on funding success is particularly strong in the USA.

5. Discussion

This analysis finds that environmental orientation positively influences the funding success of investment-based crowdfunding projects. It thus provides additional support for the frequently published expectation that crowdfunding can support sustainable development (e.g. Bonzanini et al., 2015; Cumming et al., 2017; Lehner, 2013) by financing ventures which enhance environmental protection. The paper is also in line with the results of Calic and Mosakowski (2016), who found a positive influence of environmental orientation on funding success in the context of reward-based crowdfunding in the USA. However, in contrast to their findings and to further analyses on donation-based microlending (Allison et al., 2013; Cecere et al., 2017), no positive effect of social orientation can be observed in this analysis of investment-based crowdfunding success in Germany and the USA. Thus, some differences compared to reward-based crowdfunding and donation-based microlending have been observed.

Consequently, as no negative influence of social orientation and even a positive influence of environmental orientation was found, earlier expectations regarding fundamentally different logics in investment-based crowdfunding on the one hand and reward- and donation-based crowdfunding on the other could not be confirmed by this research. Similarly, the finding by Cecere et al. (2017), stating that financial rewards could crowd out the probability to fund a project which serves the general public, cannot be supported with regard to environmentally oriented ventures. The latter are found to experience above-average support, even though this research was conducted in a context where financial rewards exist. Likewise, we could not find support for the hypotheses that environmentally or socially oriented projects receive lower average investments in a context where financial rewards are promised.

The findings of this paper differ from those of Vismara (2019), who found no positive influence of sustainability orientation on crowdfunding success for the case of equity crowdfunding in the UK. However, his finding that sustainability orientation increases the number of restricted (non-professional) investors is complemented by the insight that it is only environmental orientation that significantly impacts the number of funders of a crowdfunding campaign, while no significant influence of social orientation on the number of funders was identified. The differences between this paper's findings and those of Vismara (2019) can be explained as follows. Firstly, to analyse the influence of sustainability orientation on funding success, Vismara (2019) uses a combined measure, including environmental and social orientation. In contrast, this study analysed the influences of environmental and social orientation separately. Secondly, Vismara (2019) uses a dichotomous variable differentiating between sustainability-oriented and non-sustainability-oriented projects, whereas the present research captures different positive and negative degrees of environmental and social orientation and thus uses a more fine-grained measure. Thirdly, this research analyses investment-based crowdfunding platforms including both debt and equity crowdfunding projects, while Vismara (2019) merely investigated equity crowdfunding platforms. Lastly, Vismara's (2019) analysis was conducted in a different national setting (the UK).

Earlier research provided an initial indication that the effect of sustainability and environmental orientation might vary by country. However, these analyses did not span country borders. Comparing

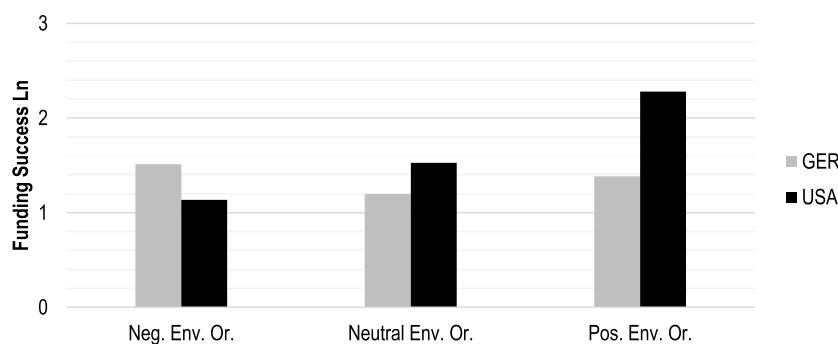


Fig. 2. Interaction effect of environmental orientation and country.

analyses conducted in different countries, a country-specific influence of sustainability orientation on crowdfunding success could only be assumed (e.g. Calic and Mosakowski, 2016; Hörisch, 2015; Hörisch, 2018). The cross-country analysis in this article finds additional support for these early indications, as the influence of environmental orientation on funding success is found to differ between Germany and the USA; environmental orientation exerts a stronger influence on funding success in the USA. Various possible explanations for these cross-country differences exist. Firstly, the World Values Survey (Inglehart et al., 2014) documents that US citizens on average show higher levels of environmental concern than Germans; this outcome could explain the more significant effect of environmental orientation in the USA. Secondly, in the USA, investment-based crowdfunding was strongly encouraged by President Obama's politics, for instance through the JOBS Act. Indeed, President Obama backed investment-based crowdfunding as a means of ensuring that "ordinary Americans will be able to go online and invest in entrepreneurs that they believe in", highlighting the opportunity to invest in projects considered to support 'good causes' (White House, 2012). In Germany, no such prominent political support for crowdfunding as a means of supporting specific causes is observable. Thirdly, among Germans (as in continental Europe in general) environmental protection could rather be regarded as an issue to be dealt with by regulation and governments than by market actors. Thus, the willingness to invest in for-profit ventures contributing to environmental protection could be more widespread in the USA, which generally experiences lower levels of environmental regulation (Löfstedt and Vogel, 2001).

The results of this study may also inform warm glow theory (Andreoni, 1990). Conforming to the expectations of Allison et al. (2013, p. 694), investors in this study choose "high warm glow" investment opportunities above "low warm glow" investment opportunities with regard to the environmental orientation of crowdfunding projects. The results of this article therefore confirm that warm glow theory can also be applied to the context of environmentally oriented and not only to socially oriented projects (cf. Hartmann et al., 2017).

Furthermore, the findings of this analysis inform warm glow theory, as the observed positive influence of environmental orientation is explicable by the fact that such orientation increases the number of funders, whereas no influence on the average funding amount was found. Thus, this research introduces a specification to warm glow theory, highlighting the need to consider the number of funders as a mediator in further analyses using warm glow theory to determine funding amounts.

Lastly, warm glow theory has previously been mainly applied to contexts where there are no financial rewards for investment, such as the context of donating (e.g. Allison et al., 2013; Crumpler and Grossman, 2008; Dunn et al., 2014). This article informatively applies the theory to investment-based crowdfunding for sustainability-oriented ventures, a context combining public and private goods as outcomes. Thus, it confirms the applicability of warm glow theory in contexts that are not restricted to public goods as outcomes. With

regard to environmental orientation, a core assumption of warm glow theory was confirmed, as higher levels of environmental orientation are found to increase funding success. In contrast to earlier research, which argued that financial rewards crowd out warm glow effects (cf. Cecere et al., 2017), we found that even in investment-based crowdfunding, environmental orientation impacts people's willingness to support a project.

Surprisingly, the current empirical findings do not show a significant effect of social orientation on crowdfunding success. The differing results regarding environmental and social orientation found in this article can be explained by earlier research on environmental and social orientation in entrepreneurship, suggesting that environmental entrepreneurship is more closely related to profit-making (Thompson et al., 2011). Thus, investors may associate higher levels of environmental orientation with opportunities for generating profits. Therefore, we can assume that investors of environmentally oriented crowdfunding projects incorporate impurely altruistic values. On the one hand, funders strive for personal satisfaction by supporting others (a feeling of warm glow) while on the other hand, egoistic motives may be strengthened by investors' ambition to obtain financial benefits.

In comparison to environmental orientation, social orientation in entrepreneurship may be associated with weaker business opportunities because social entrepreneurship is rather rooted in the non-profit domain (Thompson et al., 2011). Therefore, the impure altruistic warm glow effect is possibly weakened in the context of social orientation due to missing egoistic motives aiming at financial returns.

6. Conclusions

The potential for environmentally and socially oriented ventures to contribute to sustainable development has increasingly been highlighted (e.g. Filser et al., 2019; Kraus et al., 2018; Schaefer et al., 2015). Crowdfunding is frequently expected to help unleash this potential. This paper has therefore discussed how different degrees of environmental and social orientation of investment-based crowdfunding projects may influence their funding success. In this regard, no significant influence of social orientation on the number of funders or funding success in investment-based crowdfunding can be observed. In contrast, environmental orientation is found to increase funding success, and this influence is mediated by the number of funders of a crowdfunding campaign. This insight may help entrepreneurs and crowdfunding platforms alike to identify factors which support successful financing of environmentally oriented projects via investment-based crowdfunding.

Firstly, the results suggest that investment-based crowdfunding may indeed be a promising way to finance environmentally oriented ventures. Thus, entrepreneurs with environmentally oriented business ideas are well advised to emphasise this orientation in the project description on crowdfunding platforms if they make use of investment-based crowdfunding. In particular, environmentally oriented projects seem to be potentially attractive to a large number of funders. Entrepreneurs are therefore advised to use this potential, for example

by increasing the visibility of their campaigns. For this purpose, online as well as offline marketing can be of help. Relatedly, the finding that environmental oriented investment-based crowdfunding projects reach more supporters suggests that investment-based crowdfunding can also serve a marketing function for environmental entrepreneurs. In contrast, entrepreneurs with socially oriented business ideas are recommended to carefully consider the type of crowdfunding for their venture, as no positive influence of social orientation on funding success was found for the context of investment-based crowdfunding. In contrast, earlier analyses (e.g. [Calic and Mosakowski, 2016](#); [Allison et al., 2013](#); [Cecere et al., 2017](#)) showed such positive effects in the contexts of reward-based and donation-based forms of crowdfunding.

Secondly, the above implications emphasise the importance of crowdfunding platforms for environmentally oriented projects. Platforms can assist environmentally oriented ventures in reaching a huge number of funders if the platforms give projects high levels of visibility, that is, if they feature a high number of frequent users. Thus, entrepreneurs who intend to use investment-based crowdfunding to finance environmentally oriented ventures should choose a platform with a high number of frequent users who may be attracted to this campaign. In turn, environmentally oriented projects may help platforms to activate inactive users.

Thirdly, environmental entrepreneurs are challenged to consider their national context when financing environmentally oriented projects via investment-based crowdfunding, as this analysis highlights a different likelihood of successfully financing environmentally oriented projects depending on national context. This also implies a carefully considered choice of platform, paying special attention to which target nationality the platform addresses. Given that most investment-based crowdfunding platforms do not allow foreign citizens to invest, considering the choice of platform with regard to the national context is particularly important for investment-based crowdfunding.

Additionally, the results reveal factors of general importance for entrepreneurs to consider when using investment-based crowdfunding to finance their ventures. While projects with higher minimum funding targets are likely to reach more funders and higher absolute funding levels, the likelihood of reaching or even exceeding the minimum funding target decreases in cases where the minimum funding target is higher. Additionally, this analysis indicates that project quality (reflected by the number of videos posted) increases an investment-based crowdfunding campaign's success (cf. [Bi et al., 2017](#); [Hörisch, 2015](#); [Mollick, 2014](#)). Lastly, the results suggest that larger teams are likely to attract a higher number of funders, higher average funding amounts and consequently higher levels of funding success in investment-based crowdfunding.

The results of this article also inform warm glow theory by providing an indication of its explanatory power in the context of investment-based crowdfunding, where funders are generally expected to be profit-oriented and less altruistic than those in reward-based and donation-based crowdfunding ([Lam and Law, 2016](#); [Vasileidou et al., 2016](#)). It thus shows that warm glow theory is also applicable in the context of financing mechanisms that offer monetary rewards to contributors. Furthermore, warm glow theory is specified, as the effect of environmental orientation on funding success is found to be mediated by the number of funders.

In addition to the insights offered by this article, there are limitations. One limitation is connected to the methodology used. The analysis in this article exclusively builds on information obtained from the crowdfunding platforms and draws conclusions concerning investors. Investors were not surveyed directly. Hence, as in earlier research on warm glow theory and crowdfunding (e.g. [Allison et al., 2013](#); [Cecere et al., 2017](#); [Lagazio and Querci, 2018](#)), we can only analyse the aggregate investment decisions documented on crowdfunding platforms and draw conclusions based on and informing warm glow theory. Future research should address this limitation by drawing on surveys

among crowdfunding investors themselves. Such research would also help to investigate further factors influencing crowdfunding investment decisions, such as innovativeness and social capital (cf. [Medina-Molina et al., 2019](#)), behavioural norms or interpersonal connections (cf. [Cecere et al., 2017](#)) and the desire to receive public recognition and prestige ([Bretschneider and Leimeister, 2017](#); [Harbaugh, 1998](#)). Additionally, the warm glow effect should be further researched by analysing whether funders of environmental ventures receive warm glow feelings due to the outcome of the project (such as the realisation of actual products or services) or rather receive a warm glow from the mere act of financially supporting the project. In the latter case, funders might not track the development of the ventures after they are successfully funded ([Bretschneider and Leimeister, 2017](#)). To address this question, future research in the field should aim at analysing panel data at the level of individual funders.

Furthermore, future studies are advised to control for promised financial return, for example by assessing the influence of the rate of return, in order to measure the effect of egoistic motivations on investment decision behaviour in sustainability oriented crowdfunding.

Further investigations should also examine how the average funding amount per funder may be increased for sustainability-oriented crowdfunding projects, and how to specifically address funders who invest higher-than-average amounts. In this context, future work on sustainability and investment-based crowdfunding should also focus on the role of monetary returns and different levels of monetary returns (for example, in the form of interest rates or profit shares), since a positive effect of higher returns on the number of funders has already been shown in earlier literature ([Ahlers et al., 2015](#)).

As indicated in the above-mentioned paths for future research, several steps may still be taken in order to specify the potential of investment-based crowdfunding for environmental and social ventures and to reveal how this potential can be most effectively used for realising social change and supporting sustainable development. This research may guide such future inquiries, as it has revealed the need to distinguish between environmental and social orientation, between different degrees of environmental orientation and between different drivers of success in crowdfunding, such as the number of funders and the average funding amount, and lastly to distinguish between different national contexts. However, most importantly, it has shown that higher levels of environmental orientation increase funding success for investment-based crowdfunding by reaching a higher number of funders.

Author statement

Jacob Hörisch: Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Supervision; Validation; Visualization; Writing – original draft; Writing – review & editing.

Isabell Tenner: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Validation; Visualization; Writing – original draft; Writing – review & editing.

Declarations of Competing Interest

None.

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The influence of feedback and awareness of consequences on the development of corporate sustainability action over time

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Abstract

The current level of corporate sustainability is insufficient for overcoming pressing environmental and social issues. Research is therefore needed about processes that lead to increased corporate action that fosters sustainable development. This study investigates the influence of feedback and corporate awareness of consequences on the development of corporate sustainability action over time. It uses action regulation theory to quantitatively analyse data of 59 large German companies measured at two points in time. The results reveal a positive temporal development of corporate sustainability action, and awareness of consequences positively mediates the relationship between corporate sustainability actions in two different time periods. Feedback acts as a moderator between the positive effect of corporate sustainability action in the first period on corporate awareness of consequences in the second period. Based on these findings, recommendations for organisations include the importance of seeking and processing feedback.

KEYWORDS

action regulation theory, awareness of consequences, corporate sustainability, feedback, panel data

1 | INTRODUCTION

Corporate engagement for sustainability can be considered a precondition for sustainable development. For example Heede (2014) points out that nearly two thirds of all historic CO₂ and methane emissions were caused by no more than 90 corporations. Likewise, corporations and their global supply chains are closely linked to some of the most pressing social sustainability challenges, such as forced labour (e.g., New, 2015). Given this importance of corporations for sustainable development, it does not surprise that corporations increasingly engage for sustainability. This is for instance reflected in a growing percentage of corporations in the Fortune 500 index (Brown, Vetterlein, & Roemer-Mahler, 2010) and in the number of companies that take sustainability action by adopting a certified environmental management system according to ISO 14001 (Federal Environment Agency, 2018).

However, existing research literature has highlighted that the current level of corporate engagement for sustainability is insufficient

for staying within the planetary boundaries (Whiteman, Walker, & Perego, 2013) or for overcoming the most pressing social evils in supply chains (Wickert, 2016). Thus, a higher level of corporate engagement for sustainability is needed. Past literature has shown an increase in corporate sustainability action over time (e.g., Doluca, Holzner, & Wagner, 2018), however, not for all companies and not at the same pace (Cramer, 2005; Doluca, Holzner, & Wagner, 2018; Doluca, Wagner, & Block, 2018; Siebenhüner & Arnold, 2007). Still, relatively little is known on the processes that lead to increased corporate action fostering sustainable development. On this ground, the current paper applies concepts of action regulation theory (Frese, 2007; Frese & Zapf, 1994) and Schwartz's (1968) norm activation model to analyse the organisational learning process of corporate sustainability action and regards feedback and awareness of consequences as two possible influencing factors. Against this theoretical background, it can be assumed that an organisations' engagement with corporate sustainability triggers its awareness of consequences about corporate

sustainability, which in turn increases the respective organisations' engagement. Furthermore, the feedback corporations receive on their sustainability actions can be expected to moderate the influence of corporate engagement on the awareness of consequences. Building on these assumptions, this research addresses the following research question: How does feedback and corporate awareness of consequences influence corporate sustainability action?

This research extends the existing literature in several ways. First, the analysis addresses the research need expressed by Papagiannakis, Voudouris, and Lioukas (2014), who suggest to deeper investigate why and how changes in corporate sustainability occur. Applying action regulation theory in this context is novel because it provides a new perspective for explaining this organisational learning process. Second, earlier studies can be validated by using a different database, drawing on the German Corporate Sustainability Barometer (Schaltegger, Harms, & Windolph, 2010; Schaltegger, Hörisch, Windolph, & Harms, 2012). Third, this analysis uses data of the same corporations over two points in time and is hence one of the few studies allowing to analyse the temporal development of corporate sustainability. By paying special attention to the role of feedback and awareness of consequences as well as to the development of a corporation's engagement in sustainability over time, this analysis provides insights into why some organisations reach a high level of corporate sustainability faster than others.

The findings of this study reveal a positive development of corporate sustainability action over time. In particular, corporate sustainability action in the first period exerts a positive effect on corporate awareness of consequences in the second period, and this link is moderated by the extent of feedback a corporation receives (in Period 1). In turn, corporate awareness of consequences positively influences corporate sustainability action (in Period 2). Hence, the study shows that feedback and corporate awareness of consequences are important influencing factors, which determine the extent and pace at which an organisation develops with regard to corporate sustainability.

The remainder of the paper is structured as follows. The next section presents the extant literature on how corporate engagement for sustainability changes over time, summarises key aspects of the theoretical framework informed by action regulation theory and the norm activation model, and builds hypotheses based on both streams of literature. Section 3 describes the quantitative methodology employed for the empirical analysis, explaining the two waves of surveys conducted, the measurement constructs used, and the resulting data set. In Section 4, the results of the hypotheses testing are presented. Section 5 discusses these findings and draws conclusions for theory and practice.

2 | LITERATURE REVIEW

2.1 | Development of corporate sustainability over time

The level of corporate sustainability has increased steadily for the past decades. Thereby, corporate sustainability can be defined as "company activities – voluntary by definition – demonstrating the inclusion of

social and environmental concerns in business operations and in interactions with stakeholders" (van Marrewijk, 2003, p. 102). As, for instance, indicated by a growing number of companies implementing environmental management systems, the level of corporate sustainability has increased for the past decades (Brown et al., 2010; Federal Environment Agency, 2018). Similarly, Doluca, Holzner, and Wagner (2018) report an overall increase of corporate sustainability actions and environmental management systems established in German and British organisations between 2001 and 2016.

To better understand the reasons for such increases of corporate sustainability action, the learning process of businesses on corporate sustainability is of crucial importance. A study by Cramer (2005), for example, monitored Dutch companies in different phases of integrating corporate sustainability into their business practices and stresses that the corporate learning process towards sustainability, especially in large companies, leaves much to be desired. She concludes that sustainability learning processes in organisations mainly occur on individual or group level. However, learning processes at the level of the whole corporation remain rare (Cramer, 2005), that is, processes that are integrated throughout the organisational hierarchy from the top management to each single department. A major reason for this rather hesitant learning process is the lack of support and understanding within the organisation. Similar findings by Siebenhüner and Arnold (2007) emphasise that large companies mainly focus on small-scale measures, although radical changes can predominantly be identified among medium-sized companies. However, Doluca, Holzner, and Wagner (2018) find that the resulting level of corporate sustainability increases with the size of an organisation, possibly due to the availability of resources (cf., Gallo & Christensen, 2011). Furthermore, Doluca, Wagner, and Block (2018) report that family firms in Germany lag behind nonfamily firms with regard to implementing sustainability-related measures in the first waves of measurement; nevertheless, they catch up at a later stage.

Based on these studies, it becomes evident that not all organisations reach the same level of corporate sustainability at the same time and pace. Therefore, influencing factors should be considered. So far, only few analyses of corporate sustainability over time exist, which mainly have been conducted using data from the European Business Environment Barometer (e.g., Doluca, Holzner, & Wagner, 2018; Doluca, Wagner, & Block, 2018). However, these earlier studies use pooled cross-sectional data (i.e., building on different companies for each point in time) instead of panel data (i.e., a data set "that follows a given sample of individuals over time, and thus provides multiple observations on each individual in the sample" (Hsiao, 2014, p. 1). Consequently, Doluca, Holzner, and Wagner (2018) highlight the need for further analyses of temporal developments of corporate sustainability. Likewise, Papagiannakis et al. (2014) identify the need to deeper investigate why and how changes in corporate sustainability occur. Therefore, the use of data drawing on the same companies at different points in time represents a major contribution to existing literature on the temporal development of corporate sustainability. By examining data from the German Corporate Sustainability Barometer surveys 2010 and 2012 (Schaltegger et al., 2010; 2012), this study

addresses the research call expressed by Doluca, Holzner, and Wagner (2018) and Papagiannakis et al. (2014). Thus, in comparison to earlier studies, methodological novelties of this paper are to analyse the same organisations over time, to apply a different theoretical framework, and to use another database.

2.2 | Feedback and awareness of consequences

An important driving factor for corporate learning for sustainability is the awareness of corporations about the consequences of environmentally and socially (un)sustainable development for the respective corporation. Awareness of consequences refers to the belief that a specific condition is of importance for a relevant object, as it has consequences for this object (Papagiannakis & Lioukas, 2017). On the basis of Schwartz's (1968) norm activation model, De Groot and Steg (2009) and Zhang, Wang, and Zhou (2013) highlight the importance of the awareness of consequences as they find that actors develop positive norms, that is, feelings of moral obligation, towards a certain action in case they become aware of the consequences this action implies. With regard to corporate sustainability, past literature has indicated a positive influence of awareness of consequences of top managers on the organisations' sustainability engagement (Papagiannakis & Lioukas, 2017).

Another crucial factor for the improvement and development of corporate sustainability management is feedback. Past literature has identified feedback as a major influencing factor in organisational learning (e.g., Barlas & Yasarcan, 2006; Greve, 2003; Wong, Cheung, & Leung, 2008). Mayfield and Mayfield (2011), for example, highlight the importance of performance feedback on the individual and group level for receiving a learning and evaluation effect on the organisational level. Earlier research has also investigated the influence of feedback on corporate sustainability. By acting upon feedback and being aware of the consequences corporate actions imply, stakeholder pressures can be addressed, which plays a vital role for organisations in developing its corporate sustainability strategy (Madsen & Ulhøi, 2001; Perez-Batres, Doh, van Miller, & Pisani, 2012). Branzei, Ursacki-Bryant, Vertinsky, and Zhang (2004) and Papagiannakis et al. (2014) apply control theory to explain the impact of feedback on the sustainability learning process of corporations. According to Branzei et al. (2004), feedback is particularly important in the early stages of implementing corporate sustainability. Likewise, focusing on the environmental dimension of corporate sustainability, the findings by Papagiannakis et al. (2014) suggest that the evolution of an organisations' corporate sustainability strategy "is driven by a feedback process wherein outcomes of the environmental decisions of an earlier time influence environmental decisions of a later time" (Papagiannakis et al., 2014, p. 266). However, when it comes to feedback processing, control theory primarily focuses on discrepancy-reducing feedback that interrupts a certain action, in case the goal has not been achieved (Carver & Scheier, 1985; cf., Locke, 1991; Zacher & Frese, 2018). Action regulation theory (Frese, 2009; Frese & Zapf, 1994) extends control theory in this respect, as it takes a broader perspective on feedback, not restricted to discrepancy-reducing feedback. It thus

provides a promising path for analysing the influence of feedback on the temporal development of corporate sustainability.

2.3 | Action regulation theory

Although learning and planning are important steps in corporate sustainability, actual sustainability-related problems such as climate change or unhealthy working conditions can ultimately only be successfully reduced or eliminated by taking action. In this context, action regulation theory (e.g., Frese, 2007; Frese & Zapf, 1994; Hacker, 1985) provides a powerful approach in understanding why and how actors regulate their actions. Action regulation theory builds on and extends control theory (Zacher & Frese, 2018). Previous applications of this theory have primarily focused on entrepreneurial individuals (e.g., Frese, 2009; Frese, Gielnik, & Mensmann, 2016; Gielnik et al., 2015), but it is also applicable for actors in established corporations (e.g., Diestel & Schmidt, 2012; Raabe, Frese, & Beehr, 2007; Zacher, Schmitt, Jimmieson, & Rudolph, 2018). Although these studies investigated the behaviour of specific individuals within a corporation, such as employees or supervisors, action regulation theory has not yet been applied to explain actions of an organisation as a whole. Past literature provides evidence for the applicability of control theory on the organisational level (e.g., Branzei et al., 2004; Papagiannakis et al., 2014). A research gap, however, remains to test action regulation theory at the organisational level of analysis as it represents a valuable extension of control theory. Such application in the field of corporate sustainability is valuable, as action regulation theory allows addressing developments over time. Zacher and Frese (2018) highlight that such a perspective is only rarely taken and recommend to further apply action regulation theory based on data sets surveying the same objects at different points in time.

Action regulation theory distinguishes between three different components that can be used to explain how actors regulate their actions: (a) sequence of action, (b) structure, and (c) focus (Frese, 2007, 2009). In the following analysis, special attention is paid to the *sequence of action*, as this aspect of action regulation theory has not been applied in sustainability-related actions of organisations. Additionally, sequence of action is particularly relevant for corporations, specifically to the role of *feedback* within the action regulation process over time, and feedback has proven to be a particularly relevant influencing factor in the context of corporate sustainability (Hörisch, Johnson, & Schaltegger, 2015). Thus, considering the sequence of action extends studies on corporate sustainability using control theory (Branzei et al., 2004; Papagiannakis et al., 2014). Although control theory and action regulation theory agree on the theoretical aspects of hierarchical levels (*structure*), both differ particularly with regard to the *action sequence* (Zacher & Frese, 2018).

According to action regulation theory, the following different, possibly iterative, *sequences of action regulation* exist: (a) goal development, (b) orientation, (c) plan development and selection, (d) monitoring of execution, and ultimately, (e) feedback processing (Frese, 2009; Frese & Zapf, 1994; Zacher & Frese, 2018). Action starts with developing an overarching goal and various different subgoals,

followed by mapping its environment and developing a plan in order to achieve these goals. Afterwards, the process of execution needs to be monitored and feedback from consumers, investors, suppliers, and so on has to be processed (Frese, 2009). These sequences of action do not necessarily occur in the exact order but can also take place simultaneously or are repeated before turning to the next sequence of action. During this process, a continuous provision on feedback concerning actions takes place. Thus, the last sequence of the action regulation process, feedback processing, is of utmost importance as actors are informed about their current state of achieving the predefined goals. This enables them to regulate their actions in order to reduce any inconsistencies on this path (Zacher & Frese, 2018). Thus, the extent to which actors receive feedback on their action is of crucial relevance in action regulation theory. Feedback is defined as “information about how far one has progressed toward the goal” (Frese & Zapf, 1994, p. 279), but feedback also holds the power to change goals in a constructive way. As stated by Frese (2007), feedback is one of the most important components of the corporate learning process, although it has not yet enjoyed much attention in literature. Particularly, the influence of the extent of feedback provision on the development of corporate sustainability has not been sufficiently investigated by previous applications of action regulation theory.

2.4 | Development of hypotheses

Corporate sustainability is a steady learning process for organisations (e.g., Benn, Edwards, & Williams, 2014; Linnenluecke & Griffiths, 2010a; Schaltegger, Beckmann, & Hansen, 2013), demanding flexible adaptations and fast responses to present and future environmental and social issues. Consequently, sustainability-related goals need to be regularly adapted, extended, or changed (York, 2009). Based on the sequences of action suggested in action regulation theory, corporations pass stepwise cognitive processes iteratively, in order to reach their sustainability-related goals. In so doing, routines and expertise are being built in the field of corporate sustainability (Baker & Schaltegger, 2015). According to Frese (2007), increasing routinisation opens the opportunity to deal with additional demands as routinised action happens on a rather (semi)unconscious level and thus demands less effort and time for the actor to carry out this action. As a result, the actor is capable to concentrate on further action. On this basis, it can be expected that corporate sustainability enjoys a continuous improvement with time. Similar findings have been reported by past literature. Studies by Cramer (2005) and by Siebenhüner and Arnold (2007) provide support for the positive development of corporate sustainability over time. However, surveys among corporations show relatively large differences between organisations with regard to their level of corporate sustainability (e.g., Banerjee, Iyer, & Kashyap, 2003; Doluca, Holzner, & Wagner, 2018; Doluca, Wagner, & Block, 2018). Although, overall, the level of corporate sustainability increases (e.g., Doluca, Holzner, & Wagner, 2018), it cannot be expected that all organisations reach the same level of corporate sustainability at the same time but that it will be influenced by prior levels of corporate

sustainability of the respective organisation. In this vein, Jové-Llopis and Segarra-Blasco (2018) found that corporations that engage with innovations positively affecting the environment in the previous year are more likely to also engage with such innovations in the following year. Likewise, Papagiannakis et al. (2014, p. 257) argue in the context of corporate environmental management that “higher outcomes would trigger higher goals that [...] would lead to an increase in subsequent environmental decisions”. Consequently, corporate sustainability action can be expected to be path dependent. In other words, the level of corporate sustainability at a later stage can be expected to depend on the level of corporate sustainability action at an earlier stage. Therefore, Hypothesis 1 is formulated as follows:

Hypothesis 1. *The higher the level of prior corporate sustainability (in Period 1), the higher the level of subsequent corporate sustainability action (in Period 2).*

Extant literature suggests that corporate actions concerning an issue lead to higher levels of corporate awareness of the consequences concerning this issue (Papagiannakis & Lioukas, 2017; Zhang et al., 2013). In the context of corporate sustainability, Papagiannakis and Lioukas (2012) stress that the awareness of consequences of individuals within an organisation is important in regulating future action. At the organisational level, Qian and Schaltegger (2017) find for the context of carbon reporting that improving disclosure quality leads to higher carbon performance in the subsequent time period, as the organisation becomes aware of the consequences the issue of climate change has for this organisation. Given the consequences, (un)sustainable development can have for corporations (e.g., Linnenluecke & Griffiths, 2010b; Winn, Kirchgeorg, Griffiths, Linnenluecke, & Günther, 2011), corporate awareness of consequences is highly relevant. Therefore, based on Papagiannakis and Lioukas (2017) and Zhang et al. (2013), this work examines in how far prior levels of corporate sustainability action lead to a stronger awareness concerning the consequences of (un)sustainable development. We thus hypothesise that the level of prior corporate sustainability action positively influences the subsequent awareness of consequences. Accordingly, Hypothesis 2 is formulated as follows:

Hypothesis 2. *The higher the level of prior corporate sustainability action (in Period 1), the higher the subsequent corporate awareness of consequences concerning sustainability (in Period 2).*

Based on action regulation theory and control theory, it can be anticipated that, besides awareness of consequences, the extent of feedback related to the progress of goal achievement is of crucial importance for corporate sustainability action. Feedback is an important influencing factor for organisational learning in general (e.g., Barlas & Yasarcan, 2006; Greve, 2003; Wong et al., 2008). With regard to the formation of environmental strategies among Chinese firms, feedback was found to be an important motivator (Branzei et al., 2004). Likewise, Papagiannakis et al. (2014) qualitatively analysed corporate environmental strategies of Greek firms over a 5-year period (2004–2008) using a multiple case study approach. Their findings also

showed that sustainability-related decisions of an earlier time influence those of a later time leading to a steadily increasing achievement of new outcomes. Moreover, Papagiannakis et al. (2014) showed that the temporal evolution of corporate environmental strategies is stimulated by a feedback process. Besides these insights gained from earlier research on corporate sustainability inspired by control theory, action regulation theory highlights the importance of feedback, as it suggests that feedback plays a vital role in action regulation (Frese, 2007; Frese & Zapf, 1994; Zacher & Frese, 2018). Thus, building on action regulation theory and the evidence gathered by Branzei et al. (2004) and Papagiannakis et al. (2014) in the context of corporate sustainability, it can be expected that feedback strengthens the positive effect of prior levels of corporate sustainability on the awareness of consequences. The more feedback an organisation receives concerning sustainability, the stronger will be the impact of prior corporate sustainability actions on the awareness about consequences of actions towards corporate sustainability. Therefore, feedback processing is assumed to act as a moderator between prior corporate sustainability actions and its awareness of consequences related to sustainability actions. On this basis, Hypothesis 3 is formulated:

Hypothesis 3. *The influence of prior corporate sustainability action (in Period 1) on subsequent corporate awareness of consequences (in Period 2) is moderated by the extent of feedback a company receives on sustainability issues.*

By considering the sequential action cycle suggested in action regulation theory, which starts with goal development (Frese, 2007; Frese & Zapf, 1994), we expect that sustainability-related goals will be adapted in order to regulate and improve future corporate sustainability. Moreover, based on the norm activation model, it can be assumed that higher levels of awareness about the consequences are a particularly important trigger for actually taking action concerning an issue

(De Groot & Steg, 2009; Zhang et al., 2013). Awareness of consequences is also found to be an important determinant in many sustainability-related settings (e.g., He & Zhan, 2018; (Sörqvist et al., 2013). With regard to corporate sustainability, past literature has confirmed a positive influence of awareness of consequences of individuals within an organisation on its engagement in sustainability-related action (Papagiannakis & Lioukas, 2012, 2017). On the basis of these insights, we expect that the awareness of consequences of an organisation enhances its engagement in sustainability-related actions. Accordingly, Hypothesis 4 is formulated as follows:

Hypothesis 4. *The higher the level of corporate awareness of consequences (in Period 2), the higher the level of corporate sustainability action (in Period 2).*

Finally, Hypotheses 1, 2, and 4 logically imply that the awareness of consequences acts as a mediator between the positive development of corporate sustainability over time, that is, between the influence of prior and subsequent levels of corporate sustainability action. The expected mediation is based on findings by De Groot and Steg (2009), who provide compelling support for the mediator effect of awareness of consequences on prosocial and proenvironmental intentions on the individual level, for instance concerning reducing car use, blood donation, and energy use. Moreover, a cyclical relationship between these variables can be expected according to the sequences of action regulation, implied in action regulation theory. This leads to the proposition of Hypothesis 5:

Hypothesis 5. *The influence of the level of prior corporate sustainability actions (in Period 1) on the subsequent level of corporate sustainability actions (in Period 2) is positively mediated by the level of corporate awareness of consequences (in Period 2).*

Figure 1 summarises Hypotheses 1–4. Hypothesis 5 results by combining Hypotheses 1, 2, and 4.

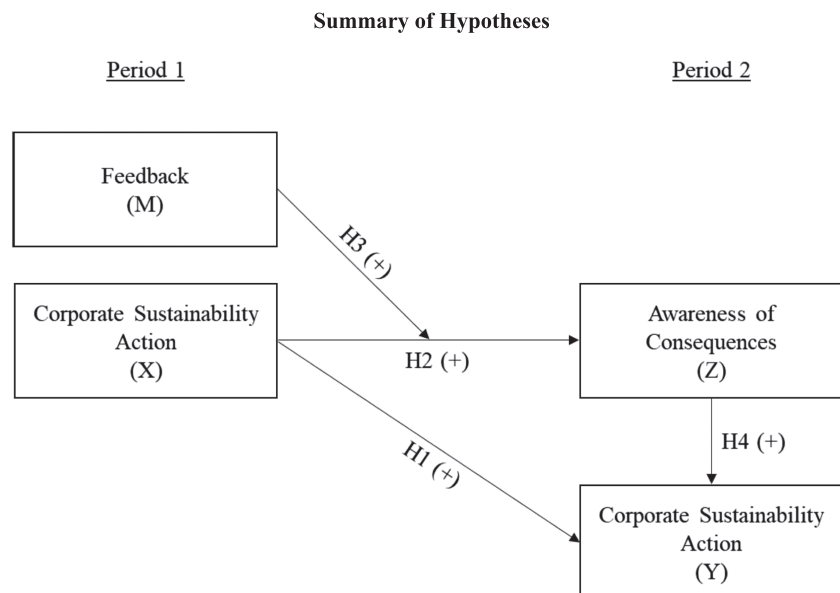


FIGURE 1 Summary of hypotheses

3 | METHOD

3.1 | Participants and procedure

This paper uses the data gathered with two published surveys among the 500 largest German companies as well as the 50 largest banks and 30 largest insurance companies (the German Corporate Sustainability Barometer; Schaltegger et al., 2010; 2012). Additionally, companies listed in the most important German stock indices (DAX, M-DAX, and S-DAX) were contacted if not already included due to the above-mentioned criteria. To avoid double counting of responses, all subsidiaries were excluded from the surveys if they do not manage sustainability issues independently from the parent company. Company size was measured by revenue (for banks and insurance companies company size was measured as balance sheet total or annual gross contributions, respectively). All companies were contacted in 2010 and 2012. By examining data from surveys in different years, this study addresses the research call expressed by Doluca, Holzner, and Wagner (2018), highlighting the need for further analyses of temporal developments of corporate sustainability.

For all participating companies, managers responsible for aspects related to corporate sustainability were the preferred contact persons. Surveying individuals who act as representatives for the whole organisation is a common procedure (e.g., Branzei et al., 2004; Hörisch, Johnson, & Schaltegger, 2015; Papagiannakis et al., 2014) and has also been used to apply control theory on an organisational level (e.g., Branzei et al., 2004; Papagiannakis et al., 2014). We have purposefully selected sustainability managers as respondents, as these are known to have a good overview about sustainability actions, feedback, and awareness on an organisational level and thus have been previously used as respondents for surveys capturing processes on the organisational level (e.g., Hörisch, Schaltegger, & Windolph, 2015).

Participation in the survey was voluntary, the data were treated anonymously, and no sanctions were applied for nonparticipation. For the survey in 2010, 334 companies were invited based on the above criteria of which 112 companies participated in the survey

(33.5% response rate). In 2012, 152 companies participated in the survey, of 383 companies initially invited, using the same selection criteria as in 2010 (39.7% response rate). The response rates for both surveys are clearly within the standard deviation range of average response rates Baruch and Holtom (2008) identified for surveys among organisations, which were published in refereed academic journals (35.7%).

The survey for 2010 was conducted from November 2009 to February 2010 and the survey for 2012 lasted from February 2012 to April 2012. In both survey waves, potential participants were first contacted via telephone. In 2010, in a second step, the survey was sent to participants by mail or e-mail. In 2012, the participants received a link to an online survey via e-mail after the initial contact by telephone. The survey included numerous aspects of corporate sustainability management, including items measuring the company's awareness of consequences with regard to sustainability, the sustainability-related action a company takes, and the feedback it receives regarding its corporate sustainability activities.

For the purpose of this paper, only those 60 companies that participated in both surveys were considered. To verify that this selection does not result in a substantial bias, it was tested whether there are significant differences with regard to key variables (i.e., revenue, the number of employees, nondomestic sales, and the question whether the respective company is family run) between those companies that participated only in 2012 and those that also responded to the survey in 2010. For none of these variables any significant differences could be observed. One company needed to be excluded *ex post*, as the respective questionnaire from 2012 was incomplete. The final data set thus comprises data from 59 companies. The descriptive statistics and the correlation matrix for these companies are displayed in Table 1.

3.2 | Measures

The measurement of the degree to which a company takes action related to sustainability (SustAct) is based on multiple items. First, the respondents were provided a list of different standards in

TABLE 1 Descriptive statistics and correlation matrix of the sample

Variable	1	2	3	4	5	6	7
1. SustAct2010	1.000	.438	.436	.332	.231	-.021	.324
2. Feedback2010		1.000	.198	.289	.211	.181	.411
3. SustAct2012			1.000	.494	.224	.065	.085
4. Aware2012				1.000	.121	.159	.347
5. Revenue					1.000	-.160	.002
6. Family business						1.000	.001
7. Industry							1.000
Mean	0.000	-0.005	0.000	0.000	0.483	0.328	0.525
SD	1.000	1.008	1.000	1.000	0.504	0.473	0.504
Minimum	-2.079	-2.915	-3.031	-2.380	0.000	0.000	0.000
Maximum	1.945	1.345	2.203	2.570	1.000	1.000	1.000
N	59	59	59	59	58	58	59

sustainability management and indicated which of these standards their company follows (AA 1000; EFQM; EMAS; Global Reporting Initiative Guidelines; ISO 14001; ISO 9000; OECD Guidelines; SA 8000; Sigma Guidelines; UN Global Compact). The standardised number of standards followed was used as a first variable in the construct *SustAct*. Furthermore, the sustainability managers were asked to evaluate the intensity to which the company implements seven core sustainability management measures (see Table A1). Each core sustainability management measure was assessed on a 5-point rating scale (ranging from *never applied* to *always applied*). Together with the first variable on the implementation of sustainability management standards, the seven standardised variables on the implementation of core sustainability management measures were used to build the construct *SustAct* using principal component analysis, resulting in one continuous latent variable. In case of missing values concerning the key sustainability measures, the average value was computed.¹ The reliability analysis showed sufficiently high values for both survey waves (Cronbach's $\alpha_{\text{SustAct}2012} = .737$; Cronbach's $\alpha_{\text{SustAct}2010} = .678$), given that the number of items is smaller than 10 (Loewenthal, 2004).

As described in the theory section, the awareness of corporations about the consequences of environmentally and socially (un)sustainable development for the respective corporation was expected to act as a mediator variable. To capture this variable (*Aware2012*), it was not asked directly, what consequences environmentally and socially (un)sustainable development has on the entire organisation, but the consequences for specific organisational units were surveyed. Therefore, the sustainability managers participating in the survey were first asked to assess the degree to which different functional units are affected by environmental issues on a 5-point rating scale, to monitor in how far the organisation is aware of consequences environmental issues have for specific functional units. Using the assessment of representative individuals within the organisation for assessing the awareness of the organisation is a common procedure, also applied by Papagiannakis and Lioukas (2017). For the eight functional units displayed in Table A1, the average score was calculated and standardised. If an organisational unit did not exist in a company (e.g., production in a service company), this variable was excluded from calculating the average score. For the same organisational units, the respondents also indicated the units' degree of affectedness by social issues, and again the average score was calculated and standardised. For these two variables (i.e., average affectedness by first environmental and second social issues of different organisational units), a principal component analysis was used to calculate one single factor, i.e., one continuous latent variable. Again, reliability analysis revealed sufficiently high values (Cronbach's $\alpha_{\text{Aware}2012} = .748$) (Loewenthal, 2004).

To measure the extent to which a company receives feedback about how far it has progressed towards its sustainability-related goals in the first period (*Feedback2010*), the respondents indicated whether the company measures its influence on six different environmental issues, seven social issues, and the influence of its sustainability action

on seven issues relevant for business success (for an overview of these issues, see Table A1), as it can be expected that the more aspects of corporate sustainability a company measures, the higher will be the degree of feedback it receives. These variables (number of environmental aspects measured, number of social aspects measured, and number of economic aspects measured) were all standardised and used to compute one single, continuous construct by means of principal component analysis. Again, the value for Cronbach's α (.685) confirmed the reliability of the construct, given the relatively low number of items included in the construct (Loewenthal, 2004).

To control for possible interfering effects, the following control variables were considered, which were highlighted to influence corporate sustainability action in previous research (e.g., Doluca, Wagner, & Block, 2018; Gallo & Christensen, 2011). First, a dummy variable was used to separate companies with annual revenues of more than €2.5 billion (*revenue* = 1) from those with revenues of 2.5 billion or less (*revenue* = 0). Second, service and trade companies on the one hand (*industry* = 0) were differentiated from producing companies (*industry* = 1). Lastly, the variable *family* indicates whether the company is a family run business (*family* = 1) or not (*family* = 0).

4 | ANALYSIS AND RESULTS

The conceptual model displayed in Figure 1 was tested using the Process Macro version 3.3 (Hayes, 2018), which builds on OLS regressions. For all constructs and all models analysed, normal distribution of the variable and its error terms were confirmed using histograms and Q-Q plots. Additionally, based on the tests suggested by Backhaus, Erichson, Plinke, and Weiber (2011), it was made sure that the data set and the analyses are not affected by problems related to heteroscedasticity. Lastly, multicollinearity was tested for based on the variance inflation factor values, and the data set was found to not to be affected by problems connected to multicollinearity as defined by Kennedy (1992).

In a first model (Model I), the effect of *SustAct2010*, *Feedback2010*, and the interaction effect between these two constructs on *Aware2012* was tested. Additionally, this model includes the control variables *revenue*, *family*, and *industry*. Model II captures the effect of *SustAct2010*, *Aware2012*, and of the control variables (*Revenue*, *Family*, and *Industry*; *SustAct2012*). Lastly, to not only test the effect of *SustAct2010* on *Aware2012* as moderated by *Feedback2010* but also the direct effect of *SustAct2010* on *Aware2012*, Model III captures the effect of *SustAct2010* and of the control variables on *Aware2012*. The results of all models are displayed in Table 2.

Hypothesis 1 can be assessed based on Model II. Overall, Model II shows a good model fit, as it explains 38.3% of the variance in the dependent variable ($R^2 = .383$). As expected in Hypothesis 1, the model documents that the effect of *SustAct2010* on *SustAct2012* is indeed positive and significant ($b = .366, p < .01$). To assess Hypothesis 2, Model III needs to be consulted, which captures the main effect of *SustAct2010* on *Aware2012*. Again, the model has a sufficient model fit ($R^2 = .183$). The model provides indication that *SustAct2010* exerts a

¹For the 60 companies included in the sample, on average 0.15, the seven items on the implementation of core sustainability management measures were missing.

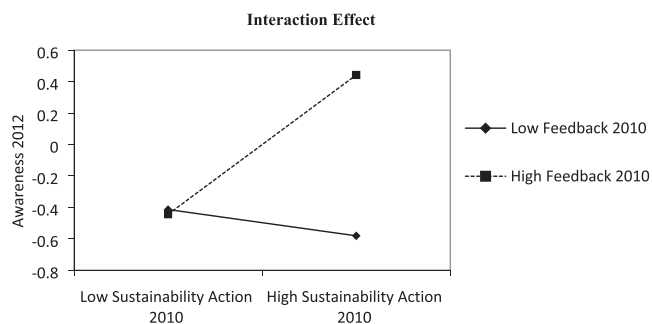
TABLE 2 Regression models

Model number	Model I	Model II	Model III
Dependent variable	Aware2012	SustAct2012	Aware2012
Independent variables			
Constant term	-.423* (.240)	.078 (.213)	-.379 (.237)
SustAct2010	.201 (.140)	.366*** (.126)	.237* (.140)
Feedback2010	.256 (.155)		
SustAct2010 * Feedback2010	.359*** (.133)		
Aware2012		.426*** (.121)	
Revenue	.106 (.250)	.220 (.228)	.156 (.259)
Family	.250 (.291)	.276 (.266)	.158 (.302)
Industry	.267 (.303)	-.497* (.270)	.476 (.300)
R ²	.289	.383	.183
N	58	58	58
p (model)	.006	.000	.028

Note. The cells display the unstandardised regression coefficients. Standard errors are reported in parentheses. Indirect effect: $b_{zx}b_{yz} = 0.101$; SE $b_{zx}b_{yz} = 0.066$; $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

significant effect on *Aware2012* ($b = .237$, $p < .1$). Thus, Hypothesis 2 can be accepted as well, given a probability of error of $p < .1$. In Hypothesis 3, it was expected that this influence of prior levels of corporate sustainability (*SustAct2010*) on corporate awareness of consequences (*Aware2012*) is moderated by the extent of feedback a company receives on sustainability issues. Model I captures this hypothesis, as it included the effect of the interaction term of *SustAct2010* and *Feedback2010* on *Aware2012*. Indeed, this interaction term shows a significant effect ($b = .359$, $p < .01$). Therefore, Hypothesis 3 can be supported. Figure 2 visualises this effect and demonstrates that although there is only a weak (negative) effect of *SustAct2010* on *Aware2012* if *Feedback2010* is low, *SustAct2010* has a strong positive effect on *Aware2012* if *Feedback2010* is high. This indicates that higher levels of prior corporate sustainability action lead to higher levels of awareness of consequences only if the level of feedback received by a company is high.

Hypothesis 4 assumes that *Aware2012* positively influences *SustAct2012* and can be analysed based on Model II. As the model

**FIGURE 2** Interaction effect

shows a significant effect of *Aware2012* on *SustAct2012* ($b = .426$, $p < .01$), Hypothesis 4 can be supported.

Lastly, building on the previous hypotheses, Hypothesis 5 expects that the influence of prior sustainability action (*SustAct2010*) on subsequent sustainability action (*SustAct2012*) is moderated by the awareness of consequences (*Aware2012*). Finding support for this hypothesis requires significant effects of *SustAct2010* on *Aware2012* (Hypothesis 2) and of *Aware2012* on *SustAct2012* (Hypothesis 4). Although the latter can be supported with a very low probability of error ($p < .01$), Hypothesis 2 can only be supported, given $p < .1$ is accepted. Additionally, the influence of *SustAct2010* on *Aware2012* was found to be only significant and positive in case *Feedback2010* is high (Hypothesis 3). Thus, Hypothesis 5 can only be supported with $p < .1$.

Interestingly, of the control variables only *industry* shows a significant effect and only in Model II. The lack of significance of *revenue* can be explained by the sample selection as only the largest German corporations have been surveyed. Hence, all companies included in the analysis are large corporations with high revenues.

Table A2 displays the same models as documented in Table 2 but uses an alternative operationalisation of the *Feedback2010* variable. Based on this robustness check, the results of Table 2 can be confirmed. The alternative operationalisation of the *Feedback2010* variable is documented in Table A1.

5 | DISCUSSION AND CONCLUSION

Sustainable development cannot be achieved without substantial action of corporations (cf., Heede, 2014; Shrivastava, 1995). Past literature indicated that although the overall level of corporate sustainability increases, not all organisations reach the same level within the same time (Cramer, 2005; Doluca, Holzner, & Wagner, 2018; Doluca, Wagner, & Block, 2018; Siebenhüner & Arnold, 2007). Therefore, knowledge on factors leading to an increase of corporate sustainability action is of crucial importance. This study enriches research on corporate sustainability by identifying awareness of consequences and feedback as important influencing factors. In this context, a novel theoretical lens is applied by informing the analysis with action regulation theory, which extends past research on feedback processing based on control theory. Furthermore, there is a lack of panel data sets on corporate sustainability, although such data are of high relevance for understanding the development of corporate sustainability over time. Although some qualitative, longitudinal studies on corporate sustainability exist (e.g., Cramer, 2005; Papagiannakis et al., 2014; Siebenhüner & Arnold, 2007), most quantitative analyses on corporate sustainability used pooled cross-sectional data; that is, although different points in time are monitored, the composition of the sample differs between the different measurements (e.g., Doluca, Holzner, & Wagner, 2018; Doluca, Wagner, & Block, 2018; Schaltegger et al., 2012). For this reason, a data set consisting of the same companies for two different points in time provides the basis for this empirical investigation.

In good agreement with Doluca, Holzner, and Wagner (2018), our findings reveal a positive development of corporate sustainability

action over time. Reasons for this observation can be found by considering action regulation theory. Frese (2007), for example, suggested that actors receive expertise and experience routinisation by iteratively passing through a sequential action cycle. During this process, actors are enabled to deal with additional demands and are thus empowered to increase their engagement in sustainability-related actions. Moreover, the results show that corporate sustainability action positively influences corporate awareness of consequences. Our results thus support earlier findings by Zhang et al. (2013) and Papagiannakis and Lioukas (2017), who found for the context of employees within corporations that actions concerning an issue lead to higher levels of awareness about this issue and sensitise for the sustainability-related consequences of the corporations' actions. Our analysis furthermore reveals that the positive effect of corporate action on awareness for sustainability-related consequences is positively moderated by feedback. This finding is compatible with those by Branzei et al. (2004) and Papagiannakis et al. (2014), who stated that the positive evolution of corporate sustainability is driven by a feedback process. These studies therefore lend support to our assumptions based on action regulation theory and its sequential action cycle (Frese, 2007; Frese & Zapf, 1994; Zacher & Frese, 2018) that feedback processing is one of the most important components of the corporate learning process. A possible reason why feedback acts as a moderator of the relationship between corporate sustainability action and corporate awareness of consequences is that organisations are informed about their current state of achieving a predefined goal and are thus enabled to reduce inconsistencies on this path (Zacher & Frese, 2018). Our findings furthermore show that corporate awareness of consequences positively influences corporate sustainability action. According to De Groot and Steg (2009) and Zhang et al. (2013), actors develop positive feelings of moral obligation towards a certain action if they become aware of the consequences this action implies. Hence, these insights also inform and support the norm activation model by Schwartz (1968). For the context of this paper, this implies that corporations become aware of the importance of the environment and social issues for them through engaging in corporate sustainability and consequently further improve their sustainability-related actions. This finding lends support to Papagiannakis and Lioukas (2017), who also reported a positive influence of awareness of consequences of managers in Greek manufacturing companies on their engagement in corporate sustainability actions. The results are also in line with the findings by Qian and Schaltegger (2017), who found that improving disclosure on carbon information leads to improved carbon performance in subsequent periods of time. Although they do not analyse awareness, they argue that awareness and organisational learning may be reasons to be further investigated to explain their findings. Finally, a positive mediation of awareness of consequences on the relationship between corporate sustainability action of an earlier time on corporate sustainability action of a later time was indicated in our study. This finding extends those of De Groot and Steg (2009), who found evidence for the mediator effect of awareness of consequences on prosocial and proenvironmental intentions of individuals. Therefore, our study indicates that a

mediator effect can also be found on the organisational level in the context of corporate sustainability. However, it should be noted that the effect of prior levels of corporate sustainability action on subsequent levels of corporate sustainability action is only partially mediated by the level of corporate awareness of consequences.

Based on the analysis presented above, several implications can be derived for theory and practice. First, the study indicates that awareness of consequences and feedback are two important influencing factors for the development of corporate sustainability action over time. Therefore, organisations are encouraged to actively seek for feedback in order to analyse their progress towards approaching sustainability-related goals. To receive such feedback, it is advisable to enhance the measurement of different aspects of sustainability (e.g., greenhouse gas emissions, labour conditions in supply chains, and so on), as enhanced measurement of sustainability aspects over time increases the extent of feedback a corporation receives. This result is thus in line with earlier studies that revealed the importance of measuring progress in sustainability management (e.g., Bell & Morse, 2013). Relatedly, the result that awareness of consequences positively impacts corporate sustainability action highlights the importance of sensitising corporate managers for the consequences (un)sustainable development has for the respective corporation. In this context, further education concerning sustainability for managers is a promising means (cf., Hesselbarth & Schaltegger, 2014; Roome, 2005).

The study also provides several theoretical implications. It informs action regulation theory in two ways. First, action regulation theory has previously only rarely been used to explain actions on the organisational level. Past studies have applied action regulation theory nearly exclusively on the level of individual acting in organisations, for example, by considering employees, supervisors, or managers. Second, our study is the first approach to apply the theory in contexts of corporate sustainability. Hence, using action regulation theory for the context of this paper provides a novel approach to understand the development of corporate sustainability action of organisations as one entity rather than the individuals employed by that organisation. The same accounts for awareness of consequences because this variable has not been applied as an influencing factor on sustainability-related *corporate* actions before. Furthermore, this study is one of the few applications of data regarding the temporal development of corporate sustainability action. Therefore, it addresses the research need to further analyse corporate sustainability taking into account temporal developments (Dolua, Holzner, & Wagner, 2018). Most notably, this study is, to the best knowledge of the authors, the first to apply action regulation theory in the context of the development of corporate sustainability over time.

However, some limitations of the study are worth noting and should be addressed in future research. First, although the theoretical framework provides a new perspective on the temporal development of sustainability-related actions of corporations, action regulation theory was not exploited to its full potential. Concerning the sequential action cycle, most attention was paid to feedback processing. However, before processing feedback, the sequence of action implies additional processes that were not in the focus of this investigation.

Empirically approaching steps like goal development, mapping the environment, planning, and monitoring of execution could provide further insights into understanding the progress in corporate sustainability action over time. Moreover, action regulation theory includes two further components besides the sequential action cycle: structure and focus. Considering those components would have gone beyond the scope of this study. However, future research analysing the structure and focus of sustainability-related action of corporations would be highly informative. Especially hierarchical allocations of such actions (i.e., conscious vs. automatic) should be considered in future studies, in particular with respect to organisations' expertise and routinisation.

A second limitation concerns the data used for the analysis. One limitation concerning the data is that it dates back to 2010 and 2012. Thus, following the data collection and critical events such as the Paris Climate Change Agreement or the formulation of the Sustainable Development Goals of the United Nations took place. Further research should analyse in how far these events affected the influences observed in this analysis. Besides, the data are limited to large corporations and to German corporations. Therefore, the results should not be generalised to other contexts without care. Although the focus on Germany was purposefully chosen, given the fact that German corporate sustainability management was found to take a middle position when compared with sustainability management in other countries (Hörisch, Windolph, & Schaltegger, 2014), the results should not be mistaken to be equally valid for SMEs. Lastly, the data are restricted to corporate sustainability action as the dependent variable. Future research should go beyond this dependent variable and also analyse actual improvements with regard to different aspects of corporate sustainability performance (such as reductions in greenhouse gas emissions), as a result of corporate sustainability action. Similarly, this analysis does not differentiate between different aspects of sustainability management. Future research could go into more detail, analysing the temporal development of not only corporate sustainability in general but with regard to specific aspects, such as climate change, biodiversity loss, or working conditions in international supply chains. Given the European strategic long-term vision for a carbon neutral economy, particularly, the analysis of temporal developments of corporate climate action is worth studying in future research.

Third, the data on feedback of this study lack a clear distinction between positive and negative feedback but rather consider the extent of feedback as such. Therefore, it remains to be identified in how far different types of feedback (i.e., positive vs. negative; internal vs. external) have different effects on the level of corporate sustainability action and performance (cf., Barlas & Yasarcan, 2006). As the scope of such identification is limited in quantitative research, further qualitative studies should be conducted. Such studies will also help to further investigate the role of feedback in organisational learning to clarify whether feedback acts as a central driver of learning or rather as a trigger (cf., Greve, 2003; Wong et al., 2008).

The above described paths for future research can help to further investigate how the contributions of corporations to sustainable development can be increased. This research highlights that important

steps towards such increase will be to extend the feedback companies receive on their sustainability action and to raise corporate awareness about the companies sustainability related consequences.

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APPENDIX A

TABLE A1 Operationalisation of constructs

Construct	Items included	Cronbach's α
SustAct2010	Sustainability standards followed (count): 1) Number of the below sustainability management standards followed by the company: AA 1000; EFQM; EMAS; Global Reporting Initiative Guidelines; ISO 14001; ISO 9000; OECD Guidelines; SA 8000; Sigma Guidelines; and UN Global Compact Implementation of sustainability management measures (1 = never; 5 = always): 2) Developing new customer segments (e.g., promoting environmentally friendly and socially oriented products) 3) Developing new business segments related to sustainability 4) Promoting employee motivation 5) Producing with more efficient use of resources (e.g., optimising production processes) 6) External communication of environmental and social activities (e.g., sustainability reporting) 7) Environmental and social-oriented cost management (e.g., using cost-effective recycling products) 1) Environmental and social-oriented risk management (e.g., health care at the workplace)	.678
Aware2012	1) Average degree to which the following functional units are impacted by environmental issues (1 = no impact; 5 = strong impact): Procurement/purchasing; research & development; manufacturing; logistics/distribution; marketing; public relations/corporate communication; personnel department/HR; strategic planning 2) Average degree to which the following functional units are impacted by social issues (1 = no impact; 5 = strong impact): Procurement/purchasing; research & development; manufacturing; logistics/distribution; marketing; public relations/corporate communication; personnel department/HR; strategic planning	.748
Feedback2010 (only included in robustness check) (only included in robustness check)	1) Number of environmental aspects measured (count): Energy consumption; water consumption; material consumption (raw materials and so on); emissions/waste water/waste; biodiversity; transport 2) Number of social aspects measured (count): Workplace/employment; occupational safety and health; training and development; diversity and equal opportunity; consumer protection; child, forced and compulsory labour (e.g., in the supply chain); freedom of association/right to collective bargaining 3) Number of economic aspects for which the company measures the influence of sustainability on these aspects (count): Costs; reputation/image/brand value; revenue/sales/profits; attractiveness as employer/job; satisfaction; innovation; efficiency/productivity 4) Number of environmental issues stakeholders demand the company to manage (count): Energy consumption; water consumption; material consumption (raw materials and so on); emissions/waste water/waste; biodiversity; transport 5) Number of social issues stakeholders demand the company to manage count Workplace/employment; occupational safety and health; training and development; diversity and equal opportunity; consumer protection; child, forced and compulsory labour (e.g., in the supply chain); freedom of association/right to collective bargaining	.685
		.713 ^a

(Continues)

TABLE A1 (Continued)

Construct	Items included	Cronbach's α
SustAct2012	Sustainability standards followed (count) 1) Number of sustainability management standards followed (AA 1000; EFQM; EMAS; Global Reporting Initiative Guidelines; ISO 14001; ISO 9000; OECD Guidelines; SA 8000; Sigma Guidelines; UN Global Compact) Implementation of sustainability management measures (1 = <i>never</i> ; 5 = <i>always</i>): 2) Developing new customer segments (e.g., promoting environmentally friendly and socially oriented products) 3) Developing new business segments related to sustainability 4) Promoting employee motivation 5) Producing with more efficient use of resources (e.g., optimising production processes) 6) External communication of environmental and social activities (e.g., sustainability reporting) 7) Environmental and social-oriented cost management (e.g., using cost-effective recycling products) 8) Environmental and social-oriented risk management (e.g., health care at the workplace)	.737

^aCronbach's α for the alternative operationalisation of Feedback2010 as used in the robustness check (Appendix B).

TABLE A2 Robustness check

Model number	Model I	Model II	Model III
Dependent variable	Aware2012	SustAct2012	Aware2012
Independent variables			
Constant term	-.391 (.250)	.078 (.213)	-.379 (.237)
SustAct2010	.188 (.145)	.366*** (.126)	.237* (.140)
Feedback2010	.257 (.162)		
SustAct2010 * Feedback2010	.304** (.126)		
Aware2012		.426*** (.121)	
Revenue	.007 (.262)	.220 (.228)	.156 (.259)
Family	.425 (.304)	.276 (.266)	.158 (.302)
Industry	.174 (.315)	-.497* (.270)	.476 (.300)
R ²	.287	.383	.183
N	58	58	58
p (model)	.007	.000	.028

Note. The cells display the unstandardised regression coefficients. Standard errors are reported in parentheses. Indirect effect: $b_{zx}b_{yz} = 0.101$; SE $b_{zx}^*_{yz} = 0.066$

* $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

**Investors in environmental ventures want good money—and a clean conscience:
How framing, interest rates, and the environmental impact of crowdlending projects
influence funding decisions**

Frederic Penz, Jacob Hörisch, Isabell Tenner

Keywords

Crowdfunding; environmental entrepreneurship; warm glow theory; framing; conjoint analysis

Abstract

Crowdfunding is becoming the most important source for financing new ventures. In particular, it is often used to finance environmentally oriented ventures. Still, it is largely unknown what specifically makes an environmentally oriented crowdfunding project attractive to investors and how entrepreneurs can frame their projects in a way that fosters its attractiveness to these investors. To study how different factors influence the decisions of potential investors and informed by warm glow theory, we conducted a real-choice experiment using choice-based conjoint analysis among a purposefully drawn sample of potential investors ($n = 569$). The results inform practitioners that with regard to framing, altruistic cues are more effective than egoistic cues, whereas with regard to the actual benefits investors receive, egoistic benefits (i.e., interest payments) are more important than altruistic benefits (i.e., environmental impact). Moreover, we found that different groups of investors exist that seek different benefits. We labeled these groups “profit-maximizers,” “receptive altruists,” and “risk-seekers aiming for the best of both worlds.”

1. Introduction

With a global volume of approximately US\$90 billion per year (Messeni Petruzzelli et al., 2019) and a projected increase to more than US\$300 billion by 2025 (Parhankangas et al., 2019), crowdfunding is becoming the most important source of financing for new ventures. It is defined as “a method of pooling often small amounts of capital from a potentially large pool of interested funders. It refers to an entrepreneur’s direct solicitation (...) to a large number of individuals” (i.e., “the crowd”) (Short et al., 2017, pp. 149–150).

Research indicates that, in particular, environmentally oriented projects experience high probabilities of attracting crowdfunding investors and thus becoming funded (Calic & Mosakowski, 2016; Hörisch & Tenner, 2020). Consequently, crowdfunding holds strong potential for contributing to sustainable development (Petruzzelli et al. 2019; Testa et al. 2019; Vismara 2019). Still, it is largely unknown what specifically makes an environmentally oriented crowdfunding project attractive to investors and how entrepreneurs can frame their projects in a way that fosters its attractiveness (Cummings et al., 2020; Mochkabadi & Volkmann, 2020; Testa et al., 2019; Vismara, 2019). Testa et al. (2019) called for more research on the motivations and investment behavior in crowdfunding for sustainable development in general. Likewise, based on a systematic literature review on crowdfunding, Mochkabadi and Volkmann (2020) identified the need for further research on “what factors determine the decision to invest” (p. 106). More specifically, Cummings et al. (2020) highlighted that future research should investigate whether different types of investors who seek different benefits exist. Consequently, this paper seeks to address the following research question: *How do different attributes of environmentally oriented crowdfunding projects influence their probability of receiving funding?*

To investigate this research question, we conducted a choice-based experiment with real financial and environmental payoffs using conjoint analysis. Inspired by Bagheri et al. (2019), we

focused on crowdlending, a specific type of investment-based crowdfunding that offers investors an a priori-defined interest rate on their investment. Previous research has shown that only 16% of the scientific papers on crowdfunding in the context of sustainability focus on crowdlending, while this type of crowdfunding covers 76% of the global market volume (Böckel et al., 2020). We presented participants (n = 569) with different crowdlending projects under realistic conditions using the Sawtooth Software. The projects varied with regards to five factors: (1) the framing of the project description (e.g., Jancenelle et al., 2018; Kamatham et al., 2020; Nielsen & Binder, 2020), (2) the promised interest rate (e.g., Ben Slimane & Rousseau, 2020; Nitani et al., 2019; Pierrakis, 2019), (3) the magnitude of the environmental impact (e.g., Hörisch & Tenner, 2020), (4) third-party certification (e.g., Calic and Mosakowski, 2016; Saluzzo & Alegre, 2021), and (5) the percentage of the funding target already achieved at the time of investment (e.g., Mollick, 2014). We analyzed the participants' choices using hierarchical Bayes analysis.

Our findings show that not only the interest rate but also the (magnitude of the) environmental impact of a campaign, third-party certification, and the percentage of the funding target already achieved significantly impact the likelihood of an environmental venture receiving funding. While framing also exerts an influence on investment decisions, this influence differs widely among different groups of investors. Based on a latent class analysis, we labeled these groups “rational profit-maximizers,” “receptive altruists,” and “risk-seekers aiming for the best of both worlds.” Whereas rational profit-maximizers primarily decide based on the interest rate and are nearly completely uninfluenced by the framing, receptive altruists ascribe nearly equal importance to the interest rate and environmental impact and are also most receptive to framing. Risk-seekers show strong preferences for the highest levels of environmental impact and interest rates and are, to this end, even willing to invest in projects with lower probabilities of being successfully funded.

The results of our study have the following theoretical and managerial implications for scholars and practitioners. First, we show that the key assumption of warm glow theory (Andreoni, 1989, 1990) that individuals making financial contributions to public goods are driven by coexisting egoistic and altruistic motives also holds true in investment-based crowdfunding. Additionally, we specify that with regard to framing, altruistic cues are more effective than egoistic cues, whereas with regard to the actual benefits investors receive, egoistic benefits (i.e., interest payments) are more important than altruistic benefits (i.e., environmental impact). Second, we provide the first typology of environmentally oriented crowdlending investors, demonstrating that different groups of investors seek different benefits. The differentiation of investor types may help to explain opposing results in prior studies (e.g., Vismara, 2019; Hörisch & Tenner, 2020). Furthermore, it may serve as an opportunity to build a more differentiated theory on the motivations of crowdlending investors and allow practitioners to optimize the attributes that are under their influence (e.g., third-party certification and framing). Finally, this paper addresses the need for more experimental approaches in crowdfunding research (Allison et al., 2015; Calic & Mosakowski, 2016; Mochkabadi & Volkmann, 2020).

2. Literature Review and Development of Hypotheses

2.1 Theoretical Framework: Theory of Warm Glow Giving in Crowdfunding

The theory of warm glow giving (Andreoni, 1989, 1990) was originally applied to explain contributions made as charity (e.g., Allgood, 2009; Krasteva & Yildirim, 2013; Tonin & Vlasopoulos, 2014) but was later extended to explain pro-social (e.g., Dunn et al., 2010; Dunn et al., 2014) and pro-environmental behavior (e.g., Hartmann et al., 2017; Menges et al., 2005). It assumes that individuals making financial contributions to public goods (e.g., charity) are driven by multiple coexisting motives. Altruistic intentions and egoistic motives in the form of a warm glow feeling hold equal importance in the decision-making process. The warm glow effect occurs when individuals enjoy the act of giving itself and receive a feeling of personal

satisfaction in return for their contributions (Andreoni, 1990; Crumpler & Grossman, 2008; Harbaugh, 1998).

In contrast to warm glow, pure altruists are interested in the supply of public goods and not in the act of making a contribution itself (Crumpler & Grossman, 2008). Still, altruistic motives are often dominated by warm glow effects (Andreoni, 1995). Andreoni (1989) coined the term “impure altruism” to describe the coexisting motives of altruism and warm glow (see also Crumpler & Grossman, 2008). The theory of warm glow giving has also found application in crowdfunding research, particularly in elucidating the enhanced funding and marketing success of crowdfunding projects with a social or environmental focus (e.g., Allison et al., 2013; Cecere et al., 2017; Hörisch & Tenner, 2020). In the context of crowdfunding, the differentiation between warm glow motives and purely altruistic motives may be reflected, for example, in the projects that investors choose. While pure altruists who are interested in the supply of public goods will seek to invest in projects that will probably be implemented, investors led by warm glow motives will enjoy the act of contributing to projects promising public goods independent of a likelihood of realization. However, it has not been empirically tested whether a warm glow effect exists in investment-based crowdfunding.

Along with altruistic and warm glow motives, other motives exist in crowdfunding that can be described as egoistic or self-enhancing, such as the desire to receive interest payments (Bretschneider & Leimeister, 2017). Past research suggests that egoistic motives in the form of monetary repayments have a strong influence on investors’ decision-making process (Cholakova & Clarysse, 2015; Vismara, 2019). Therefore, in addition to (impure) altruism, egoistic motives are assumed to play a key role in the decision-making of crowdlending investors.

2.2 The Influence of Framing on Crowdfunding Decisions

Based on the summarized studies, it can be expected that the framing of a project (e.g., as an opportunity for egoistic benefits, altruistic benefits, or a warm glow effect) impacts the decisions of crowdfunding investors. Indeed, the past literature on other aspects of framing provides indications that the way crowdfunding projects are linguistically framed has a significant effect on their funding success. Allison et al. (2013) revealed that funding time is reduced for project narratives focusing on accomplishments, while it is extended for narratives evoking blame and concern (Allison et al., 2013). In reference to warm glow theory, Jancenelle et al. (2018) detected confidence and optimism in project framing as diminishing factors for a warm glow effect because project initiators “appear less in need” (Jancenelle et al., 2018, p. 214) for potential investors. Based on these insights, we expect that the way crowdfunding projects are linguistically framed with regard to egoism, altruism, and warm glow opportunities has a significant effect on investment decisions for a relevant share of investors.

First, the framing of crowdfunding projects can be tailored toward the extrinsic motivations of investors. Perhaps the most obvious motivator for investors contributing to crowdfunding projects is receiving interest payments. The opportunity to receive financial rewards provides an egoistic motivation and is found to significantly influence funding success (Cholakova & Clarysse, 2015). In the context of crowdfunding for renewable energy projects, Ben Slimane and Rousseau (2020) found that higher interest rates positively influenced funding success. Based on these insights, an assumption can be made that crowdfunding projects with a linguistic framing tailored toward egoistic, profit-oriented motives receive a higher number of pledges. Thus, Hypothesis 1a was proposed as follows:

Hypothesis H1i. *Purely egoistic framing will have a positive influence on the likelihood of a crowdfunding project receiving pledges.*

Findings on prosocial microlending suggest that project descriptions emphasizing the opportunity to help someone are more likely to find investors than projects highlighting business opportunities (Allison et al., 2015). However, a different scenario is advanced in crowdfunding types that offer monetary rewards, such as crowdlending. Bretschneider and Leimeister (2017), for example, did not find any indication that the altruistic motivations of funders influence investment decisions in crowdfunding. Likewise, Dorfleitner and Oswald (2016) argue that investors in crowdlending aim at minimizing possible financial loss. In a study on equity crowdfunding, Cholakova and Clarysse (2015) revealed that investors are primarily oriented toward making financial profits, while non-financial intentions remain secondary. Thus, investors in crowdlending are argued to be mainly driven by financial motivations (Hossain & Oparaocha, 2017). For these reasons, we expect that crowdlending projects framed in a purely altruistic manner will be less likely to receive pledges. Accordingly, we proposed Hypothesis 1ii:

Hypothesis H1ii. *Purely altruistic framing will have a negative influence on the likelihood of a crowdlending project receiving pledges.*

In contrast to pure altruism, past literature has argued that investors in sustainability-oriented crowdfunding projects are driven by impure altruism, that is, the coexistence of altruistic and warm glow motives (e.g., Allison et al., 2013; Cecere et al., 2017; Gleasure & Feller, 2016). Similar findings have become evident for pro-environmental behavior, in general. With regard to environmentally friendly actions in terms of climate protection, Hartmann et al. (2017) found that there is dominance of the warm glow effect over purely altruistic motives among students. The authors also provided evidence for the warm glow effect mediating the influence of altruism on pro-environmental actions (Hartmann et al., 2017). Therefore, it can be expected that environmentally oriented projects framed toward stimulating warm glow effects will attract a higher number of investors. Accordingly, Hypothesis 1iii was proposed as follows:

Hypothesis H1iii. *Warm glow framing will have a positive influence on the likelihood of a crowdlending project receiving pledges.*

2.3 The Relative Importance of Framing, Environmental Impact, and Interest Rate

While in the previous section, we argued that framing exerts a significant influence on investment decisions in crowdlending for environmental ventures, it is unlikely to exert the only or most important influence. Also, the magnitude of a pre-defined interest rate offered to investors is likely to influence investment decisions (Pástor et al., 2020). Indeed, previous research found that the prospect of interest payments has a strong impact on the likelihood of receiving pledges in crowdlending (Pierrakis, 2019; Ben Slimane & Rousseau, 2020). In addition to interest, several other factors that increase the chances of crowdfunding campaigns have been identified by past literature (e.g., Bi et al., 2017; Mollick, 2014). In particular, the literature has revealed that crowdfunding projects oriented toward tackling environmental problems show higher success rates (Calic & Mosakowski, 2016; Bento et al., 2019; Hörisch & Tenner, 2020). Drawing on warm glow theory, Hörisch and Tenner (2020) revealed that the higher the level of the environmental orientation of a venture, the higher the number of investors and the greater the financial success in investment-based crowdfunding. Therefore, the level of environmental impact positively influences a projects' likelihood of receiving pledges. This is explicable against the background of the warm glow theory (Andreoni, 1989, 1990), as projects with higher levels of environmental impact offer a stronger warm glow effect. Consequently, we expect that not only the mere framing of projects as environmentally friendly but also the actual degree of environmental impact envisaged will influence funding decisions. Accordingly, we formulated Hypothesis 2 as follows:

Hypothesis H2. *Higher levels of environmental impact will positively influence the likelihood of a crowdlending project receiving pledges.*

Acknowledging that not only the framing but also the interest rate and the magnitude of the environmental impact influence investment decisions for environmental ventures, a question arises regarding which of these influencing factors demonstrates the highest relative importance in crowdlending decisions. Past literature suggests that financial rewards in investment-based crowdfunding, such as interest payments, play a more important role than nonfinancial rewards, such as environmental effects (Cholakova & Clarysse, 2015). Hence, it can be expected that, in crowdlending, the level of financial interest paid to investors has the strongest relative importance in investment decisions. In contrast, less is known about the relative importance of other project attributes, such as the magnitude of the environmental impact and the framing of crowdfunding projects. Therefore, in addition to addressing the previous hypotheses, we will explore the relative importance of the level of the interest rate, its framing, and the level of environmental impact. Figure 1 summarizes the research design, including the two hypotheses.

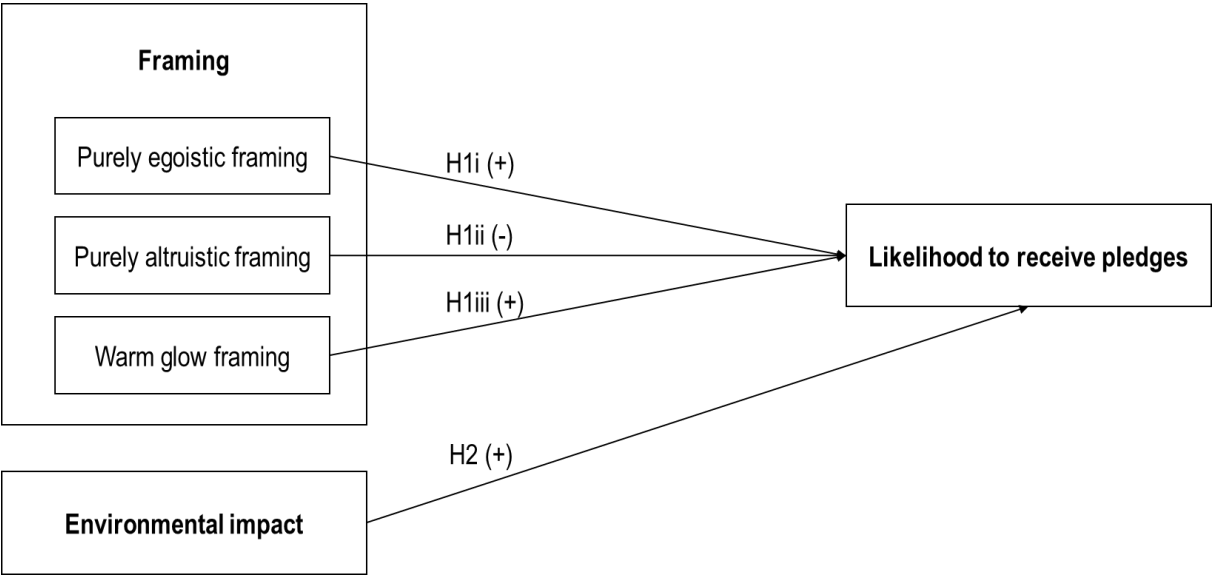


Figure 1. Summary of Hypotheses

3. Methodology

Much research on decision-making in entrepreneurship has relied on post hoc methodologies that, while undoubtedly advancing the field, have numerous systematic confounding effects (Shepherd & Zacharakis, 2018). Consequently, a growing number of researchers emphasize the need to triangulate post hoc data with real-time data, which calls for more experimental research on entrepreneurship (Shepherd & Zacharakis, 2018; Wiklund et al., 2019) and crowdfunding (Allison et al., 2015; Calic & Mosakowski, 2016; Mochkabadi & Volkmann, 2020). Specifically, Shepherd and Zacharakis (2018) recommended the use of conjoint analysis in entrepreneurship research, and Nielsen and Binder (2020) explicitly called for conducting conjoint analysis in crowdfunding research in order to “gauge the effect of multiple attributes on crowd-funders’ behavior” (p. 22).

In this study, we applied a choice-based conjoint analysis (CBC) that allows for the simulation of real crowdlending investments (Chrzan & Orme, 2000; Sawtooth Software, 2017). In doing so, we presented participants with different crowdlending projects under realistic conditions using the Sawtooth Software.

Our web-based choice experiment was divided into four parts. First, potential respondents were checked for eligibility based on socio-demographic characteristics (see the section below on the sample). Second, eligible respondents received a short introduction to crowdlending and the attributes used in the study. To increase the external validity of the study, it was emphasized to respondents that financial rewards in the form of interest payments would be actually paid to investors and that the promised positive environmental impact would actually be implemented in the “real world,” as announced in the project descriptions. Therefore, the study provided a decision context that strongly resembled real decisions (Shepherd & Zacharakis, 2018). Third, the respondents performed two choice tasks, with six choice options each. Both the number of choice tasks and the number of choice options were selected based on data from actual

crowdfunding platforms specializing in environmental ventures (Bettermvest and LeihDeinerUmweltGeld) to design the choice environment as realistically as possible. While the first choice task used random attribute expressions based on a balanced overlap design, the second choice task presented the same six choice options to every respondent and served as a control. In both rounds, respondents had the opportunity to choose no project (a “none” option). The study concluded with a questionnaire to assess the crowdfunding experience, the respondent’s preferences, sustainability orientation, and a control for social desirability.

To check the face validity of the attributes and the attribute levels, we pre-tested the survey with a sample of respondents (n = 33). Based on the feedback, we designed the final choice tasks. The pre-test also confirmed that the presentation of the crowdfunding initiatives could actually elicit perceptions of the framings being used.

Sample

The sample was recruited from December 2020 to January 2021 via an online panel provider. We used purposeful sampling to generate a sample that was representative of the socio-demographic characteristics of crowdfunding investors. Based on Tenner and Hörisch (2021), we chose quota targets for gender, education, and age. Table 1 provides an overview of the envisaged quotas and the actual socio-demographic characteristics of the final sample. It demonstrates that the sample used for this analysis was very similar to what Tenner and Hörisch (2021) described as representative of active crowdfunding investors in environmentally oriented ventures, as the maximum deviation from the quota targets was 2.1%. A German context was selected to examine a non-English-speaking culture, as recommended by Allison et al. (2013). Additionally, in the German market, the per capita volume of the crowdfunding market has been documented as close to the European average (Hörisch, 2019). Thus, this choice also assisted with the generalizability of our results.

The total sample consisted of 569 respondents. To avoid the potential effects of hurrying, we measured the time participants spent on the choice tasks and excluded “speeders.” As a result, 497 participants remained in the final sample. Hence, our results are based on 994 choice tasks performed by 497 respondents.

Table 1. Socio-demographic characteristics of the final sample (n=497)

Category	Group	Respondents (%)	Quota target (%) ¹
Gender	Female	31.8%	31.0%
	Male	68.2%	69.0%
Age (in years)	15 – 29	17.5%	18.2%
	30 – 39	16.1%	18.2%
	40 – 49	26.4%	26.3%
	50 – 59	24.9%	23.2%
	60 +	15.1%	14.1%
Highest educational achieve- ment	None	0.6%	1.0%
	Basic secondary school	21.1%	22.2%
	Secondary school	5.0%	3.0%
	A level	19.7%	19.2%
	Graduate degree	48.7%	49.5%
	Dissertation/ habilitation	4.8%	5.1%

¹ based on Tenner and Hörisch (2021)

Independent variables

Based on the literature review, we identified three attributes of environmentally oriented crowdlending projects that are of specific relevance for investors: (1) the framing of the project description (see, e.g., Jancenelle et al., 2018; Kamatham et al., 2020; Nielsen & Binder, 2020), (2) the promised interest rate of the project (Nitani et al., 2019; Pierrakis, 2019; Ben Slimane & Rousseau, 2020), and (3) the magnitude of the environmental impact of the project (e.g., Hörisch & Tenner, 2020). We experimentally manipulated these attributes, as demonstrated in Table 2. We designed attribute levels as close as possible to real crowdlending decisions based on prior studies. The three levels of interest rate were based on the mean average interest rate

of the two environmentally oriented crowdlending platforms Bettervest and LeihDeinerUmweltGeld, which was about 6%. Accordingly, we chose 5% (the mean average minus one standard deviation), 7% (the mean average plus one standard deviation), and 0% (pro-social micro-lending) as the attribute levels. Likewise, we chose three levels of environmental impact, representing low, medium, and high amounts. We focused on environmental impact in terms of climate change, as this is one of the most pressing environmental issues today (e.g., Rockström et al., 2009; Steffen et al., 2015). Moreover, climate stability is a public good (Finus & Rüb-
belke, 2013) that does not offer private benefits. This increases the transferability of our findings to other environmental aspects that offer solely public benefits. Furthermore, climate change and, specifically, emissions are clearly measurable and quantifiable, in contrast to other sustainability-related phenomena that have also received attention in crowdfunding research (e.g., Calic & Mosakowski, 2016; Cumming et al., 2019; Messeni Petruzzelli et al., 2019; Vismara, 2019). To reduce the complexity of the respondents, we selected emission reduction levels of one, two, and three tons. We did not include an option with zero environmental impact, as we focused solely on environmentally oriented crowdlending.

Table 2. Attributes and attribute levels of independent variables

Attribute	Attribute Levels
Framing	Pure egoism Pure altruism Warm glow
Interest rate	0% 5% 7%
Environmental impact	Compensation of 1 ton of CO ₂ Compensation of 2 tons of CO ₂ Compensation of 3 tons of CO ₂
Third-party certification	No certification Gold Standard
% of funding target achieved	20% 50% 80%

Figure 2 shows an example of a choice task presented to the respondents in the study. The framings represent, from left to right, an egoistic, a warm glow, and an altruistic framing.

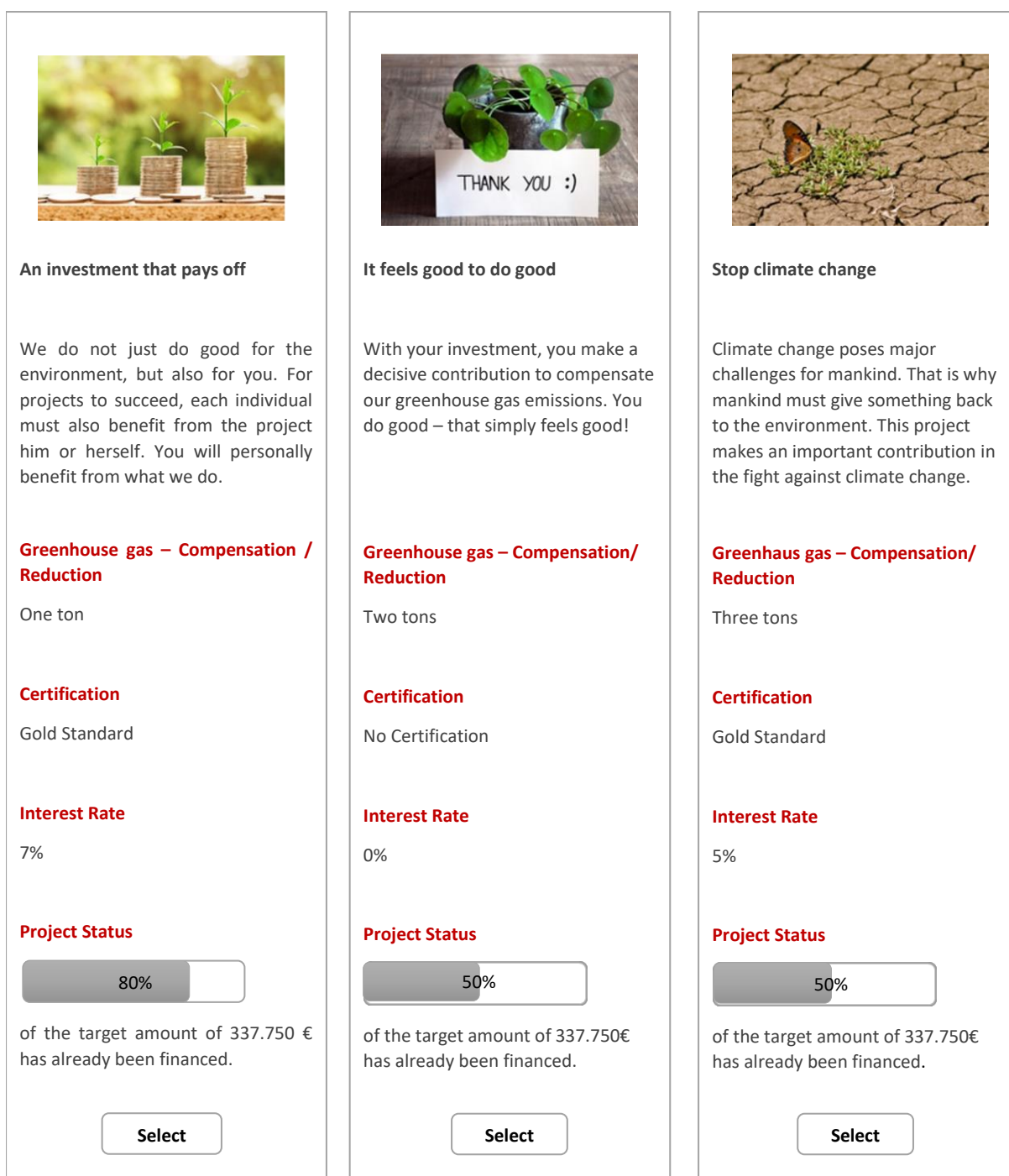


Figure 2. Sample choice task from web-based survey (translated from German)

Dependent variable

In both choice tasks, the respondents were asked to invest 100€ in one of six crowdfunding projects. Additionally, as recommended by the Sawtooth Software (n.d.), we provided respondents with a “none” option, that is, a decision not to invest in any of the projects. Consequently,

the choices of the respondents represent the dependent variable. We kept the investment amount constant to reduce the complexity of the investment decision and thus avoid respondent cognitive overload.

Control variables

We controlled for several variables that have been shown to have an impact on crowdlending decisions. First, a recent study by Tenner and Hörisch (2021) suggests that investors' socio-demographic characteristics influence their investment decisions in crowdfunding. Therefore, we controlled for the age, education, gender, and income of the participants. Second, Calic and Mosakowski (2016) highlighted the influence of third-party endorsement on the funding success of environmentally oriented crowdfunding projects (see also Saluzzo & Alegre, 2021). Therefore, we identified the gold standard as a potential endorsement by a third-party certifier for CO₂ reductions and, thus, differentiated between being certified according to the gold standard or not being certified. Third, Mollick (2014) shows that the percentage of the funding target that a project has already achieved is highly relevant for decision-making in crowdlending. Following the insight that projects that do not achieve a third of their funding amount through early contributors (e.g., family and friends) are likely to fail, we chose one attribute level to be clearly below 33% (i.e., 20%). Based on the finding that projects are unlikely to fail by a small margin, we included an attribute level of 80% of the funding target already achieved as a case of a relatively high probability of funding. Fourth, to include projects for which an outcome was hard to predict, we included a third category in which 50% of the funding target had already been achieved. In doing so, we were able to control for social influence effects in crowdfunding, which highlights that some investors are only likely to act as late investors during the final stage of a campaign (e.g., Chan et al., 2020; Vismara, 2018; Zhang & Liu, 2012). Furthermore, we also controlled for the percentage of the funding target that a project had already achieved. This allows for the interpretation of the motivations of investors: investors motivated by the prospect

of financial gains, as well as purely altruistic investors who want to ensure the supply of the public good, are likely to invest in projects that have already achieved a high percentage of the funding target. In contrast, investors who are interested in receiving a warm glow feeling from the mere act of giving will be less interested in the probability that a project will actually achieve its funding aim. Lastly, we controlled for social desirability to increase the validity of the responses by including the social desirability scale by Kemper et al. (2014).

Furthermore, the literature shows that the targeted funding amount (Calic & Mosakowski, 2016; Hörisch & Tenner, 2020) and duration of the crowdfunding project (Mollick, 2014; Hörisch, 2015) can also influence investment decisions. To avoid including too many attributes in the conjoint analysis (Sawtooth Software, 2017), we kept the project duration and the targeted funding amount constant (at average levels found for environmentally oriented crowdlending projects). As a funding target, we chose 337,750 EUR, which was the median target amount on the two environmentally oriented crowdlending platforms Bettervest and LeihDeinerUmweltGeld. Additionally, we asked participants about their crowdfunding experiences and analyzed whether there were differences between people with and without such experience. In the context of our study, prior crowdfunding experience served as a proxy for financial literacy, which can exert substantial influence on crowdfunding decisions (Meoli et al., 2021). In our sample, 119 participants had previously invested in crowdfunding projects. A robustness analysis, presented in Appendix 1, shows that no major differences existed between participants with and without crowdfunding experience regarding the importance they ascribed to the attributes of interest. Thus, we decided not to include prior crowdfunding experience in our main analysis, which also reduced the number of attributes in the conjoint analysis (Sawtooth Software, 2017).

Data analysis

As prior work has indicated that hierarchical Bayes analyses outperform multinomial logit models in terms of hit rate (e.g., Andrews et al., 2002; Lenk et al., 1996; Moore et al., 1998), we applied a hierarchical Bayes analysis throughout our study (Johnson, 2000; Sawtooth Software,

2009). First, we estimated the total utility of each attribute (see Table 3). Second, we used hierarchical Bayes analysis to estimate the part-worth utilities of all the attribute levels. We estimated the mean, standard deviation, and 95% highest posterior density interval (HDI) of the beta coefficients. To support readers who are less accustomed to hierarchical Bayes analysis, Table 4 also displays the results of a simple multinomial logit model. The analyses were performed using Sawtooth Software Lighthouse Studio and partly complemented by analyses using the packages “bayestestR,” “dplyr,” and “ggplot2” in the R programming environment to calculate the HDIs.

4. Results

4.1 Evaluation of the hypotheses

The main results of the conjoint analysis can be found in Tables 3 and 4. Table 3 reveals the average importance of the attributes; Table 4 shows the path worth utilities and beta coefficients of all the attribute levels.

Table 3. Average relative importance values of attributes

Attributes	Average Importance	Standard Deviation	Lower 95% CI	Upper 95%CI
Framing	9.09	6.33	8.53	9.65
Environmental Impact	19.92	6.13	19.38	20.45
3rd party certification	16.48	7.10	15.86	17.10
Interest rate	33.52	8.14	32.80	34.24
% of funding target achieved	21.00	6.86	20.39	21.60

Table 4. Results of the Hierarchical Bayes analysis (n=497)

Attributes and attribute levels	Hierarchical Bayes analysis			Multinomial logit model	
	Coefficient ^a	Standard Deviation	95% HDI ^b	Coefficient	Standard error
Framing					
Pure altruism	0.20	0.21	[-0.18:0.65]	0.11 †	0.07
Warm glow	-0.32	0.23	[-0.80:0.10]	-0.10 †	0.07
Pure egoism	0.12	0.23	[-0.32:0.56]	-0.01	0.07
Interest rate					
0%	-3.39	0.67	[-4.76:-2.26]	-1.01***	0.10
5%	1.13	0.35	[0.49:1.85]	0.33***	0.07
7%	2.26	0.41	[1.60:3.16]	0.67***	0.07
Environmental impact					
1 ton of CO ₂	-1.67	0.36	[-2.43:-1.03]	-0.55***	0.08
2 tons of CO ₂	0.13	0.22	[-0.29:0.56]	0.07	0.07
3 tons of CO ₂	1.54	0.30	[1.01:2.19]	0.48***	0.07
3 rd party certification					
No certification	-1.40	0.27	[-0.90:-1.98]	-0.41***	0.05
Gold Standard	1.40	0.27	[0.90:1.98]	0.41***	0.05
% of funding target achieved					
20%	-1.69	0.34	[-2.41:-1.10]	-0.54***	0.09
50%	-0.19	0.23	[-0.60:0.29]	-0.06	0.08
80%	1.88	0.33	[1.33:2.53]	0.60***	0.07
None	0.42	0.70	[-1.05:1.80]	-0.30*	0.18
No. of observations	497				
RLH value ^c	0.71				
Log-likelihood				-789.60	
Pseudo R ^{2d}				0.18	

a Estimates of coefficients are interval scaled and zero centered within attributes. They are calculated based on the mean population betas. Mean betas were calculated based on 60,000 iterations of which only every 5th draw was saved in order to avoid correlations among draws.

b Posterior intervals are calculated based on the mean betas that were also used to calculate the coefficients. We calculated the highest density intervals (HDI), which include the 95% of means with the highest probability density.

c The root likelihood value (RLH value) indicates the fit of the model. The best possible value is 1.0 and the worst possible value is the reciprocal of the number of choices available in a task (Sawtooth, 2009). For this model the worst possible value would be 1/6=0.17. The RLH value reflects the average fit of the model for all 497 observations.

d Pseudo R² is calculated as 1-(LL₁/LL₀), where LL₀ is the log likelihood of the null model.

Note: †p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001.

In H1i, H1ii, and H1iii we expected that the framing of crowdlending projects would influence their likelihood of receiving pledges. Indeed, Table 3 reveals that framing accounts for nearly 10% of the average importance. Still, for each attribute level (egoistic, altruistic, and warm glow framing), the values scatter so widely that the HDIs of the posterior distribution in Table 4 suggest that the population mean was above or below zero. Thus, none of the framing levels could be considered as having a consistent effect. Consequently, we could not confirm H1i, H1ii, or H1iii for the overall sample. Yet, the results of the multinomial logit model indicated that altruistic framing had a positive effect and warm glow framing had a negative effect when a more liberal alpha level was accepted ($\alpha = .10$, or 90% confidence, with $p < .10$ indicating significance).

In H2, we argued that the magnitude of the environmental impact would also positively influence the likelihood of a crowdlending project receiving pledges. The average importance of environmental impact of nearly one-fifth (19.92%) provides the first indication for the support of this hypothesis. When analyzing the effects of the attribute levels, we can confirm that the highest level of environmental impact exerts the strongest positive effect (consistent for the entire HDI), whereas a consistent negative impact exists for the lowest level of environmental impact. Thus, we found support for H2.

With regard to the interest rate, we confirmed in a controlled, experimental setting that higher levels of interest rates positively influence the likelihood of a crowdlending project receiving pledges. Indeed, Table 4 reveals that the effect was consistent for all three levels of the interest rate, as the zero-interest option exerts a consistent (i.e., for the entire HDI) negative effect, whereas both the 5% and the 7% interest rate levels exert a consistent positive effect. This was also reflected in the significant ($p < .01$) effect of the attribute levels in the multinomial logit model. Overall, the interest rate accounted for about one-third (33.52%) of the average importance (Table 3).

When comparing the average importance of the framing (9.09%), the environmental impact (19.92%), and the interest rate (33.52%), it becomes evident that the interest rate has the highest relative importance (Table 3). Furthermore, the magnitude of the environmental impact is of greater importance than the framing.

To explore whether significant interactions existed between the single independent variables, the same model was also run, while allowing the inclusion of interaction effects using the Sawtooth Interaction Search Tool. As displayed in Appendix 2, no interaction effects were significant in this analysis.

4.2 Comparing different types of investors

To address the research needs emphasized by Cummings et al. (2020) and Mochkabadi and Volkmann (2020), that is, to investigate whether different types of investors that seek different benefits from crowdfunding exist, we performed a latent class analysis. This allows for the identification of segments of respondents with similar preferences within a sample (Sawtooth Software, 2009) and could have provided an explanation for the scattered results with regard to the effect of framing. We performed different latent class analyses, allowing for up to three groups and adding additional variables, such as prior crowdfunding experience. The Akaike information criterion (AIC) values indicated that the third group added additional explanatory power to the latent class analysis (see Table 5). Furthermore, the results suggest that the three different groups of respondents that were identified can be distinguished best based on the average importance they ascribe to the different attributes included in the hierarchical Bayes analysis: framing, environmental impact, third-party certification, interest rate, and the percentage of the funding target already achieved (see Tables 5 and 6). Thereby, the percentage of the funding target already achieved can capture an aspect of risk that is specific to crowdfunding. While the financial literature (e.g., Pástor et al., 2020) primarily frames risk as the risk of losing the investment, in the context of crowdfunding environmental ventures, another dimension of

risk comes into play. This dimension is the risk that the project in which one has invested will not meet its funding target and, thus, will not be realized. This risk captures the opportunity costs frequently also considered in financial economics (Friedman & Neumann, 1980; Northcraft & Neale, 1986; Tengs & Graham, 1996), as the money invested in projects that do not achieve their funding targets is not lost but cannot be used for alternative investment opportunities.

The first group of investors was characterized by the very high importance of the interest rate to them (63.99%). All interest rate levels showed consistent effects. Additionally, the percentage of the funding target that has already been achieved exerts a strong influence. This indicates that investors in Group 1 strongly consider risks in terms of opportunity costs and place a high relative importance on contributing only to those projects they expect to reach their funding target and, thus, to deliver the benefits they promise. Together with the strong influence of the interest rate, this suggests that the first group rationally assesses the financial potential of an investment opportunity. In turn, when compared to the other groups, Group 1 showed, by far, the lowest sensitivity to the environmental impact and third-party certification of this impact. Likewise, the relative importance of the framing is close to zero. In conclusion, this group can be labeled “rational profit maximizers,” who are not substantially influenced by the framing of an investment opportunity. Rational profit maximizers made up the largest portion of all respondents (44.7%), which might explain why, in the overall sample, no consistent effect of framing was observed. Based on the characteristics of profit maximization, it can be expected that this group also consists of professional and institutional investors who increasingly make use of investment-based crowdfunding (Signori & Vismara, 2018; Dietrich et al., 2019; Block et al., 2021).

Group 3 can be considered a counterpart to Group 1. This group demonstrated the highest relative importance to environmental impact (Table 6). In fact, the importance of the environmental impact (29.32%) was nearly as high as that of the interest rate (31.41%), whereas in Group

1, the interest rate was found to be roughly six times more important than the environmental impact. Interestingly, while the influence of the interest rate was still consistent, respondents in this group value investment opportunities with a 5% or 7% interest rate as nearly equally attractive (Table 5). The percentage of the funding target already achieved also exerts a substantial influence on the investment decisions in Group 3. This could be interpreted as Group 1 rationally assesses the potential of a project to reap the maximum level of financial benefits, whereas Group 3 rationally assesses the environmental potential of an investment opportunity. Against the background of the differentiation between altruist motivations and warm glow motivations introduced in Section 2.1, this group of investors seems to follow an altruistic motivation, as they invest in projects that are likely to deliver the public good (i.e., the environmental impact) and do not seem to be primarily interested in the mere act of giving, which creates a warm glow feeling. However, the influence of third-party certification of the environmental impact is relatively low, and, in contrast to the group of “rational profit maximizers,” Group 3 shows a substantial receptivity to the framing of a crowdlending project (10.54%, see Table 6). Specifically, the members of this group are consistently receptive to pure altruistic framing (Table 5), whereas the scatter for the other types of framing is relatively large. Due to this receptivity toward altruistic framing, this group can be described as “receptive altruists.”

Lastly, for Group 2, both the environmental impact and the interest rate are of high relative importance (Table 6). Interestingly, this group demonstrates a very strong preference for both the highest level of interest rate and the highest level of environmental impact. The difference between the coefficients for the 5% and 7% interest rate levels is larger than for any other group (Table 5). Similarly, this group shows, by far, the strongest preference for large- over medium-sized environmental impacts; in no other groups is the difference between the coefficient for three and two tons of CO₂ emission reductions larger. In contrast to Groups 1 and 3, the members of Group 2 shows a strong preference for the environmental impact to be certified by a third party (Table 6). Thus, this group can be described as aiming for the best of both worlds:

the highest possible interest rates and the highest possible environmental impact, certified by a third party. Obviously, such preferences come at a certain price. In conventional investing, this price would usually be reflected by higher levels of risk (cf. Pástor et al., 2020), understood as the risk of losing the investment. In crowdfunding, further types of risk exist (cf. Ahlers et al., 2015). In the case of this analysis, risk was captured in the likelihood of the supported crowdlending projects not reaching their funding targets (i.e., the risk of the project not being realized) and, thus, creating high opportunity costs. In fact, the percentage of the funding target already achieved is of the lowest relative importance in this group, by far lower than for the other two groups (Table 6). Hence, members of this group accept that the funding target might not be reached and, thus, the environmental and financial impact might not be delivered—if this allows for the combination of high levels of (certified) environmental impact with high levels of interest rates. Hence, the description of Group 2 as “aiming for the best of both worlds” needs to be changed to “risk-seekers aiming for the best of both worlds.” If we interpret this characterization against the differentiation between pure altruistic motivations (reflected in the desire to support the actual delivery of a public good) and warm glow motivations (where the mere act of giving creates satisfaction and not the actual creation of the public good), it becomes evident that Group 2 is motivated by warm glow motives and strongly environmentally oriented projects that are unlikely to actually deliver the environmental impact in which one invested. In line with this interpretation, this group is the only one that consistently and positively responded to warm glow framing, which combines altruistic with egoistic cues. Overall, risk-seekers aiming for the best of both worlds are influenced by framing to a nearly equal degree as the receptive altruists (compare Group 3 in Table 6). In addition to warm glow framing, pure altruistic framing exerts a substantial positive impact, and egoistic framing exerts a consistent negative impact. Group 2 consisted of only 21.5% of all respondents, and is, thus, smaller than the other two groups. This might explain why the consistent effects of warm glow framing observed for this group were not transferred to the overall sample.

In fact, when analyzing these three groups separately, it becomes evident that, while in the overall sample, framing does not exert a consistent impact on investment decisions, in two of the three groups it does. Still, the direction of the effects of framing are partly different than hypothesized. In opposition to H1i, in all groups, we found a positive, consistent effect of altruistic framing, though to differing extents. In contrast, the effects of egoistic framing and warm glow framing are consistent only for the second group. Unlike what was proposed in H1i, the effect of egoistic framing is negative. Still, as proposed in H1iii, warm glow framing has a positive influence on the likelihood of a crowdlending project receiving pledges in Group 2.

When comparing the sociodemographic characteristics of the three groups (see Appendix 3), all groups reflected the common characteristics of crowdfunding investors (cf. Tenner and Hörisch, 2021). As a result, relatively young (<50 years old), well-educated, male individuals dominated all groups. However, an interesting difference existed among the groups concerning income. The second group of “risk-seekers aiming for the best of both worlds” demonstrated the highest levels of income. Approximately 75% of these respondents earned above the German average income, and substantially more respondents than in the other groups belonged to the highest income level. Thus, their higher acceptance of risk might have been a consequence of their comfortable economic position.

Table 5. Results of the latent class analysis ^a (n=497)

Attributes and attribute levels	Group 1 (profit maximisers) N=222			Group 2 (risk seekers) N=107			Group 3 (receptive Altruists) N=168		
	Zero-centered values ^b	SD ^c	HDI ^d	Zero-centered values ^b	SD ^c	HDI ^d	Zero-centered values ^b	SD ^c	HDI ^d
Framing									
Pure altruism	4.42	3.54	0.68:8.69	16.50	2.68	10.90:18.72	24.06	9.83	1.91:30.70
Warm glow	-2.30	2.33	-5.16:0.43	5.19	1.64	1.71:6.69	-27.25	12.59	-36.05:0.09
Pure egoism	-2.12	5.87	-9.12:3.78	-21.70	4.32	-25.11:-12.61	3.19	6.17	-20.84:5.35
Interest rate									
0%	-206.84	14.31	-231.96:-177.21	-118.26	20.38	-160.74:-102.50	-99.89	55.65	-225.77:-63.02
5%	93.73	16.46	73.81:110.52	35.40	13.25	25.20:63.10	53.18	24.14	33.07:117.84
7%	113.12	7.85	103.40:121.44	82.85	7.13	76.88:97.64	46.71	32.96	23.51:117.84
Environmental impact									
1 tons of CO ₂	-24.48	11.30	-38.08:-12.46	-62.82	8.49	-69.96:-45.09	-91.47	33.37	-114.14:-16.66
2 tons of CO ₂	1.17	2.60	-1.76:4.34	10.39	2.08	6.08:12.48	36.36	17.16	0.29:48.48
3 tons of CO ₂	23.31	8.71	14.22:33.74	52.44	6.41	39.01:57.48	55.11	16.72	16.61:65.83
3 rd party certification									
No certification	-20.02	11.93	-34.26:-7.90	-59.72	8.73	-66.41:-41.37	-29.21	11.32	-59.75:-8.51
Gold Standard	20.02	11.93	7.90:34.26	59.72	8.73	41.37:66.41	29.21	11.32	8.51:59.75
% of funding target achieved									
20%	-44.32	8.10	-52.40:-34.56	-15.97	6.41	-29.41:-10.87	-44.23	7.56	-52.31:-16.52
50%	8.39	0.41	7.87:8.84	6.71	0.40	6.35:7.54	3.19	2.56	1.37:8.56
80%	35.93	7.69	26.69:43.63	9.26	6.01	4.45:21.87	41.04	7.77	10.64:44.04
None	80.88	21.58	54.88:102.77	5.82	16.90	-7.29:41.21	48.95	24.35	5.69:101.39

No. of total observations	497
Null log-likelihood	-967.12
Log-likelihood	-758.06
AIC ^e	1580.12

a The latent class analysis starts to estimate the utilities of respondents starting with a random number and improves the solution until the log-likelihood increases by less than 0.001 or the maximum number of runs (100) is reached. We calculated the utilities for 2 and 3 groups and chose the better fitting solution (3 groups) based on the AIC. We computed 10 replications per scenario and thus performed in total 40 iterations.

b To allow for comparison among groups the utilities are re-scaled to “zero-centered diffs” so that its average range within attributes is 100.

c Standard Deviation

d Highest Density Interval

e The AIC value for two groups is 1589.40.

Table 6. Average relative importance values of attributes per group

Attributes	Average Importance		
	Group 1 (profit maximizers)	Group 2 (risk seekers)	Group 3 (receptive altruists)
Framing	2.39	7.64	10.54
Environmental Impact	9.56	23.05	29.32
3rd party certification	8.01	23.89	11.68
Interest rate	63.99	40.22	31.41
% of funding target achieved	16.05	5.20	17.05

5. Discussion and Conclusions

5.1 Discussion

The analysis just presented addresses the research need for experimental approaches in crowdfunding research (Allison et al., 2015; Calic & Mosakowski, 2016; Mochkabadi & Volkmann, 2020) to better control disruptive factors and external influences. With regard to the positive influence of financial incentives on crowdfunding success using the controlled environment of an experiment, our analysis confirms previous findings based on field data (e.g., Ben Slimane & Rousseau, 2020; Cholakova & Clarysse, 2015; Vismara, 2019). Likewise, Pástor et al. (2020) have already shown that, in general, “sustainable investing produces positive social impact by making firms greener and by shifting real investment toward green firms” (p. 1). We confirmed this finding for the specific and increasingly important context of crowdlending, as we revealed that crowdlending investors are more likely to invest in more environmentally friendly ventures. Previous analyses based on field data have already suggested that crowdfunding success is driven by altruistic motives in general (Cecere et al., 2017) or specifically by the existence

(Calic & Mosakoski, 2016) or magnitude (Hörisch & Tenner, 2020) of the environmental impact of the respective crowdfunding campaigns. Again, we confirmed these insights using an experimental approach.

Taken together, these two key findings on the positive impact of financial and environmental incentives lend support to the key assumption of warm glow theory (see Andreoni, 1989, 1990), as individuals making financial contributions to public goods (in our case, combating climate change) are driven by coexisting egoistic and altruistic motives. Interestingly, we also found that this co-existence was common among all the groups of crowdlending investors we identified, as the altruistic group was consistently impacted by financial motives and the rational profit-maximizing group by environmental motives, although to varying degrees. We, thus, provide further indication of the potential of applying warm glow theory in crowdfunding research (cf. Böckel et al., 2020). Going beyond earlier research that also suggested the co-existence of both motives, we can specify that while financial and environmental incentives influence all investors, the influence of egoistic incentives dominated in all of the groups. Thus, we can confirm the earlier indication that in crowdlending, investment decisions are made similarly to conventional investing, which might constitute a difference from other crowdfunding types (Lehner, 2013).

The coexistence of substantial influences that financial and environmental benefits exert on investment decisions clearly supports the warm glow theory. A more nuanced picture emerges with regard to the influence of warm glow framing on investment decisions. As we did not find a consistent impact of framing on investment decisions in the overall sample, we could not generally confirm earlier findings from the context of donation-based (Kamatham et al., 2020) and reward-based crowdfunding (Nielsen & Binder, 2020) that the way crowdfunding projects are linguistically framed significantly influences funding success. In our analysis of crowdlending, we found framing to be relevant only for specific groups of investors. The less consistent effects of framing in the context of crowdlending might be explained by the fact that this type

of crowdfunding resembles traditional forms of investment (cf. Lehner, 2013) and, thus, puts a stronger emphasis on material facts (such as the interest rate) than on framing. In contrast, with regard to altruistic framing, we found that in all groups of crowdlending, investors were receptive to this type of framing and showed consistent positive effects.

With regard to the effect of warm glow framing, we found that most potential crowd investors were not receptive to such framing. However, those who were (i.e., the risk-seekers aiming for the best of both worlds, Group 2) showed a consistent positive reaction to warm glow framing. This finding resembles that of Allison et al. (2013) in the context of prosocial microlending.

5.2 Practical implications

This paper used a real-choice conjoint analysis in the context of crowdlending to investigate how different attributes of environmentally oriented crowdfunding projects (including framing, interest rate, and environmental impact) can help environmental ventures receive funding. Based on the results, we confirmed that framing funding requests in specific ways may help environmental entrepreneurs bridge the funding gap. However, how potential investors react to different kinds of framing differs substantially between different groups of investors. Moreover, the influence of framing is outweighed in relative importance by more tangible factors such as the interest rate or the magnitude of the environmental impact of the respective venture.

These general insights provide the following practical implications. First, while different groups of potential investors exist, we found that all groups, including the group of altruists, ascribe the highest relative importance to the interest rate. Thus, we conclude that, in the context of environmentally oriented ventures, and also in the new, promising context of financing ventures via crowdlending, the ability of entrepreneurs to create financial opportunities for investors remains of crucial importance.

At the same time, our results highlight that most investors in environmentally oriented projects are not satisfied with investment opportunities offering any environmental impact but do consider the magnitude and the reliability of the environmental impacts promised. As a second implication, we therefore recommend environmental entrepreneurs not to regard the environmental impact as of secondary importance, but to use opportunities for the creation of high levels of environmental impact and to certify the creation of this impact.

Third, earlier research has argued that information asymmetries and the potential for moral hazards can create substantial obstacles for crowdfunding (e.g., Courtney et al., 2017; Strausz, 2017; Roma et al., 2017). These obstacles can lead to two kinds of problems. First, entrepreneurs might successfully use crowdfunding to finance their ventures but might (un)intentionally not deliver the promised financial or environmental benefits. Second, the possibility of such moral hazard behavior after funding might prevent potential investors from funding a project in the first place. Our research highlights that third-party certification can help address this second potential problem along with information asymmetries. We used climate change as the context of our study because established third-party certifications exist that we could use in our real-choice conjoint analysis. Still, for crowdfunding campaigns in general, and in particular for their promises to deliver (non-)financial benefits, an established third-party certification does not exist. This might explain why earlier analyses (e.g., Ahlers et al., 2015) did not find an influence of the external certification of crowdfunding projects in general on investment decisions. We thus recommend utilizing third-party bodies, independent from individual entrepreneurs and crowdfunding platforms, that can certify the reliability of crowdfunding campaigns.

Fourth, our findings highlight the importance of an entrepreneur's ability to organize a relevant share of the funding target through his or her own network. The percentage of the funding target already achieved at the time of funding substantially influences the likelihood of receiving pledges (cf. Chan et al., 2020; Mollick, 2014; Vismara, 2018; Zhang & Liu, 2012). We therefore

recommend that environmental entrepreneurs activate and possibly extend their own networks before starting a crowdlending campaign. Additionally, entrepreneurs should realistically assess the size and financial capability of their networks before setting a funding target to guarantee that they are able to organize a relevant share of this target through their own network and early, enthusiastic investors. In this regard, potential crowdlending investors belonging to the group of “risk-seekers aiming for the best of both worlds” can be an important target group for attracting enthusiastic early investors. Entrepreneurs are recommended to address this group in the early stages of a crowdlending campaign, as for this group, the percentage of the funding target already achieved is of only minor importance; as a result, this group might be more willing to invest early. Moreover, this group shows high levels of income and thus bears a great potential for increasing the share of the funding target already achieved relatively early (for the role of early investors, see Vismara, 2019).

Fifth, our findings reveal that the factors influencing investment decisions differ substantially among different groups of investors. Hence, we recommend that entrepreneurs start by assessing the specific attributes of their campaign that cannot be changed (e.g., the [in]ability to pay a specific interest rate or what magnitude of environmental impact is realistic). Next, entrepreneurs should analyze which group(s) of potential investors (rational profit-maximizers, altruists, or risk-seekers aiming for the best of both worlds) suit(s) their project best and, consequently, optimize(s) the attributes that are under their influence (e.g., third-party certification, framing, and the magnitude of environmental impact) as to which are of specific relevance for the group of potential investors they are targeting.

Sixth, environmental entrepreneurs should refrain from framing their funding requests as egoistic opportunities for the self-enhancement of potential investors. Even though it is important to deliver egoistic attributes such as high interest rates, this should not be emphasized in the framing of the campaign. In contrast, altruistic framing appears to be a more promising approach. This indicates that while potential investors are influenced to a high degree by egoistic

incentives, they prefer stories that are told in an altruistic manner, or at least in a warm glow manner, combining altruistic with egoistic cues. We thus conclude that investors in crowdlending want good money but also strive for a clean conscience.

5.3 Implications for research

In addition to the already-mentioned implications for entrepreneurship practice, the findings of our analysis can also inform research. First, our study demonstrates that the warm glow theory can be fruitfully applied in the context of crowdlending. We confirm the key assumption of warm glow theory (Andreoni, 1989, 1990) that individuals making financial contributions to public goods are driven by coexisting egoistic and altruistic motives. Additionally, we specify that, with regard to framing, altruistic cues are more effective than egoistic cues, whereas with regard to the actual benefits investors receive, egoistic benefits (i.e., interest payments) are more important than altruistic benefits (i.e., environmental impact) in environmentally oriented crowdlending.

In addition, the results of the study provide the first typology of investment-based crowdfunding investors. The differentiation among different types of investors may help to explain opposing results in prior studies (e.g., Vismara, 2019; Hörisch & Tenner, 2020). Furthermore, the typology may serve as an opportunity to build a more differentiated theory on the motivations of crowdlending investors. Therefore, future studies may investigate additional variables, especially the primary information of investors, to further improve the typology.

Finally, this study extends the methodological range of prior research in the field of crowdfunding and environmental entrepreneurship to experimental approaches, following various calls in the field (Allison et al., 2015; Calic & Mosakowski, 2016; Wiklund et al., 2019; Mochkabadi & Volkmann, 2020). It demonstrates that experimental research in general and conjoint analyses in particular are powerful means to validate and specify previous research using a controlled setting.

This research also has limitations that should be addressed in future studies. First, we kept the study relatively simple to avoid respondent overload, to obtain significant connections between attributes, and to avoid overfitting (cf. Nielsen & Binder, 2020). Thus, we did not include all potential success factors as independent variables and kept some of them constant. While the attributes were chosen consciously based on prior studies, we cannot exclude the possibility of endogeneity due to confounding variables or omitting potentially relevant variables. Specifically, we did not test the influence of personal values as another influencing factor on the willingness to invest in environmentally oriented crowdfunding projects (Nielsen & Binder, 2020; Tenner & Hörisch, 2021). Similarly, we did not include the risk of losing the investment as another control variable, even though earlier research showed its importance in sustainable investment decisions (e.g., Pástor et al., 2020). Thus, future research should include other aspects of risk beyond the risk of opportunity costs.

Another limitation was that our sample only allowed us to differentiate between investors with ($n = 119$) and without prior experience ($n = 378$) in crowdfunding (see Appendix 1), but we were not able to test the effects specific to professional investors in crowdfunding or to control for financial literacy. Given the increasing importance of professional and institutional investors in crowdfunding (Signori & Vismara, 2018; Dietrich et al., 2019; Block et al., 2021), future research may conduct a similar analysis, drawing on samples of professional and institutional investors.

As a last limitation, with regard to different possible motivations, our analysis focused on investors, while a growing body of literature also focuses on the different kinds of motivations of entrepreneurs (see Civera et al., 2020; Troise & Tani, 2020). Future research may, therefore, analyze how these entrepreneurial motivations may influence the matching of proponents and investors and, in turn, funding success.

In addition, by including these relevant variables, future research should build on the typology of the investors we observed. For example, future research could build on the classification of

investors and link it to earlier investor research following either institutional or market logic. Relating our findings to Vismara's (2016) earlier research, future work may, for example, test whether a group of rational profit-maximizers primarily follows an institutional logic (and may primarily consist of institutional investors), whereas a group of receptive altruists follows a market logic and consists of non-professional investors who benefit from crowdfunding, as it makes investment accessible and efficient. Likewise, it is worth testing whether groups identified among potential crowdlending investors in the context of environmental entrepreneurship can also be found for other funding mechanisms for environmental entrepreneurs, such as venture capitalists. Together with the analysis at hand, such future research can help to further specify the potential of crowdfunding for increasing investment in environmentally oriented ventures.

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Appendix 1. Average relative importance values of attributes for participants with (n=119) and without (n=378) crowdfunding experience

Attributes	Without Crowd-funding experience			With Crowd-funding experience		
	Average relative importance	Standard Deviation	95% Confidence Interval	Average relative importance	Standard Deviation	95% Confidence Interval
Framing	10.18	6.99	9.48:10.89	11.38	6.20	10.26:12.49
Environmental Impact	18.82	6.08	18.21:19.44	18.97	4.80	18.11:19.83
3rd party certification	15.72	6.47	15.07:16.37	15.66	7.81	14.25:17.06
Interest rate	31.23	8.10	30.41:32.04	32.67	8.61	31.13:34.22
% of funding target achieved	24.05	7.70	23.27:24.82	21.33	6.16	20.22:22.43

Appendix 2. Results of the interaction effect search.

Run	Parameters in Model	Log-Likelihood Fit	Chi Square Value	2LL P-Value for Interaction Effect	Gain in % over Main Effects
Main Effects	10	-789,60			
+ Certification x Interest rate	12	-786,12	6,97	0,03	0,36%
+ Framing x % of funding target achieved	14	-786,08	7,05	0,13	0,36%
+ Interest rate x % of funding target achieved	14	-787,28	4,66	0,32	0,24%
+ Certification x % of funding target achieved	12	-788,72	1,77	0,41	0,09%
+ Environmental impact x Interest rate	14	-787,72	3,77	0,44	0,19%
+ Framing x Interest rate	14	-788,20	2,82	0,59	0,15%
+ Environmental impact x % of funding target achieved	14	-788,71	1,79	0,77	0,09%
+ Framing x Certification	12	-789,37	0,47	0,79	0,02%
+ Environmental impact x Certification	12	-789,44	0,33	0,85	0,02%
+ Framing x Environmental impact	14	-789,01	1,18	0,88	0,06%

Appendix 3. Socio-demographic characteristics of the groups

Category	Group	Total (n=497)	Group 1 (n=222)	Group 2 (n=107)	Group 3 (n=168)
Gender	Female	158	31.5%	32.7%	31.5%
	Male	339	68.5%	67.3%	68.5%
Age (in years)	15 – 29	87	21.6%	15.9%	13.1%
	30 – 39	80	18.5%	15.0%	13.7%
	40 – 49	131	24.3%	29.9%	26.8%
	50 – 59	124	23.9%	18.7%	30.4%
	60 +	75	11.7%	20.6%	16.1%
Highest Edu- cation	None	3	1.4%	0.0%	0.0%
	Basic secondary school	25	23.9%	19.6%	18.5%
	Secondary school	98	4.1%	1.9%	8.3%
	A level	105	19.4%	16.8%	22.0%
	Graduate degree	242	47.3%	53.3%	47.6%
	Dissertation/ habilitation	24	4.1%	8.4%	3.6%
Income (net in EUR)	0 – 1.150	74	14.4%	10.3%	18.5%
	1.151 – 2.250	101	21.6%	13.1%	23.2%
	2.250 – 4.500	229	46.8%	52.3%	41.1%
	4.500 +	93	17.1%	24.3%	17.3%

The potential of crowdfunding for sustainable development: a comparison of sustainable and conventional crowdfunding projects

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Abstract: Crowdfunding bears great potential for sustainable entrepreneurs, who often face difficulties in receiving loans from traditional financing mechanisms. Because such ventures are able to tackle pressing environmental and social issues, they are of interest to researchers, and recent studies have already identified factors that increase their crowdfunding success. However, it remains unstudied as to what potential sustainable crowdfunding holds in contributing towards sustainable development and to what extent crowdfunding projects that are environmentally, socially, sustainability- and conventionally oriented actually differ. Based on a quantitative dataset, 282 investment-based crowdfunding projects were characterised along the entrepreneurship typology suggested by Thompson and colleagues. The results revealed that the marketing function of crowdfunding was prevalent for environmentally oriented crowdfunding projects. Socially oriented crowdfunding projects were identified as small scale compared to other project types, since they aimed for lower funding targets. Finally, conventionally oriented crowdfunding projects mainly used crowdfunding to finance service and organisational innovations. Based on these insights, implications for research and practice are drawn.

Keywords: crowdfunding; investment-based; sustainability; sustainable development; social; environment; conventional; entrepreneurship; venture; characteristics.

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1 Introduction

Crowdfunding is considered a successful tool for financing diverse entrepreneurial projects (Mollick, 2014; Baumgardner et al., 2017). It is defined as “*the efforts by entrepreneurial individuals and groups [...] to fund their ventures by drawing on relatively small contributions from a relatively large number of individuals using the internet, without standard financial intermediaries*” (Mollick, 2014, p.2). Crowdfunding holds particular relevance for sustainable entrepreneurs, who often face difficulties in receiving financial support from banks and other professional investors (Lehner, 2013; Bonzanini et al., 2016; Cumming et al., 2017). Such entrepreneurs have great potential in tackling environmental and social issues and thus in addressing planetary boundaries (Schaltegger et al., 2018). Therefore, the existing crowdfunding literature assumes a certain impact of sustainability-oriented crowdfunding projects towards sustainable development (Calic and Mosakowski, 2016; Hörisch, 2018; Vismara, 2019). According to Wehnert et al. (2019, p. 131) crowdfunding projects “*can be considered as sustainability-oriented when the supported product or service improves conditions for people and/or the environment by specifically addressing social (e.g., fair production) and/or environmental (e.g., pollutant free packing; usage of recycled materials) aspects*”. However, it remains unstudied so far as to what potential sustainability-oriented crowdfunding holds in contributing to sustainable development. There is a current lack of scientific knowledge about the function of crowdfunding in financing and marketing such projects. Therefore, this study addresses the following research questions:

RQ1 What potential does crowdfunding for sustainable ventures hold for sustainable development?

RQ2 How does crowdfunding for sustainable, environmental, social and conventional ventures differ?

The research questions were addressed using a quantitative, empirical approach. The data were derived from four different investment-based crowdfunding platforms located in the US and Germany. After conducting manual coding, the data was quantitatively examined by performing a logistic regression analysis, a multivariate analysis of covariance (MANCOVA) and post-hoc tests. In contrast to reward- and donation-based crowdfunding, in which supporters receive material returns, immaterial returns or no returns, investment-based crowdfunding offers monetary incentives to their supporters. It is used as an umbrella term for debt and equity crowdfunding (Rossi and Vismara, 2018).

In addressing the above-mentioned research questions, the current study contributes to the existing literature in several ways, as described in the following paragraphs.

First, differences among environmentally, socially, sustainability- and conventionally oriented crowdfunding projects are identified. In doing so, a research proposal expressed by Hörisch (2018) as well as one by Böckel et al. (2020) are addressed that call for the

identification of motives and characteristics for each project type. In particular, the differences between conventional crowdfunding projects on one side, and projects with a certain degree of sustainability orientation on the other have not been highlighted so far (Hörisch, 2018).

Second, Hörisch (2018) called for analysing how crowdfunding contributes to sustainable development. In order to address this research gap, the study examined whether the differently oriented crowdfunding projects used crowdfunding predominantly for collecting funds (i.e., a financing function) or attracting new customers (i.e., a marketing function) and whether crowdfunding offered the opportunity of small-scale or large-scale funding. So far, the marketing function of crowdfunding has not received much attention from past researchers (Böckel et al., 2020). Therefore, this study addresses the currently existing research gap by illuminating different functions of crowdfunding, apart from the financing goal.

Third, the study analysed whether conventionally, environmentally, socially and sustainability-oriented crowdfunding projects differed in their appearance on social media sites, bearing in mind that social media is an important success factor in crowdfunding (Borst et al., 2018). In addition, the question arises as to what types of innovation are predominantly funded on crowdfunding platforms. This is the first study to address this question with regard to crowdfunding for sustainable ventures by differentiating between product innovations, service innovations and organisational innovations. It helps in assessing the potential of crowdfunding for sustainable development, since different innovation types can play different roles in promoting sustainable development (e.g., Hörisch, 2013; Hansen and Schaltegger, 2016; Keskin et al., 2013; Lordkipanidze et al., 2005).

Fourth, investment-based crowdfunding was chosen for this study because it holds the highest global funding volume in comparison to reward- and donation-based crowdfunding (Massolution, 2015). Although it seems to be the most relevant crowdfunding type, it has received little academic attention in the past with regard to crowdfunding in general (Jovanovic, 2018) and sustainable crowdfunding in particular (Böckel et al., 2020).

Fifth, this study is the first to apply the typology of entrepreneurship brought forward by Thompson et al. (2011) in a crowdfunding context in order to differentiate among the different sustainability dimensions of crowdfunding projects.

The remainder of this paper is structured as follows. Section 2 introduces a conceptual framework for classifying crowdfunding projects that follow different orientations. Subsequently, past literature is summarised, followed by the development of the hypotheses. Section 3 provides an overview of the methodology used, in particular the data collection process, the applied measures and the descriptive statistics. The results of this investigation are presented in Section 4. Finally, the findings are discussed in the last section in terms of implications for research and practice.

2 Conceptual framework and literature review

Several researchers have suggested that crowdfunding offers a great opportunity to close the funding gap for sustainability-oriented ventures because supporters favour projects that benefit the general public while the individual profit remains subordinate (Belleflamme et al., 2014; Lam and Law, 2016; Lehner, 2013). Hence, past literature has

expected a certain contribution of sustainability-oriented crowdfunding towards sustainable development. Against this backdrop, recent studies have already identified factors that increase the likelihood of sustainability-oriented projects (Bento et al., 2019; Calic and Mosakowski, 2016; Hörisch, 2018; Vismara, 2019), environmentally oriented projects (Hörisch, 2015; Vasileiadou et al., 2016) and socially oriented projects (Allison et al., 2015; Lehner, 2014) in receiving funds via crowdfunding campaigns. However, so far, it remains unstudied in which ways sustainability-oriented crowdfunding actually contributes to sustainable development and how such projects differ from conventional crowdfunding projects. By addressing this research gap, this study contributes to the current understanding of the contribution of crowdfunding towards sustainability transitions. Valuable insights are also expected against the backdrop of new institutional theory (cf. Powell and DiMaggio, 1991) and the legitimacy of crowdfunding projects that follow an environmental, social or sustainable orientation. Entrepreneurs need to be legitimate in order to receive support from their stakeholders (Bruton et al., 2010). In crowdfunding, legitimacy enhances the chance of receiving financial assets and a higher number of non-institutional supporters (Frydrych et al., 2014; Lehner and Harrer, 2019). Therefore, investigating differently oriented crowdfunding projects with regard to their funding and marketing potential on investment-based crowdfunding platforms promises to create a better understanding of their legitimacy.

The entrepreneurship typology applied in this study is based on a framework by Thompson et al. (2011), which has been widely acknowledged in entrepreneurship research (e.g., Schaefer et al., 2015; Vallaster et al., 2019). It distinguishes between four types of entrepreneurship. *Conventional* (or *traditional*) *entrepreneurship* is predominantly profit-oriented and focuses on the creation of economic value. Similarly, *environmental entrepreneurship* is also oriented towards economic profit while simultaneously creating ecological benefits by addressing relevant market failures with new products and services (York, 2018). In contrast, *social entrepreneurship* follows a social mission that is usually altruistically motivated and thus not necessarily oriented towards creating economic value (Thompson et al., 2011; Giones et al., 2020). Helping people is paramount for social entrepreneurship. *Sustainable entrepreneurship* addresses opportunities that facilitate a society that is economically, environmentally and socially sustainable (Thompson et al., 2011). It can be either non-profit or for-profit oriented. According to this entrepreneurship framework, a differentiation is made among conventionally, socially, environmentally and sustainability-oriented crowdfunding projects in order to determine similarities and differences between the different crowdfunding project types.

Independent of the entrepreneurial orientation, crowdfunding provides various benefits to its project initiators. Collecting monetary funds from supporters represents the most prominent and apparent function (Mollick, 2014; Schwienbacher and Larralde, 2012; Hörisch, 2018). The financing function benefits both young start-ups and already existing businesses (Lehner, 2013; Hörisch, 2018). With reference to the financing function, the past literature has already highlighted certain differences between sustainability-oriented and conventionally oriented crowdfunding projects. By analysing two sustainable crowdfunding platforms, Hörisch (2018) revealed that 63.6% of all projects were successfully funded, representing a higher success rate when compared to investigations on thematically open platforms (Mollick, 2014; Calic and Mosakowski, 2016). According to Thompson et al. (2011), environmental and conventional entrepreneurship are characterised as having the highest profit orientation, while social

entrepreneurs follow a social mission driven by altruistic motivations. For this reason, socially oriented crowdfunding initiators are expected to aim for rather low maximum funding targets in order to finance small-scale projects. In comparison, conventionally, environmentally or sustainability-oriented ventures entering markets with new products and services are assumed to aim for the large-scale potential of investment-based crowdfunding. Based on these insights, it can be expected that conventionally, environmentally and sustainability-oriented crowdfunding projects will make greater use of the financing potential of crowdfunding in comparison to socially oriented projects. Based on the assumption that the financing potential of crowdfunding increases with the maximum funding target, the first hypothesis was formulated as follows:

H1: Socially oriented crowdfunding projects will aim for a lower maximum funding target compared to conventionally, environmentally and/or sustainability-oriented crowdfunding projects.

Apart from the financing function, crowdfunding can also be used as a marketing tool, in a similar way for both start-ups and established firms (Brown et al., 2017; Gerber and Hui, 2013; Belleflamme et al., 2014). The marketing benefits of crowdfunding include direct sales, product and service promotion, feedback from the market and the collection of new ideas from the crowd (Brown et al., 2017). Furthermore, crowdfunding helps to create a fan network, which is difficult and time-consuming to build with traditional marketing instruments (Gerber and Hui, 2013). The bigger the community, the higher the impact of the crowdfunding campaign. For this reason, the marketing function is expected to increase with the number of individuals that support the crowdfunding campaign (Lukkarinen et al., 2016; Hörisch, 2018; Pitschner and Pitschner-Finn, 2014), as they are “often seen as a quantification of the value of one’s project” (Gerber and Hui, 2013, p.11). Dependent on the type of marketing the venture seeks, it can decide on a specific crowdfunding type (i.e., reward-based, donation-based, equity or debt crowdfunding) (Brown et al., 2017). Reward-based crowdfunding, for example, is particularly suitable to pre-sell products as a material return for the crowds’ financial support. Against this backdrop, crowdfunding platforms represent markets in which project initiators offer their ideas, products or services, which in turn are consumed by their project supporters (Gerber and Hui, 2013). Projects with an environmental, social or sustainability orientation are probably more reliant on the support and encouragement of the crowd. Since sustainability-oriented crowdfunding projects are linked to a greater level of uncertainty, communication with (potential) supporters is of higher relevance when compared to projects with a conventional background (Messeni Petruzzelli et al., 2019). Past literature on equity crowdfunding provides evidence that sustainability-oriented projects attract a higher number of supporters (Vismara, 2019). In particular, environmentally oriented crowdfunding projects, which often address market failures with newly developed products and services (Thompson et al., 2011) are dependent upon public acceptance. Therefore, in contrast with conventionally oriented projects, such ventures are expected to aim for the marketing potential of crowdfunding. Hence, the second hypothesis was formulated as follows:

H2: The number of supporters will be higher for environmentally, socially and/or sustainability-oriented crowdfunding projects than for conventionally oriented crowdfunding projects.

The involvement of crowdfunding projects in social media, such as Twitter, Facebook and Instagram, is an important success factor in crowdfunding (Gera and Kaur, 2018; Mollick, 2014). In line with Lehner (2014), leveraging social capital is a key element for building a strong crowd, which in turn increases economic profit. Social capital can be obtained by communicating with the project's community through social media sites. An empirical study by Borst et al. (2018) revealed that the activity on social media sites raises the funding success of reward-based crowdfunding projects. Similarly, Mollick (2014) quantitatively analysed 48,500 Kickstarter campaigns and concluded that large Facebook networks with a high number of likes increase the chance of being successfully funded. Nevertheless, different conclusions were drawn by Clauss et al. (2020) who did not find a significant effect of social network size on financial crowdfunding success. Yet, the majority of empirical studies provide evidence for the high relevance of social media in order to run a successful crowdfunding campaign.

It can be assumed that environmentally, socially, sustainability- and conventionally oriented crowdfunding projects ascribe different levels of importance to their social media networks. On social media platforms like Twitter, Facebook and Instagram, Laurell et al. (2019) found that sustainability-oriented crowdfunding campaigns as well as sustainability-related discussions receive little attention. Indeed, only 0.21% of the content on crowdfunding in social media was linked to sustainability (Laurell et al., 2019). In contrast, for social entrepreneurs, social values had a higher standing than making financial crowdfunding a success (Lehner, 2014). A greater emphasis is put on raising social capital on social media sites. Therefore, a constant interaction and exchange of ideas with (potential) supporters is crucial to strengthen social networks (Lehner, 2014). Based on these insights, it can be assumed that socially oriented crowdfunding projects ascribe a higher importance to their social network size. Therefore, the third hypothesis was formulated as follows:

H3: The number of Facebook likes will be higher for socially oriented crowdfunding projects compared to environmentally, sustainability- and conventionally oriented crowdfunding projects.

Crowdfunding is an effective tool for financing innovations of (sustainable) entrepreneurial ventures (Hervé and Schwienbacher, 2018; Testa et al., 2019). It can even be regarded as a success factor for crowdfunding initiators, since past literature has identified that project initiators who moderately promoted their project based on its innovativeness positively influenced its crowdfunding success (Lins et al., 2018). The Organisation for Economic Co-operation and Development (OECD) defines innovation as “*the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations*” (OECD, 2005, p.46). Different types of innovations can play different roles in fostering sustainable development (e.g., Hansen and Schaltegger, 2016; Hörisch, 2013; Cillo et al., 2019). This calls for investigating which innovation types (i.e., product, service or organisational innovations) are financed via sustainability-related and conventional crowdfunding. According to Agrawal et al. (2013), projects offering product innovations will receive a higher benefit from crowdfunding, since attributes and performance promises of the respective product can be easily communicated in project descriptions and videos. For sustainability-oriented crowdfunding initiators, Messeni Petruzzelli et al. (2019) recommend offering tangible outcomes in order to enhance funding success. However, Wehnert et al. (2019) stress that

the crowdfunding success of sustainable product features strongly depends upon how complex the product is; in other words, products characterised by low complexity (such as cacao) enjoy a higher trust level in their sustainable features among supporters. In particular, as emphasised by Mollick and Robb (2016), reward-based crowdfunding platforms are useful to finance product innovations due to the opportunity to pre-sell the respective product as a return for financial support. For this reason, some researchers also use the term ‘product-based crowdfunding’ when referring to reward-based crowdfunding (e.g., Roma et al., 2017). In summary, an assumption can be made that product innovations are the most frequently financed on crowdfunding platforms. Therefore, the dominance of product innovations is also expected on investment-based crowdfunding platforms. The fourth hypothesis is formulated as follows:

H4: Environmentally, socially, sustainability- and conventionally oriented crowdfunding projects predominantly use crowdfunding to finance product innovations.

3 Methodology

3.1 Data collection

The dataset originated from four investment-based crowdfunding platforms, which offered monetary rewards to supporters in return for their support. The same dataset was used as described by Hörisch and Tenner (2020). Two German crowdfunding platforms (Seedmatch and Companisto) and two US crowdfunding platforms (StartEngine and First Democracy VC) were included in the data collection process. In doing so, a consideration of two countries, which represent two of the largest crowdfunding markets (Europe and North America) was possible. Moreover, Fleming and Sorenson (2016) as well as Allison et al. (2013) expressed the need to conduct more crowdfunding research based on data from different nations. All four platforms were thematically open; thus, they included conventionally, environmentally, socially and sustainability-oriented crowdfunding projects. A quantitative design was chosen in order to address the research questions. In the first step, each crowdfunding project site completed on the respective platforms was manually coded as part of the full-text analysis. The data collection process was performed in April 2018; a total of 320 projects were included that had been completed at that time. Extreme values of the dependent variables were identified using boxplot diagrams and deleted. The final sample consisted of 282 projects. In the second step, the data were analysed using a MANCOVA, post-hoc tests and a multinomial logistic regression analysis.

3.2 Measures

3.2.1 Independent variable

The independent variable *orientation* was based on the conceptual framework of Thompson et al. (2011) and assessed whether a crowdfunding project was conventionally oriented, socially oriented, environmentally oriented or sustainability-oriented. In the first step, two independent coders manually coded the level of the environmental and social orientation for each crowdfunding project on a 7-point rating scale, based on the textual

project description on the appropriate project site (cf. Calic and Mosakowski, 2016). The scale ranged from +3 (highly environmentally friendly projects) to -3 (highly environmentally harmful projects). In advance of the coding process, each coder received clear coding instructions. The inter-coder reliability for both constructs was above the critical value of 0.667 (Krippendorff's $\alpha_{\text{environmental orientation}} = 0.807$; Krippendorff's $\alpha_{\text{social orientation}} = 0.722$) (Krippendorff, 2013). In the second step, projects that received a positive rating point (on average between the two coders) were evaluated as environmentally or socially oriented, respectively. Sustainability-oriented projects followed both a social and an environmental orientation. If a project was neither environmentally nor socially oriented, it belonged to the category of conventionally oriented crowdfunding projects.

3.2.2 Dependent variables

Several dependent variables were included in this investigation. All the projects defined a *maximum funding target* (in thousands of USD) that represented the highest possible funding amount that could not be exceeded for the respective crowdfunding campaign. The *number of supporters* was a simple count variable and represented a common measure for the marketing success of a crowdfunding project (Hörisch, 2018; Lukkarinen et al., 2016; Pitschner and Pitschner-Finn, 2014). It captured how many individuals supported a crowdfunding campaign by spending a certain amount of money. The occurrence in social media channels was captured as the number of *Facebook likes* the project had collected (cf. Mollick, 2014). Last, the *type of innovation* was assessed on a nominal scale by distinguishing between product innovations, service innovations and organisational innovations (based on OECD, 2005). Similar to the independent variable, this variable was coded by two independent individuals and the inter-coder reliability was confirmed (Krippendorff's $\alpha_{\text{innovation}} = 0.674$).

3.2.3 Covariates (secondary independent variables)

A number of covariates were also included, which were assumed to have potential additional effects on the dependent variables; in addition, they were used as secondary independent variables in the logistic regression analysis. *Team size* was assessed as an indicator of firm size. This variable was operationalised as the number of team members. Moreover, past studies in other thematic contexts (e.g., Hechavarria et al., 2012; Spiegler and Halberstadt, 2018) have suggested that the gender of the entrepreneurial team is expected to hold a certain influence on the dependent variables. The variable *female founder* was operationalised as the percentage of female members among the core founding team. Another covariate was the number of *updates* provided by the project initiator(s) during the crowdfunding campaign on the project site. Lastly, the level of professionalism was an important influencing factor that was examined. Professionalism is often represented by the quality of the project. The number of videos, images and the text length of the description on the project site are commonly used to assess the project quality in crowdfunding (Mollick, 2014; Dorfleitner et al., 2016). This covariate was measured as the mean value of the standardised number of videos, number of images and the word count of the project description. The higher the number of videos, images and words used, the higher the quality of the project.

An overview of all variables and their operationalisations is provided in Table 1.

Table 1 Operationalisation of variables

<i>Variable</i>	<i>Operationalisation</i>
<i>Independent variable</i>	
Orientation	1 = Conventionally oriented crowdfunding project 2 = Environmentally oriented crowdfunding project 3 = Socially oriented crowdfunding project 4 = Sustainability-oriented crowdfunding project
<i>Dependent variables</i>	
Max. funding target	Amount in USD
Number of supporters	Count of supporters
Facebook likes	Count of Facebook likes
Type of innovation	1 = Product innovation 2 = Service innovation 3 = Organisational innovation
<i>Covariates (secondary independent variables)</i>	
Team size	Count of team members
Updates	Number of project updates
Female founder	% of female founding members
Project quality	Composite Z-scores (video count, image count, text length)

3.3 Descriptive statistics

The descriptive statistics of the independent variable *orientation* of the crowdfunding projects are displayed in Table 2. Surprisingly, the majority of the crowdfunding projects within this sample focused on one or both of the sustainability orientations (61.3%). Only 38.7% were conventionally oriented crowdfunding projects without a specific orientation on social or environmental issues.

Table 2 Descriptive statistics of the independent variables

	<i>N</i>	<i>%</i>
Conventionally oriented crowdfunding projects	109	38.7
Environmentally oriented crowdfunding projects	28	9.9
Socially oriented crowdfunding projects	81	28.7
Sustainability-oriented crowdfunding projects	64	22.7
<i>Total</i>	282	100

The descriptive statistics of the dependent variables and the covariates (secondary independent variables) are shown in Table 3. The table displays the means and standard deviations of each variable for the total sample as well as for the four groups of the independent variable.

Table 3 Descriptive statistics of metric dependent variables and covariates by type of entrepreneurship

	<i>Total sample</i>	<i>Conventional orientation</i>	<i>Environmental orientation</i>	<i>Social Orientation</i>	<i>Sustainable Orientation</i>
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Max. Funding Target	1,914,612.50 (1,199,553.49)	1,981,588.92 (1,184,205.16)	2,188,340.29 (1,071,746.64)	1,626,721.73 81,149,112.20)	2,045,149.13 (1,296,179.78)
Number of Supporters	379.49 (344.88)	365.00 (328.94)	534.96 (392.47)	339.10 (330.34)	387.28 (356.61)
Facebook Likes	4,203.76 (6,618.00)	4,133.72 (6,890.03)	2,827.61 (4,364.57)	3,786.32 (6,818.66)	5,453.44 (6,641.25)
Team size	5.17 (3.62)	4.96 (83.97)	5.04 (2.55)	5.37 (3.44)	5.34 (3.68)
Updates	8.73 (6.74)	7.67 (5.94)	10.74 (6.18)	9.39 (7.14)	8.67 (7.40)
Female Founder	17.63 (23.34)	15.87 (22.46)	17.29 (23.14)	17.11 (22.84)	21.34 (25.53)
Project Quality	-0.01 (0.77)	-0.013 (0.85)	-0.045 (0.46)	-0.06 (0.80)	-0.00 (0.73)

4 Results

A MANCOVA was conducted in order to determine statistically significant differences among the environmentally, socially, sustainability- and conventionally oriented crowdfunding projects with reference to the maximum funding target, the number of supporters and the number of Facebook likes. Team size, the number of female founding members, the number of updates and project quality were included as covariates. The overall MANCOVA test was statistically significant; thus, there was a noteworthy difference among environmentally, socially, sustainability- and conventionally oriented crowdfunding projects, Wilk’s lambda = 0.903, $F(9, 562.34) = 2.684$, $p = 0.005$, $\eta_p^2 = 0.034$. The results of the MANCOVA for each individual dependent variable are displayed in Table 4.

The findings of the MANCOVA show that there was a significant effect of the orientation of crowdfunding projects on the maximum funding target, $F(3, 237) = 6.287$, $p = 0.000$, $\eta_p^2 = 0.075$. With reference to the marketing function, a significant influence of the orientation of crowdfunding projects on the number of supporters was found, $F(3, 237) = 1.971$, $p = 0.060$, $\eta_p^2 = 0.025$, given that a level of significance of 10% is acceptable. In order to assess in which direction the means differed, post-hoc tests were conducted for the dependent variables maximum funding target and number of supporters. Hochberg’s GT2 was chosen because equal variances were assumed based on Levene’s test, and there were unequal group sizes for the independent variable (see Table 2). With regard to the maximum funding target, the post-hoc test (see Appendix A) revealed that, on average, projects that were socially oriented aimed for a

significantly lower maximum funding target ($m_{\text{max. funding target}} = 1,626,721.73$) than crowdfunding projects that were environmentally oriented ($m_{\text{max. funding target}} = 2,188,340.29$) or sustainability-oriented ($m_{\text{max. funding target}} = 2,045,149.13$). Although the post-hoc test did not indicate a significant difference between socially oriented and conventionally oriented crowdfunding projects, these results offer support for Hypothesis 1 (if a significance level of 10% is acceptable). With regard to the second hypothesis, environmentally oriented crowdfunding projects ($m_{\text{number of supporters}} = 534.96$) on average attracted a significantly higher number of supporters compared to conventionally oriented crowdfunding projects ($m_{\text{number of supporters}} = 365.00$), when accepting a significance threshold of $p < 0.1$. Hence, Hypothesis 2 is supported for the environmental dimension. Yet, no significant differences were found for the mean number of supporters between conventionally oriented crowdfunding projects and either socially or sustainability-oriented crowdfunding projects. However, crowdfunding projects with a social orientation had a significantly lower number of supporters ($m_{\text{number of supporters}} = 339.10$) than environmentally oriented crowdfunding projects. As can be seen in Table 4, there was no effect of the orientation of crowdfunding projects on the number of Facebook likes, $F(3, 226) = 0.753$, $p = 0.261$, $\eta_p^2 = 0.010$. Accordingly, Hypothesis 3 could not be confirmed.

Table 4 Multivariate analysis of covariance (MANCOVA)

Source	Dependent variable	Summed squares	df	Mean square	F	Sig.	Partial η^2
Constant term	Max. funding target	1.88 ¹⁴	1	1.88 ¹⁴	154.714	0.000	0.399
	Number of supporters	4,280,755.63	1	4,280,755.63	40.161	0.000	0.147
	Facebook likes	868,619,887.73	1	868,619,887.73	18.886	0.000	0.075
<i>Independent variable</i>							
Orientation	Max. funding target	2.2913	3	7.6212	6.287	0.000	0.075
	Number of supporters	630,212.15	3	210,070.72	1.971	0.060	0.025
	Facebook likes	103,936,780.92	3	34,645,593.64	0.753	0.261	0.010
<i>Covariates</i>							
Team size	Max. funding target	4.07 ¹²	1	4.07 ¹²	3.357	0.034	0.014
	Number of supporters	373,371.29	1	373,371.29	3.503	0.032	0.015
	Facebook likes	136,680,771.85	1	136,680,771.85	2.972	0.043	0.013

Table 4 Multivariate analysis of covariance (MANCOVA) (continued)

Source	Dependent variable	Summed squares	df	Mean square	F	Sig.	Partial η^2
Updates	Max. funding target	1.56 ¹¹	1	1.56 ¹¹	0.128	0.360	0.001
	Number of supporters	1,967,069.60	1	1,967,069.60	18.455	0.000	0.073
	Facebook likes	4,941,775.77	1	4,941,775.77	0.107	0.372	0.000
Female founder	Max. funding target	4.79 ¹¹	1	4.79 ¹¹	0.395	0.265	0.002
	Number of supporters	78,195.85	1	78,195.85	0.734	0.197	0.003
	Facebook likes	9,774,392.40	1	9,774,392.40	0.213	0.323	0.001
Project quality	Max. funding target	6.07 ¹²	1	6.07 ¹²	5.010	0.013	0.021
	Number of supporters	312,267.33	1	312,267.33	2.930	0.044	0.012
	Facebook likes	281,436,439.27	1	281,436,439.27	6.119	0.007	0.026

Model fit: adj. R2 (max. funding target) = 0.122; adj. R2 (number of supporters) = 0.122; adj. R2 (Facebook likes) = 0.012

Sample size: N = 241 (the n is smaller than in the total sample due to missing values for the covariates team size, updates and female founder).

Sig. levels are based on one-sided tests of significance as directed hypotheses were tested (cf. Cho and Abe, 2013).

Of the covariates, team size was found to have a significant effect on the maximum funding target [$F(1, 240) = 3.357, p = 0.034, \eta_p^2 = 0.014$], the number of supporters [$F(1, 240) = 3.503, p = 0.032, \eta_p^2 = 0.015$] and the number of Facebook likes [$F(1, 240) = 2.972, p = 0.043, \eta_p^2 = 0.013$]. Moreover, the number of updates also influenced the number of supporters [$F(1, 240) = 18.455, p < 0.001, \eta_p^2 = 0.073$]. There was no significant effect of the percentage of female founders on either of the dependent variables. Yet, project quality had a significant influence on the maximum funding target [$F(1, 240) = 5.010, p = 0.013, \eta_p^2 = 0.021$], the number of supporters [$F(1, 240) = 2.930, p = 0.044, \eta_p^2 = 0.012$] and the number of Facebook likes [$F(1, 240) = 6.119, p = 0.007, \eta_p^2 = 0.026$].

Last, in order to determine the influence of orientation on the type of innovation, a multinomial logistic regression was conducted (see Table 5). Nagelkerke's r^2 (= 13%) indicated that the model explained a relevant share of the variance for type of innovation. The reference category for the logistic regression model was product innovation. As displayed in Table 5, no significant effect was found for environmental and social orientation on either innovation type. The parameter sustainability orientation was reset due to redundancy. Yet, the findings revealed that conventionally oriented projects were

more likely to use crowdfunding for financing service or organisational innovations. The results for service innovation were positive and significant ($B = 1.104$; $p = 0.001$), however, the effect of conventional orientation on organisational innovation was only significant at the 10% level ($B = 0.943$; $p = 0.084$). This result contradicts the assumption expressed in Hypothesis 4. Consequently, no support was found for the last hypothesis.

Table 5 Logistic regression

<i>Dependent variable^a</i>	<i>Independent variable</i>	<i>Regression coefficient</i>	<i>Standard error</i>	<i>Significance</i>
Service innovation	Constant term	0.194	0.443	0.331
	Conventional orientation	1.104	0.374	0.001
	Environmental orientation	-0.249	0.531	0.320
	Social orientation	0.339	0.378	0.185
	Sustainability orientation	0 ^b	.	.
	Team size	-0.008	0.048	0.432
	Updates	-0.032	0.023	0.083
	Female founder	-0.008	0.006	0.089
	Project quality	-0.218	0.233	0.174
	Organisational innovation	Constant term	-1.378	0.847
Conventional orientation		0.943	0.683	0.084
Environmental orientation		-0.590	1.178	0.308
Social orientation		0.629	0.676	0.176
Sustainability orientation		0 ^b	.	.
Team size		-0.088	0.112	0.217
Updates		-0.001	0.040	0.494
Female founder		-0.018	0.013	0.090
Project quality		-0.598	0.473	0.103

^aReference category for dependent variable: product innovation.

^bParameter was reset due to redundancy.

Model fit: Nagelkerke's $r^2 = 0.130$.

Sample size: $N = 282$.

Sig. levels are based on one-sided tests of significance as directed hypotheses were tested (cf. Cho and Abe, 2013).

Of the secondary independent variables, the percentage of female founders had a significant negative effect on service innovation and organisational innovation. Thus, female founders were more likely to start crowdfunding projects in order to finance product innovations. Also, the number of updates negatively influenced service innovations.

5 Discussion and conclusion

Crowdfunding is considered a successful tool for financing environmentally, socially and sustainability-oriented projects, which often face difficulties in receiving financial support from standard financial intermediaries. It is often suggested by researchers that such projects provide great potential to address environmental and social issues and thus facilitate sustainable development (Calic and Mosakowski, 2016; Hörisch, 2018; Vismara, 2019). This study is an initial examination that sheds light on the potential that sustainable crowdfunding holds in contributing towards sustainable development.

The majority of the crowdfunding projects in this study followed a social or environmental orientation or even focused on both dimensions (sustainability-oriented), although all four investigated platforms were thematically open and not exclusively designated to sustainable projects. Therefore, in general, investment-based crowdfunding offered a great opportunity to close the funding gap for such ventures, as was also suggested by Vismara (2019). The findings of this analysis revealed that the marketing function of crowdfunding was prevalent for environmentally oriented crowdfunding projects because they achieved the highest level of success with regard to the number of supporters, especially in comparison to conventionally oriented campaigns. These findings are in line with Thompson et al. (2011) who argued that environmentally oriented crowdfunding projects usually address market failures with newly developed products and services. In order to receive public awareness and acceptance, the support and encouragement of the crowd is particularly important for such ventures. The results are also in good agreement with earlier research by Vismara (2019), who reported a positive influence of sustainability-oriented crowdfunding projects on the number of restricted (i.e., non-professional) investors.

Furthermore, socially oriented crowdfunding projects were identified as small in scale compared to other project types, since they aimed for the lowest funding target. A possible explanation is that social entrepreneurs are driven by altruistic motivations, while generating economic profit remains secondary (Thompson et al., 2011). In contrast, crowdfunding projects focussing on environmental or sustainability-related issues aimed for significantly higher maximum funding targets compared to socially oriented projects. This finding tends to refute research by Hörisch (2018), who observed that only 19% of all projects on purely sustainable crowdfunding platforms were economically oriented. Yet, Hörisch (2018) did not focus on investment-based crowdfunding, where profit orientation is essential in order to provide a financial return on investments to supporters. The assumption can be made that environmentally oriented crowdfunding projects in particular make greater use of the financing potential of crowdfunding because the introduction of new products and services into the market requires financial assets (cf. Thompson et al., 2011). For example, investment-based crowdfunding promises specific potential for large-scale projects that offer technological solutions in the green energy sector, as such ventures show a high complexity, novelty and long-term orientation (Ardito et al., 2016, 2019a; Messeni Petruzzelli et al., 2011) and probably opt for high funding amounts in order to realise their entrepreneurial intentions. By providing follow-up financing for already established green energy technologies, crowdfunding holds especially great potential in leading to sustainable development transitions in the industry (cf. Ardito et al., 2019b).

In contrast to projects that addressed one or both of the sustainability dimensions, conventionally oriented crowdfunding projects used crowdfunding to finance service and

organisational innovations. These findings are inconsistent with earlier research, which suggests that crowdfunding in general attracts ventures that offer product innovations (Agrawal et al., 2013; Mollick and Robb, 2016; Wehnert et al., 2019). As hypothesised by Mollick and Robb (2016), there appears to be a difference between reward-based and investment-based crowdfunding when it comes to financing different innovation types. Indeed, the nature of reward-based crowdfunding is to pre-sell the respective product as an incentive for financial support. Therefore, the funding of product innovations is particularly suitable on reward-based platforms. In turn, equity and debt crowdfunding offer greater opportunities, especially for service and organisational innovations. Although no significant differences were found for crowdfunding projects following a social and/or environmental orientation, it seems that investment-based crowdfunding holds the potential to promote sustainable development by not only financing sustainable product innovations, but also service and organisational innovations.

Several practical and research implications can be derived based on the insights of this study. First, the potential of crowdfunding in contributing towards sustainable development is determined by paying particular attention to the different functions of crowdfunding. In particular, the marketing function has not been sufficiently researched thus far. Since a broad spectrum of projects exists that focus on environmental, social or sustainability problems, new scientific insights were gained on the kind of projects that are particularly qualified to be financed via investment-based crowdfunding. The latter include environmentally oriented entrepreneurs who are planning to market new products and services. Furthermore, small-scale social entrepreneurship and large-scale environmental and sustainable entrepreneurship are suitable for funding on debt and equity crowdfunding platforms. In addition, two research gaps were addressed by this study: the call for more research on investment-based crowdfunding and for addressing different sustainability dimensions in the same dataset (Böckel et al., 2020; Hörisch, 2018). This study also informs the conceptual framework by Thompson et al. (2011) by having successfully applied their typology of entrepreneurship in a crowdfunding context.

Practitioners (in particular, the initiators of environmentally, socially or sustainability-oriented crowdfunding projects) can use these insights to better assess the potential of crowdfunding for their ventures. For instance, investment-based crowdfunding does not hold potential for just large-scale projects. Even socially oriented entrepreneurs looking for small-scale financing are represented on such platforms and do not realise significantly lower marketing success rates than conventional projects. Social projects held 28.7% of the share on the investigated crowdfunding platforms. In comparison, environmentally oriented projects only make up 9.9%, although they tend to show a higher profit orientation (Thompson et al., 2011). This finding underlines the fact that social entrepreneurs have a good chance of funding in investment-based crowdfunding. Therefore, project initiators following a social mission are strongly recommended to consider investment-based crowdfunding in their platform choice. Furthermore, environmentally oriented entrepreneurs are recommended to use investment-based crowdfunding for both the financing and marketing functions. Thematically open debt and equity crowdfunding platforms can also be recommended for entrepreneurs in general who seek financing for service and organisational innovations.

The results of this study come with several limitations, which are accompanied by some future research proposals. First, the study focused on investment-based crowdfunding projects, which provided monetary returns for their supporters. Therefore,

similar examinations should be conducted with reward- and donation-based types of crowdfunding. Different findings can be expected for these crowdfunding mechanisms because projects in reward-based and donation-based crowdfunding are not necessarily economically oriented and probably put a different emphasis on the envisaged funding target they want to achieve during the crowdfunding campaign. Second, other forms of innovations should be included in future analyses, such as the differentiation between radical and incremental innovations (cf. Chan and Parhankangas, 2017). Furthermore, future research may differentiate between the financing of inventions, innovations or the scaling of an already existing innovation. Third, crowdfunding attracts both start-ups and established ventures (Lehner, 2013), which are assumed to show different orientation levels on one or both of the sustainability dimensions (e.g., Hörisch et al., 2019). Future researchers are recommended to distinguish between start-ups and established ventures when analysing similarities and differences between crowdfunding projects. In addressing these future proposals, the scientific knowledge about the potential of crowdfunding for sustainable development, as well as similarities and differences between sustainable and non-sustainable crowdfunding projects, can be addressed.

In conclusion, crowdfunding for sustainable ventures can contribute to sustainable development in several ways. First, investment-based crowdfunding holds great potential for financing socially oriented crowdfunding projects on a small scale and environmentally and sustainability-oriented projects on a larger scale. In addition, it is particularly useful for marketing environmentally oriented ventures by raising their public awareness. In doing so, crowdfunding supports the launch of newly developed, environmentally friendly products and services into the market.

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Appendix

Appendix A. Post-hoc Tests

<i>Dependent variable</i>	<i>Independent variable orientation</i>	<i>Mean</i>	<i>Independent variable orientation</i>	<i>Mean</i>	<i>Sig.</i>
Max. funding target	Conventional	1,981,588.92	Environmental	2,188,340.29	0.479
			Social	1,626,721.73	0.116
			Sustainable	2,045,149.13	0.500
	Environmental	2,188,340.29	Conventional	1,981,588.92	0.479
			Social	1,626,721.73	0.089
			Sustainable	2,045,149.13	0.498
	Social	1,626,721.73	Conventional	1,981,588.92	0.116
			Environmental	2,188,340.29	0.089
			Sustainable	2,045,149.13	0.099
	Sustainable	2,045,149.13	Conventional	1,981,588.92	0.500
			Environmental	2,188,340.29	0.498
			Social	1,626,721.73	0.099
Number of supporters	Conventional	365.00	Environmental	534.96	0.057
			Social	339.10	0.498
			Sustainable	387.28	0.499
	Environmental	534.96	Conventional	365.00	0.057
			Social	339.10	0.028
			Sustainable	387.28	0.150
	Social	339.10	Conventional	365.00	0.498
			Environmental	534.96	0.028
			Sustainable	387.28	0.477
	Sustainable	387.28	Conventional	365.00	0.499
			Environmental	534.96	0.150
			Social	339.10	0.477

Post-hoc test according to Hochberg’s GT2 testing procedure.

Sig. levels are based on one-sided tests of significance as directed hypotheses were tested (cf. Cho and Abe, 2013).



Crowdfunding for Responsible Entrepreneurship

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Abstract

This chapter introduces the key ideas and mechanisms of crowdfunding. On this basis, it highlights how crowdfunding can serve financing and marketing responsible entrepreneurship, paying particular attention to success factors responsible entrepreneurs should consider when conducting a crowdfunding campaign. For illustration, the case of *fairafric*, a fair-trade and organic chocolate producer that successfully made use of crowdfunding multiple times, is introduced. Building on this case and the empirical literature at the intersection between crowdfunding and responsible entrepreneurship, propositions are formulated. These highlight the growing importance of crowdfunding for responsible entrepreneurs, the increasing professionalization of crowdfunding as well as obstacles for the future development of the phenomenon.

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1 Introduction

Crowdfunding is a relatively new phenomenon, which evolved parallel to the internet revolution at the turn of the century and experienced an immense increase in popularity ever since.¹ Crowdfunding is defined as “the efforts by entrepreneurial individuals and groups – cultural, social, and for-profit – to fund their ventures by drawing on relatively small contributions from a relatively large number of individuals using the internet, without standard financial intermediaries”.² The global market volume of crowdfunding is estimated to be 90 billion USD in 2020.³ In Germany, a total crowdfunding volume of 145.2 million EUR was raised for 4,444 crowdfunding projects in 2016.⁴ According to the Crowdfunding Barometer 2017, 11.7% of the German population has participated in crowdfunding before, while 35.4% have a good understanding of the crowdfunding mechanism. Crowdfunding also enjoyed attention in recent academic literature. Since 2011, a steady increase in published articles on crowdfunding can be observed.⁵ Nevertheless, the scientific research field on crowdfunding is still very limited. In order to gain a better understanding of the crowdfunding phenomenon, this book chapter provides a brief overview of the crowdfunding literature by putting particular focus on the relevance of crowdfunding for responsible entrepreneurship. To start with, chapter one introduces key actors in the crowdfunding process as well as different types and functions of crowdfunding. Chapter two analyses the potential of crowdfunding for financing and marketing responsible entrepreneurs by paying special attention to success factors in different phases of a crowdfunding campaign. The elaborated, literature-based insights are substantiated by the best practice example of *fairafrik*, a fair-trade and organic chocolate producer which conducted several successful crowdfunding campaigns. Last, propositions on crowdfunding for responsible entrepreneurship are formulated in chapter three.

Different actors are involved in the crowdfunding process (see figure 1)⁶. In the first step, an entrepreneur or entrepreneurial team publishes an open call to financially support the respective project on an internet-based crowdfunding platform. The platform acts as an intermediary between the entrepreneur and the supporters backing the project. Within a pre-defined funding period, the crowdfunding project aims to attract as many supporters as possible in order to reach or even

¹ Baumgardner et al., 2017

² Mollick, 2014, p. 2

³ Messeni Petruzelli et al., 2019

⁴ Klein & Pinkert, 2016

⁵ Jovanovic, 2018

⁶ Böckel et al., 2020

exceed its funding target. The majority of crowdfunding platforms follow an all-or-nothing approach. According to this principle, initiators of crowdfunding projects define a minimum funding target, which has to be reached or exceeded in order to receive the funded amount after the crowdfunding campaign is completed.⁷ In case the funding target is missed, the collected amount will be returned to the supporters. Alternatively to the all-or-nothing approach, the initiator can keep the funded amount on platforms following a keep-it-all principle, even though the minimum funding target was not met.⁸ After a successful funding period, the raised amount is transmitted from the platform to the project initiator for the purpose of realising the project. At this point, promised rewards are delivered to the project supporters.

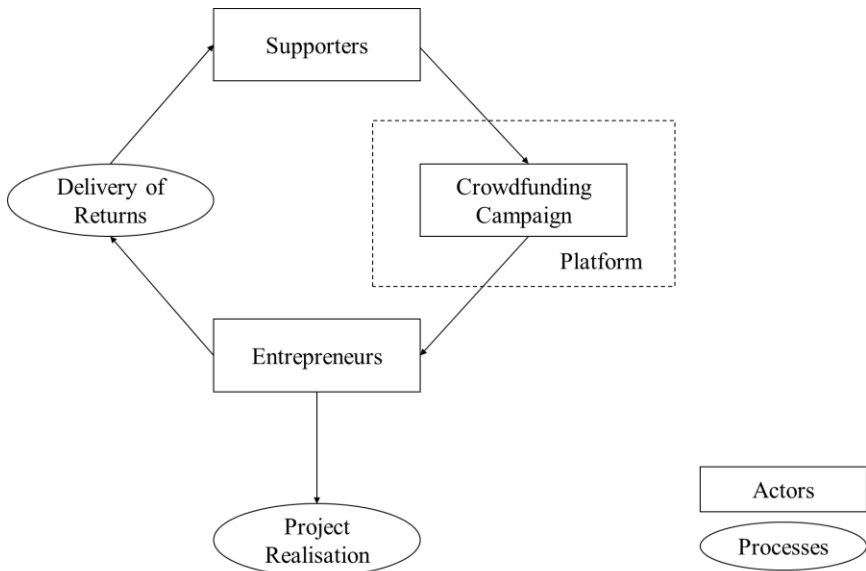


Figure 1: Actors and Processes in Crowdfunding (own illustration).

A distinction is made between four different types of crowdfunding with reference to the type of return supporters receive for their investment⁹. In donation-

⁷ Cumming et al., 2014

⁸ Cumming et al., 2014

⁹ Böckel et al., 2020

based crowdfunding, supporters of crowdfunding projects do not receive any return. This type of crowdfunding is mostly used to fund non-profit organisations, initiatives and public goods. Supporters of reward-based crowdfunding campaigns receive a non-financial incentive for their investment, typically in form of the product or service to be funded. Equity and debt crowdfunding are investment-based mechanisms in which monetary returns are paid to the supporters of the project. Equity crowdfunding projects offer profit shares, similar to company shares in the stock market, whereas debt crowdfunding is a form of loan financing based on previously defined interest rates. Hybrid forms combining different types of crowdfunding are common.¹⁰ Investment-based platforms, for example, tend to integrate material rewards for smaller investments, such as merchandise items or thank-you cards.

Figure 2 displays the share of the global market volume of different types of crowdfunding. It highlights that debt crowdfunding holds the highest market share with 76%. In comparison, donation-based, reward-based and equity crowdfunding incorporate less than a quarter of the global crowdfunding market volume.¹¹

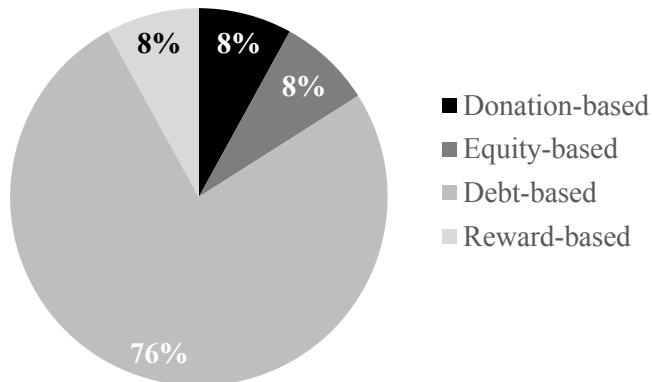


Figure 2: Share of Market Volume of Different Types of Crowdfunding¹²

One of the most successful international crowdfunding platforms is Kickstarter with over 176,000 funded projects and more than 4.5 billion USD raised

¹⁰ European Commission, 2016

¹¹ Massolution, 2015

¹² based on Massolution, 2015

as of January 2020.¹³ The market leader in Germany is Startnext with a share of 91.6% of the German crowdfunding market volume.¹⁴ Kickstarter and Startnext are both hybrid platforms focussing on donation-based and reward-based crowdfunding types.

Apart from the type of return, crowdfunding platforms also differ with regard to further characteristics. While some platforms are thematically open, others focus on a specific industry, such as art, real estate, green energy or social projects. For these platforms, project ideas are only accepted in case they fit to the selection criteria of the platform. Furthermore, different geographical scopes of the platforms exist, as some act on inter- and transnational level (e.g. KIVA, Indiegogo, Kickstarter) while others focus on national (e.g. Startnext) or regional projects (such as the Northern German platform Nordstarter, which is specialised on the region of Hamburg). In this respect, platforms vary in their visibility, prominence as well as the size and composition of the community using the platform. Furthermore, while some platforms are free to use for project initiators, others charge a certain amount of commission and transaction costs, in case the project is successfully funded. A third possibility is making a voluntary donation for the platform.

The academic literature distinguishes between different functions of crowdfunding for entrepreneurial ventures. The acquisition of financial resources represents the most prominent value of crowdfunding for entrepreneurs.¹⁵ The financing function can serve both, young start-ups that aim at the realisation of news ideas as well as the growth of more established businesses.¹⁶ Likewise, conducting a crowdfunding campaign also acts as a marketing tool for ventures, due to a higher visibility of the project during the funding process and consequently an increasing public interest in traditional and social media.¹⁷ Thus, conducting a crowdfunding campaign is an opportunity to establish a community and raise awareness for the idea to be funded. Moreover, crowdfunding is commonly regarded as a market test, since supporters are often rewarded with the product to be funded. In this way, entrepreneurs get an impression of the public's interest in the specific product or service a venture offers. The feedback of first users is

¹³ Kickstarter, 2020

¹⁴ Klein & Pinkert, 2016

¹⁵ Schwienbacher & Larralde, 2012; Mollick, 2014

¹⁶ Lehner, 2013

¹⁷ Burtch et al., 2013; Dorfleitner et al., 2014; Mollick, 2014

highly valuable in order to receive suggestions for improvement and, thus, address customer requests more efficiently.¹⁸ Finally, crowdfunding fulfils a legitimising function as the crowd is expected to democratically mirror the social acceptance of the crowdfunding project.¹⁹

2 Crowdfunding for Responsible Entrepreneurship

Responsible entrepreneurship offers a wide understanding of businesses, especially small and medium-sized enterprises (SMEs) and family businesses, which follow an ethical responsibility for society and nature. In this respect, responsible entrepreneurs, as part of the global society, show a high interest for the world that we as humans share by recognising and acting against environmental abuses and social inequalities. In line with Tiba and colleagues, responsible entrepreneurship is used as an umbrella term for various entrepreneurial types, such as social, environmental and sustainable entrepreneurship,²⁰ which aim at creating social and environmental benefits by addressing market failures as opportunities.²¹ Nevertheless, responsible entrepreneurs often fail in receiving funds from banks, credit institutes or other financial investors because they are frequently regarded as unproductive and fraught with risk.²² In public as well as scientific debates, crowdfunding is expected to close the funding gap for such entrepreneurs.²³ Therefore, crowdfunding holds an immense potential to successfully contribute to the entrepreneurial solution of social and environmental problems. Historically, it has been expected that primarily entrepreneurs consider crowdfunding, who do not receive funding from conventional investors or banks.²⁴ Increasingly, however, responsible entrepreneurs deliberately decide to use this funding mechanism. Besides the marketing function, one reasons for responsible entrepreneurs choosing crowdfunding as a source of financing is that the crowd is frequently found to favour socially and environmentally beneficial projects. A major reason for assuming such high potential of crowdfunding financing responsible entrepreneurship is that a public benefit is promised, which is by some authors even regarded to be more important than the individuals benefits in crowdfunding.²⁵ Especially start-

¹⁸ Belleflamme et al., 2014; Lam & Law, 2016

¹⁹ Lehner, 2013; Lehner & Nicholls, 2014; Vasileiadou et al., 2016

²⁰ Tiba et al., 2019

²¹ Thompson et al., 2011

²² Ghisetti et al., 2017

²³ Hemer, 2011; Bartenberger & Leitner, 2013; Lam & Law, 2016; Böckel et al., 2020

²⁴ Lambert & Schwienbacher, 2010

²⁵ Lam & Law, 2016

ups and small- and medium-sized enterprises seem to benefit from crowdfunding as an alternative financing mechanism.²⁶ A number of studies already addressed the relevance of crowdfunding for responsible entrepreneurs.²⁷ Overall, empirical findings suggest that environmentally and socially oriented projects in reward-based crowdfunding tend to have a higher funding success²⁸ while attracting a higher number of supporters in equity crowdfunding.²⁹ Still, besides examples, which show that projects of responsible entrepreneurship can be successfully financed via crowdfunding, counterexamples which failed to be crowdfunded successfully, highlight the need to examine which factors to consider when aiming at financing responsible entrepreneurial activity via crowdfunding.³⁰

2.1 *Success Factors*

A number of factors have been identified by existing scientific literature that increase the probability of crowdfunding projects to be successful. Most of these factors can be applied for crowdfunding projects in general and are not only valid for responsible entrepreneurs. Academic studies, for example, examined the influence of non-profit and for-profit orientations on the funding success. Evidence suggests that crowdfunding projects following a non-profit orientation have a higher chance of receiving funds due to a high interest in supporting organisations committed to public welfare.³¹ However, the total funding amounts for non-profit crowdfunding campaigns are lower in comparison to for-profit campaigns.³² Another important success factor is the level of the pre-defined funding target, since projects with a lower funding target are more likely to reach their target faster³³ and more frequently³⁴ compared to projects with a higher funding target. Consequently, responsible entrepreneurs are well advised to realistically assess the financial needs they face and to not have unrealistically high expectations towards the crowd. As an additional success factor, supporters of crowdfunding projects

²⁶ Dorfleitner et al., 2014

²⁷ e.g. Calic & Mosakowski, 2016; Hörisch, 2015, 2018, 2019; Messeni Petruzzelli et al. 2019, Testa et al., 2019 Vismara, 2019; Wehnert et al., 2018

²⁸ Calic & Mosakowski, 2016

²⁹ Vismara, 2019

³⁰ Hörisch, 2018

³¹ Belleflamme et al., 2013; Pitschner & Pitschner-Finn, 2014; Hörisch, 2015

³² Pitschner & Pitschner-Finn, 2014

³³ Ly & Mason, 2012

³⁴ Mollick, 2014; Hörisch, 2015

demand a high professionalism of the presented project on the platform page. Elements of professionalism include the existence of a project video, as well as the absence of spelling errors.³⁵ Furthermore, supporters are attracted by using a language arousing positive emotions among potential supporters.³⁶ In terms of the composition of the entrepreneurial team, past studies on gender diversity have concluded that crowdfunding projects initiated by women are more successful than those started by men.³⁷ In addition, the social network size of the project initiator as well as the size of the project team exert a positive influence on crowdfunding success.³⁸ Responsible entrepreneurs who intend to finance their activity via crowdfunding are therefore advised to make intensive use of social media marketing. Likewise, the endorsement by third parties (e.g. by online-blogs or traditional media) is likely to increase funding success. Calic and Mosakowski find that particularly environmentally-oriented projects are likely to benefit from such endorsements.³⁹ A similar effect was found regarding the frequency of updates provided to the crowd during the funding phase.⁴⁰ Additionally, the effect of different narratives in the project description (e.g. information on risks, business success and personal anecdotes) was identified as success factor for crowdfunding campaigns.⁴¹ Finally yet importantly, the specific returns for supporters influence the funding success. For the context of donation and reward-based crowdfunding, Hörisch indicates that projects, which do not have material rewards as outcomes, face more difficulties in achieving their crowdfunding targets. This in turn can pose a particular difficulty to responsible entrepreneurs exclusively focussing on the delivery of public goods.⁴²

Based on the success factors identified above, initiators of crowdfunding projects should be provided with substantial skills and characteristics in order to successfully finance responsible entrepreneurship using crowdfunding. For instance, the entrepreneur will be confronted with substantial time demands before, during and after the actual funding period. In this respect, initiators should be willing and capable to invest considerable amounts of time to prepare and carry out a crowdfunding campaign. Basically, it can be distinguished between four phases of conducting a successful crowdfunding campaign (see figure 3). Within

³⁵ Mollick, 2014; Dorfleitner et al., 2016; Bi et al., 2017

³⁶ Dorfleitner et al., 2016

³⁷ Greenberg & Mollick, 2017; Johnson et al., 2018

³⁸ Mollick, 2014; Zheng et al., 2014; Hörisch, 2015

³⁹ Calic & Mosakowski, 2016

⁴⁰ Mollick, 2014

⁴¹ Allison et al., 2013; Allison et al., 2015; Dorfleitner & Oswald, 2016

⁴² Hörisch, 2015

the first phase, the preparation phase, the target group and content of the project need to be clarified. Afterwards, initiators are recommended to assess the best possible crowdfunding type and return for their supporters in advance of making a platform decision. Each of the crowdfunding types (donation-based, reward-based, debt and equity crowdfunding) has its strengths and weaknesses and does not fit for every project type. Therefore, entrepreneurs are confronted with several challenges in this decision-making process. Regional projects, non-profit-organizations, projects that aim at comparably small sums and those that are thematically located in the cultural and creative scene are better placed in donation- and reward-based crowdfunding. Latter is especially interesting for businesses that search for feedback from the crowd concerning a new product or service in form of a market test. In donation- and reward-based crowdfunding, the feeling of a warm glow is a major motivator among supporters.⁴³ Therefore, project initiators face the challenge of creating an emotional bond and community feeling among their supporters. In turn, earlier research also indicates that particularly for projects, which do not create material rewards, investment-based crowdfunding (debt or equity crowdfunding) can be promising options. Equity crowdfunding offers potentials for the early financing of start-ups and innovation projects of SMEs. Nevertheless, entrepreneurs are obliged to regularly report information to their investors in equity crowdfunding. In comparison to donation-based and reward-based crowdfunding, project initiators in investment-based crowdfunding are often required to develop a convincing business plan. When a decision has been made for a suitable mechanism, the platform choice needs to be well considered, as various different platform types exist and research shows different success rates for responsible projects at different crowdfunding platforms.⁴⁴

Furthermore, the preparation phase also includes an accurate calculation of financial needs and the definition of realistic funding targets and funding duration. Producing an appealing video for the project site also needs to be done before the actual funding phase. An important skill in this respect is the ability of storytelling. Evoking emotions by using a good narrative is an essential tool in order to receive a high number of supporters, especially for responsible entrepreneurs.⁴⁵ The second phase, the communication phase, requires huge effort to establish a community and raise awareness for the upcoming crowdfunding project. Different channels can be addressed, most importantly social media networks. For the acquisition of supporters prior to the funding phase, the initiator has to show a considerable social media affinity. The use of further communication channels is

⁴³ Allison et al. 2013; Gleasure & Feller, 2016

⁴⁴ Hörisch, 2018

⁴⁵ Allison et al., 2013; Dorfleitner et al., 2016

recommendable, such as friends and acquaintances, traditional media and public events. In the actual funding (or realisation) phase, social media activity is comparably important. Regular updates are required on the projects site as well as in various social media channels. Additionally, initiators need to address questions and feedback from the crowd in order to remove any uncertainties and make the campaign and the subsequent use of financial means as transparent as possible. After completing the crowdfunding campaign, the post-funding phase begins, independent of whether the funding target has been reached. In case the crowdfunding campaign was successful, promised rewards are to be distributed to the crowd. The project initiators are well advised to communicate successes and failures openly. In addition, intended propositions are realised and financial means are used according to the propositions that were made on the project site.

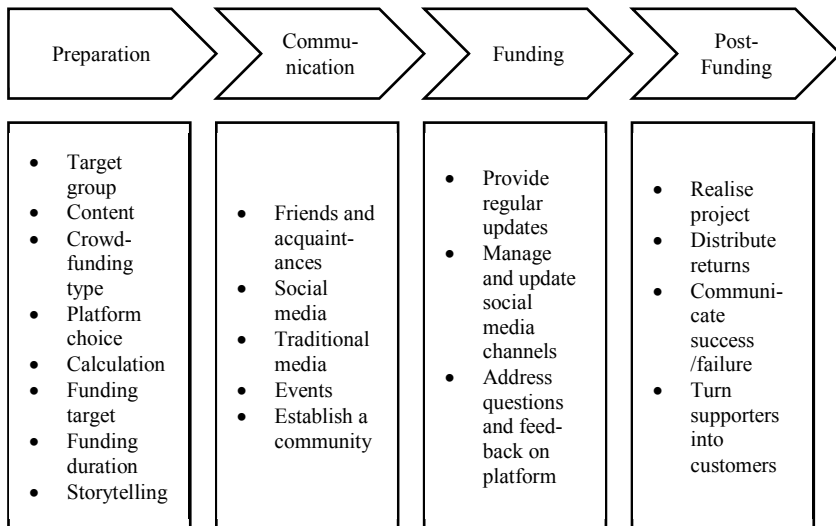


Figure 3: Phases of Conducting a Successful Crowdfunding Campaign⁴⁶.

Particularly the post-funding phase has received only scant attention in prior research on responsible entrepreneurship.⁴⁷ However, this phase is of crucial importance with regard to many aspects of crowdfunding. For example, if a crowdfunding campaign primarily served marketing purposes, the entrepreneurs need to make sure to turn supporters of the crowdfunding project into regular customers

⁴⁶ Content based on Pirringer, 2016

⁴⁷ Jovanovic, 2018

and to make use of the increased attention in social media during the crowdfunding phase. Also, for the context of responsible entrepreneurs, who aim at solving environmental or social inequalities, this phase is of particular importance. Currently, only little regulation exists which enforces the entrepreneurs to use the money for the social or environmental purposes that they marketed during the actual crowdfunding campaign. Existing research highlights that while most entrepreneurs indeed deliver the promised returns, delivery is frequently delayed.⁴⁸ Relatedly, for the specific context of entrepreneurship in the realm of combating climate change, it was found that the disclosure on the actual environmental benefits created with the money raised via crowdfunding is frequently deficient. For the future development of crowdfunding as a means to finance and advertise responsible entrepreneurial projects, meeting the expectations of the crowd in the post-funding phase will be of utmost importance.

2.2 Best Practice Example: *Fairafric*

The potential of crowdfunding to finance responsible entrepreneurship has attracted a growing number of ventures, which decided to use crowdfunding as a means for financing and marketing. A particularly successful example is the case of *fairafric*.⁴⁹ *Fairafric* is a fair-trade and organic chocolate producer, which realises nearly the entire value creation-process in Ghana, Africa. It aims for the reduction of inequalities and the improvement of social standards among the African population by increasing employment rates, salaries and access to education and health care. Its positive contribution to the African society makes it a showcase for responsible entrepreneurship.

Fairafric was founded in 2016 by Hendrik Reimers and is located in Munich. Since the launch of the venture, several crowdfunding campaigns have enabled and facilitated its growth and success. Altogether, the start-up has undergone five successful crowdfunding campaigns and is currently in the fund-raising process of the sixth one (as of March 2020). In total, over 370,000 EUR has been received so far by past crowdfunding projects, excluding the current campaign, which aims at funding 1.5 to 2.0 million USD.⁵⁰

In its campaigns, *fairafric* made use of different types of crowdfunding. Three campaigns have been started on the international donation- and reward-

⁴⁸ Mollick, 2014

⁴⁹ Besides the documented sources, the following case study is based on a semi-structured interview with Julia Gause, Sales Manager at *fairafric*.

⁵⁰ Fairafric, 2020b

based platform Kickstarter. The first campaign⁵¹ was conducted in 2016 and aimed at funding 15,000 EUR. Drawing on 843 supporters, in total a funding amount of 29,516 EUR could be realised. The second campaign⁵² on Kickstarter followed a year later in 2017 with 1,152 supporters and a funding amount of 49,222 EUR, while the third campaign⁵³ was conducted in 2018 with 61,638 EUR funded by 1,130 supporters. In each campaign, *fairafrik* communicated a specific purpose for which the financial resources were required. While the first funding was used as seed money to get the production started, the second campaign collected funds in order to finance the organic certification of its products. In the third Kickstarter campaign, the crowd enabled climate neutrality of the start-up and the launch of the *fairafrik* foundation. Because Kickstarter is an internationally recognised platform, the geographical scope among the supporters was fairly wide.

Besides three reward-based crowdfunding projects on Kickstarter, *fairafrik* has also conducted two campaigns on the British equity crowdfunding platform Seedrs. The first campaign on Seedrs⁵⁴ was launched in 2017 (closed in 2018) and reached around 138,000 EUR funded by a total of 264 investors. The second campaign⁵⁵ using equity crowdfunding (closed in 2019) collected a funding amount of approximately 1,243,000 EUR from 165 investors. Of this amount, 93,000 EUR was raised by the crowd whereas 1,150,000 EUR derived from two large capital investors. Since Seedrs is a British crowdfunding platform, the two campaigns mainly addressed supporters within Europe. While the previously introduced reward-based crowdfunding campaigns on Kickstarter functioned as financing instrument, marketing tool and market test similarly, the use of equity crowdfunding on Seedrs merely aimed at the acquisition of financial resources, as investors are not necessarily interested in receiving the product per se. In comparison, by offering rewards in form of products, supporters provide valuable feedback to a company. *Fairafrik* is, for example, able to assess, which new type of chocolate flavour sparks the interest of the crowd. Furthermore, *fairafrik* aimed at mobilising the crowd and raising public awareness for its unique business idea. The difference in scopes between its reward-based and investment-based crowdfunding campaigns is indicative for the more general characteristics of these types of crowdfunding. In donation and reward-based crowdfunding, the overall funding amount as well as the amount funded per supporter are usually smaller than

⁵¹ Kickstarter, 2018b

⁵² Kickstarter, 2018a

⁵³ Kickstarter, 2019

⁵⁴ Seedrs, 2020a

⁵⁵ Seedrs, 2020b

in investment-based crowdfunding, while the number of supporters tends to be higher.

During its crowdfunding campaigns, *fairafric* attached special importance to a number of success factors, which have also been identified by past academic literature. An important learning effect has been achieved with regard to the project video. The level of professionalism in the videos has increased over time. Compared to the first project video, which was filmed with a mobile phone, more recent videos are supported by an employee who has expertise and equipment for professional filmmaking, such as a drone for showing the production site from an aerial perspective. Within its project videos, *fairafric* proves its competence in storytelling and evoking emotions of potential supporters. Moreover, all crowdfunding campaigns were intensively communicated and advertised on *fairafric*'s social media sites (such as Facebook and Instagram) and the regular newsletter in order to grow its community and find new supporters. Especially 'early-bird' teasers on Facebook turned out to be an important tool to develop a dynamic in collecting funds right from the start of the campaign. Furthermore, regular updates have been posted on the platforms. In this respect, an advantage of conducting several campaigns on the same platform is that investors of earlier campaigns can be informed about the new campaign by using the update function.

In its early years, *fairafric* was confronted with hesitation among banks and conventional investors and turned to crowdfunding as a consequence, due to a lack of available alternatives. Recently, however, *fairafric* started a cooperation with two shareholders, who provide support in terms of expertise and financial resources. Its current crowdfunding activities can thus no longer be understood as a last resort⁵⁶, because conventional investors are no longer reluctant to invest in *fairafric*. *Fairafric* plans to establish a new solar-powered, state of the art chocolate factory in rural Ghana in the near future. For its realisation, approximately 5.0 million USD are needed. While one part of it will be financed by shareholders, equity and bank loans, another major part will be received from the crowd. The choice fell on (subordinated) debt crowdfunding with a funding goal of up to 2.0 million USD. Such an ambitious funding target can hardly be collected by using reward-based crowdfunding. In contrast to earlier conducted crowdfunding campaigns, no crowdfunding platform is involved in the current fundraising project. Due to its large community, *fairafric* decided to run its own campaign directly on its homepage.⁵⁷ As a consequence, legal requirements restrict direct advertisements in social media, which usually play an important role to gain supporters. However, the campaign's success cannot be denied, since an amount of almost

⁵⁶ cf. Walthoff-Borm et al., 2018

⁵⁷ Fairafric, 2020a

1.5 million EUR has already been received (as of March 2020). Moreover, prominent support was received from the president of Ghana, Nana Addo Dankwa Akufo-Addo, and the German Chancellor Angela Merkel, representing two important third-party endorsements. The campaign mainly addresses investors in German speaking countries (Germany, Austria, and Switzerland). When the fundraising period ends, an annual interest rate of 5% within nine years will be paid to the investors.

In spite of the current debt crowdfunding campaign, *fairafri*c remains faithful to its roots in reward-based crowdfunding and is already planning another crowdfunding campaign on Kickstarter. The goal is to conduct a market test for new product ideas like chocolate-coated fruits, nuts and coffee. Since products are offered as rewards, this campaign will help to assess which product idea raises the highest interest among the crowd. In addition, collected funds are used in order to pre-finance ingredients and production costs.

*Fairafri*c has been chosen as a best practice example because the start-up was continuously accompanied by the crowd thanks to a number of different crowdfunding campaigns. The crowd holds a considerable impact of where the start-up stands today and in which direction it will develop in future. It further shows that supporters in crowdfunding are willing to support entrepreneurs taking responsibility to reduce social and environmental injustice in the world.

3 Outlook and Propositions

Based on the overview provided in this chapter, propositions on crowdfunding for responsible entrepreneurship can be formulated. First, various empirical studies document that crowdfunding can indeed serve as an additional source of financing for responsible entrepreneurship.⁵⁸ The outstanding crowdfunding success of *fairafri*c emphasizes this potential. This insight is particularly relevant, as the importance of crowdfunding in financing ventures is growing. Based on a prediction by the World Bank, it is expected that crowdfunding will be the most important form of financing new ventures from 2020 on.⁵⁹ Combining these two developments of a general growth of crowdfunding and the insight that crowdfunding favours responsible entrepreneurship, a first proposition on crowdfunding for responsible entrepreneurship can be formulated:

⁵⁸ Allison et al., 2013, 2015; Calic & Mosakowski, 2016, Vismara, 2019

⁵⁹ Messeni Petruzelli et al., 2019

Proposition 1: The importance of crowdfunding in financing responsible entrepreneurial activity is growing.

Besides the quantitative growth of the global crowdfunding volume, qualitative changes occur, which can be summarized as a growing professionalization of the crowdfunding market. This shift towards higher levels of professionalization is not only reflected in cases such as the crowdfunding history of *fairafric*. It is also indicated by increasing attention crowdfunding receives by regulation and by a general shift towards investment-based crowdfunding. The latter comes along with growing funding amounts per funder. Therefore, a second proposition is as follows:

Proposition 2: Crowdfunding for responsible entrepreneurial activities experiences a growing professionalization.

With regard to the funding of responsible entrepreneurial activity via crowdfunding, one of the crucial aspects for the future development of crowdfunding will be whether responsible crowdfunding projects deliver the public benefits that they have advertised during the actual crowdfunding campaign. One factor influencing this development will doubtlessly be the regulation of the crowdfunding market, which currently focuses on the delivery of private benefits of funders, but not on the delivery of public benefits, which are characteristics of responsible entrepreneurship. Research on crowdfunding for responsible entrepreneurship is therefore advised to increasingly investigate the post-funding phase of crowdfunding.

Proposition 3: The future development of crowdfunding as a means to finance responsible entrepreneurial activity depends on the ability of crowdfunding campaigns to deliver the private and public benefits advertised during the campaigns as well as on related regulatory activity.

Future research should try to verify these propositions empirically and should focus on the aspects of crowdfunding, which have received only scant attention so far, such as the marketing function or the motivations of supporters in crowdfunding.

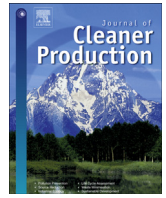
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Crowdfunding sustainable entrepreneurship: What are the characteristics of crowdfunding investors?



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ABSTRACT

By addressing the financing gap for sustainable entrepreneurs, crowdfunding holds great potential to tackle environmental and social issues. Characterizing the target group of crowdfunding projects can enhance their funding success because a higher number of supporters can be attracted. Still, little knowledge is available about the types of supporters who invest in sustainability-oriented crowdfunding projects. Therefore, this study identifies such supporters' socio-demographic characteristics and individual values based on Schwartz's theory of basic human values. Drawing on a data set of 282 respondents from the German population, the typical supporter of sustainability-oriented crowdfunding projects is young, well-educated, familiar with crowdfunding and holds low levels of self-enhancement and conservative values. Based on these insights, recommendations are made for project initiators, as well as platform providers, which include specifically targeting younger, well-educated individuals with rather liberal and less-conservative values.

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1. Introduction

Entrepreneurship offers great potential as a means to transform economies toward sustainable development (Johnson and Schaltegger, 2020; Terán-Yépez et al., 2020). The concept of sustainable entrepreneurship emerged in recent decades and aims to develop products, services, or processes that help preserve the environment and social communities (Shepherd and Patzelt, 2011). However, the market launch of entrepreneurial ventures in general (Cassar, 2004), and sustainable entrepreneurship in particular (Ridley-Duff, 2009; Vismara, 2019), often faces difficulties in securing funding from conventional financing mechanisms. In this respect "the opportunity to invest in 'sustainability' seems overpowered by the success of 'quick-win investment formats'" (Bocken, 2015: 9). As a consequence, alternative financing models have emerged, such as ethical banking, social impact investment, and sustainable venture capital (Bocken, 2015; Rizzi et al., 2018). Usually, these alternative financing models still involve professional investors and standard financial intermediaries (such as banks). Another financing channel through which to fund sustainable

entrepreneurship is crowdfunding, which offers individuals (i.e., private or "restricted" investors [Vismara, 2019]) the opportunity to support the launch of sustainable start-ups without the need for standard financial intermediaries. Various studies have noted that funding from the "crowd" provides a successful tool for financing sustainable entrepreneurship (e.g., Calic and Mosakowski, 2016; Hörisch and Tenner, 2020; Lehner, 2013). Therefore, it bears great potential for facilitating sustainable development. As traditional investors frequently regard sustainable entrepreneurship as unprofitable and fraught with risk, crowdfunding is expected to act as a supplemental financing instrument for such projects (Calic and Mosakowski, 2016; Lehner, 2013; Ridley-Duff, 2009).

Crowdfunding describes the process of financing specific projects "by drawing on relatively small contributions from a relatively large number of individuals using the internet, without standard financial intermediaries" (Mollick, 2014: 2). Prior research has examined factors that facilitate sustainability-oriented crowdfunding projects' success (Böckel et al., 2020; Hörisch, 2018; Tenner and Hörisch, 2020). However, little is known about crowdfunders who finance sustainable entrepreneurship. Past research dealing with crowdfunders' characteristics so far has concentrated on crowdfunders in general (Bretschneider and Leimeister, 2017; Gerber and Hui, 2013). Still, the identification of specific characteristics and values of individuals who support sustainability-

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oriented crowdfunding projects could boost these projects' funding and marketing success by helping project managers to better target potential funding sources. To determine which segments of the population are worth targeting for sustainability-oriented crowdfunding projects and how they can be characterized, this paper's aim is to *identify socio-demographic characteristics and individual values of supporters of sustainability-oriented crowdfunding projects*.

In this effort, two important contributions are made. First, in contrast to the personal traits and characteristics of professional investors in sustainable entrepreneurship (e.g., Lange and Valliere, 2020; Palacios-González and Chamorro-Mera, 2018), it remains unstudied so far which types of private investors are most likely to support sustainability-oriented crowdfunding projects and which individual values they embody. The latter will be approached by applying the theory of basic human values, which distinguishes between four value clusters: self-enhancement values; self-transcendence values; openness-to-change values; and conservative values (Schwartz 1992, 1994; Stern et al., 1998). These values serve as guiding principles for human behavior and form individuals' personalities (Schwartz, 2012). By applying the theory of basic human values in our study, research gaps identified by Mochkabadi and Volkmann (2018), Gerber and Hui (2013), and Bretschneider and Leimeister (2017) are addressed that encourage future researchers to expand our knowledge of crowdfunders' personal traits. The theory has not been used to identify crowdfunders' psychographic characteristics before; therefore, its application promises new insights for crowdfunding literature.

Second, an imbalance exists with regard to the methodologies used in research on crowdfunding sustainability-oriented projects. Most studies so far have concentrated on analyzing data derived from project sites on crowdfunding platforms (e.g., Bento et al., 2019; Calic and Mosakowski, 2016; Hörisch, 2015; Hörisch and Tenner, 2020; Vismara, 2019). Conclusions on funders' preferences and motives primarily are drawn based on these crowdfunding projects' funding successes, but when it comes to analyzing crowdfunders' characteristics, the information provided on the project page is insufficient. The number of studies that consider the supporter's perspective by directly surveying or interviewing crowdfunders is limited (for exceptions, see Bretschneider and Leimeister, 2017; Cecere et al., 2017; Pierrakis, 2019). In particular, the supporter's perspective on sustainability-oriented crowdfunding projects remains unstudied so far; thus, this is the first study to use a survey of (potential) crowdfunders to characterize supporters of sustainability-oriented crowdfunding projects. In choosing individual members of the crowd as the unit of analysis, this article goes beyond earlier work on crowdfunding in the sustainability realm, as surveying members of the crowd allows for directly capturing crowdfunders' characteristics and values.

The remainder of the paper is structured as follows. The following section provides an overview of existing research on crowdfunders' characteristics, followed by the development of hypotheses. In Section 3, the methodological approach is explained, then the study's findings are presented in Section 4. The last section provides a discussion of the results and draws implications for theory and practice.

2. Literature review and development of hypotheses

In the scientific literature, four crowdfunding types can be differentiated in terms of rewards that supporters receive in return for their investment (Hörisch, 2018; Mollick, 2014; Vasileiadou et al., 2016). In donation-based crowdfunding, supporters do not receive any compensation in return for their support. Material or immaterial rewards are offered in reward-based crowdfunding usually in the form of the product or service to be funded. Equity

and debt crowdfunding are investment-based mechanisms. Comparable to the stock market, investors in equity crowdfunding receive profit shares in return for their investment. In debt crowdfunding, investors are promised an interest payment that will be disbursed within a predefined time period.

In contrast to traditional investment mechanisms (such as banking and credit institutions), and independent of crowdfunding type, a successful crowdfunding campaign fulfills more than just the financing function. In fact, crowdfunding frequently is used as a marketing instrument to attract new customers (Hörisch, 2018), or as a market test for newly developed products, by assessing whether the crowd is interested in what the crowdfunding campaign is offering (Belleflamme et al., 2014; Lam and Law, 2016). Thus, successful crowdfunding campaigns provide numerous advantages for initiators of sustainability-oriented projects.

Past literature already has identified success factors for crowdfunding projects in general (Anglin et al., 2018; Belleflamme et al., 2013; Bi et al., 2017; Mollick, 2014) and sustainability-oriented crowdfunding projects in particular (Bento et al., 2019; Calic and Mosakowski, 2016; Hörisch, 2015; Hörisch and Tenner, 2020; Vismara, 2019). However, the academic understanding of crowdfunding for sustainability-oriented projects remains in its infancy (Arshad et al., 2020). Bento et al. (2019: 8) generally note that supporters of sustainability-oriented crowdfunding projects "*prefer to support initiatives which contribute to a sustainable cause they perceive as important.*" However, little is known about these supporters' socio-demographic characteristics or individual values. Several researchers have begun to analyze crowdfunders in general, but the question remains open whether supporters of sustainability-oriented crowdfunding projects differ from ordinary crowdfunders.

2.1. Crowdfunders' socio-demographic characteristics

Several researchers identified supporter characteristics in crowdfunding, but with no specific focus on sustainability-oriented crowdfunding projects. Bretschneider and Leimeister (2017) conducted an online survey to identify motivations that cause supporters to invest in crowdfunding projects. In this respect, altruistic motivations and the pursuit of recognition are found to be important players in crowdfunders' investment decisions. Gerber and Hui (2013) came to similar conclusions after conducting qualitative interviews with participants in the crowdfunding process. According to their findings, supporters of crowdfunding projects are driven to help others and support ideas that match their individual principles. Moreover, receiving rewards of any type (material, immaterial or monetary) was found to affect crowdfunding investment decisions (Bretschneider and Leimeister, 2017; Gerber and Hui, 2013). Based on a survey of 500 crowdfunders, Cecere et al. (2017) reported a warm-glow effect, in which individuals invest in crowdfunding projects to receive feelings of self-satisfaction. Further extant literature focused on the influence of trust and personal relationships on crowdfunders' investment behavior and found that different dimensions of trust act as mediators in the decision-making process (Kang et al., 2016), while management skills and personal relations do not appear to affect this relationship significantly (Voigt et al., 2019).

Apart from psychographic factors, several studies have characterized conventional (i.e., not sustainability-oriented) crowdfunders in terms of socio-demographic characteristics. Considering that crowdfunding is a relatively new, internet-based phenomenon (Ordanini et al., 2011) that is highly dependent on social media (Borst et al., 2018; Gerber and Hui, 2013; Laurell et al., 2019), it can be expected that crowdfunding projects' supporters are relatively young. Evidence for this assumption is provided by Bretschneider

and Leimeister (2017), who reported an average age of 39 among crowdfunders in debt crowdfunding. Moreover, past literature suggests a greater likelihood of younger individuals being concerned about the environment (Diamantopoulos et al., 2003). In line with these findings, sustainability-oriented projects' supporters can be expected to be relatively young. Thus, the first hypothesis is presented:

H1. *Younger individuals are more likely to invest in sustainability-oriented crowdfunding projects.*

Furthermore, it can be assumed that household income levels affect the likelihood of investing in sustainability-oriented crowdfunding projects. Compared with other forms of financial investment, crowdfunding is also possible with small sums. Therefore, crowdfunding is an investment opportunity that is accessible to supporters with relatively low income levels. Two reasons reinforce the assumption that individuals with relatively low income levels are more likely to support sustainability-oriented crowdfunding projects. First, supporters of sustainability-oriented crowdfunding projects are expected to be driven primarily by altruistic motivations and a desire to receive a warm-glow feeling for themselves (Allison et al., 2013; Cecere et al., 2017; Gleasure and Feller, 2016), which also is known to be evoked from relatively small contributions (Vismara, 2019). Second, it can be expected that high-income investors would focus their investment decisions on the stock market or other forms of traditional investing, while low-income investors would instead decide to invest their money in crowdfunding projects. Thus, it can be assumed that supporters of such projects do not rely on a high income. On this basis, Hypothesis 2 is stated below:

H2. *Individuals with lower income levels are more likely to invest in sustainability-oriented crowdfunding projects.*

Several researchers have studied gender effects on crowdfunders' decision-making processes. Furthermore, studies on both reward-based crowdfunding (Cecere et al., 2017) and investment-based crowdfunding (debt and equity) (Bretschneider and Leimeister, 2017; Hervé et al., 2019; Mohammadi and Shafi, 2018) found that they attracted mostly male investors. According to Hervé et al. (2019), as well as Mohammadi and Shafi (2018), the reason for this imbalance is that males demonstrate a higher tolerance for financial risks than females. Considering that sustainability-oriented projects are fraught with risk and uncertainties compared with conventional projects (Dickel et al., 2018; Hart, 1995), it can be expected that risk-averse individuals avoid such investments. Therefore, although women generally show a higher level of environmental concern (Jones and Dunlap, 1992; Schahn and Holzer, 1990), the number of male supporters of sustainability-oriented crowdfunding projects is assumed to be higher. This also is strengthened by the fact that environmental behavior levels do not differ between men and women, despite different levels of environmental concern (Tindall et al., 2003). Therefore, Hypothesis 3 is formulated as follows:

H3. *Men are more likely to invest in sustainability-oriented crowdfunding projects.*

Another important characteristic of crowdfunders is their formal education levels. Several extant studies have provided evidence of a dominance by highly educated individuals among crowdfunders. In particular, Bretschneider and Leimeister (2017) found that 66% of their survey participants who were contacted as users of the crowdfunding platform Innvestment have university degrees. Similarly, approximately half the sample in a study conducted among active crowdfunders by Pierrakis (2019) have

comparable degrees. Furthermore, individuals with above-average educational levels demonstrate greater environmental concern than less-educated individuals (van Liere and Dunlap, 1980). As explained by Kollmuss and Agyeman (2002: 248), "the longer the education, the more extensive is the knowledge about environmental issues." On this basis, it can be expected that individuals with higher formal education levels are more likely to support sustainability-oriented crowdfunding projects. The corresponding hypothesis is formulated below:

H4. *Individuals with above-average formal education levels are more likely to invest in sustainability-oriented crowdfunding projects.*

Besides the socio-demographic factors described above, potential supporters of sustainability-oriented crowdfunding projects need a certain level of familiarity with the crowdfunding concept. Considering that crowdfunding is a relatively new investment mechanism (Ordanini et al., 2011), trust issues among potential investors may occur, for example, with regard to receiving promised rewards and the implementation of advertised measures in the post-funding phase (cf. Hörisch, 2019). For this reason, it can be argued that individuals who are familiar with the crowdfunding concept are more likely to invest in a crowdfunding project. Familiarity with crowdfunding increases as a result of positive experiences and growing knowledge about crowdfunding. Consequently, Hypothesis 5 is formulated accordingly:

H5. *Individuals with higher levels of familiarity with crowdfunding are more likely to invest in sustainability-oriented crowdfunding projects.*

2.2. Crowdfunders' basic human values

Values determine individuals' self and personality, and they act as motivators for their actions (Schwartz, 2012). Shalom H. Schwartz (1992, 1994) developed the theoretical framework behind this assumption, known as the theory of basic human values. Values are defined as "desirable trans-situational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity" (Schwartz, 1994: 21). In accordance with this definition, six main features frequently are used to describe human values (Schwartz 1992, 1994, 2012): Values are (1) beliefs that (2) relate to desirable goals that motivate behavior. (3) They transcend specific situations or actions, thereby distinguishing them from situational attitudes and norms. Moreover, (4) values serve as criteria or guiding principles for evaluating and making decisions about actions, people, and events. Each individual (5) ranks these values hierarchically according to their relative importance. Thus, individuals set different priorities when they rank their values, which eventually (6) guide their actions (Schwartz, 2012).

Since the 1990s, the theory of basic human values frequently was applied to characterize individuals, groups, societies, and cultures to determine motivations behind their actions (Schwartz, 2012). In total, ten basic human values were identified, which are not necessarily in the exact same hierarchical order for each individual (Schwartz 1992, 1994): tradition; conformity; security; self-direction; stimulation; hedonism; universalism; benevolence; power; and achievement. These values can be categorized into four overarching value clusters: self-enhancement values; self-transcendence values; openness-to-change values; and conservative values (Schwartz 1992, 1994; Stern et al., 1998).

This study's purpose is to characterize supporters of sustainability-oriented crowdfunding projects by applying these four overarching value clusters as adopted by Stern et al. (1998). In this regard, self-enhancement values include power, achievement,

and hedonistic values. According to Schwartz (2012), power describes the individual need for status, prestige, and authority, while achievement values include the pursuit of success by demonstrating competence. Moreover, hedonists strive for pleasure and self-satisfaction in their lives (Schwartz, 2012).

Self-transcendence and self-enhancement values are in conflict with each other and lead to different behaviors. Unlike self-enhancement values, universalism and benevolence are sub-values of self-transcendence values. Individuals with a high level of universalism are understanding, tolerant, and protective of the environment and society, while benevolence describes the care and protection of people with whom the individual is in personal contact (such as friends and family) (Schwartz, 2012). Based on these insights, individuals who attach great importance to self-enhancement values are assumed to show a lower probability of supporting sustainability-oriented crowdfunding projects, as supporting such projects requires altruistic, rather than self-enhancing, values (Allison et al., 2013; Cecere et al., 2017; Gleasure and Feller, 2016). In turn, individuals who prioritize self-transcendence values in their hierarchical order are assumed to possess a higher probability of supporting sustainability-oriented crowdfunding projects because they attach greater importance to protecting people and nature. Thus, Hypotheses 6 and 7 are formulated as follows:

H6. *Individuals with high levels of self-enhancement values are less likely to invest in sustainability-oriented crowdfunding projects.*

H7. *Individuals with high levels of self-transcendence values are more likely to invest in sustainability-oriented crowdfunding projects.*

Conservative individuals cherish tradition, security, and conformity. In accordance with Schwartz (2012), tradition refers to an individual's appreciation of and commitment to religious or cultural customs and ideas, whereas security entails safety and stability for oneself, personal contacts and the wider society. Furthermore, in line with the theory of basic human values, conformity motivates obedient, self-disciplined, and polite actions

while restraining behavior that acts against societal norms and expectations. Conservatism strongly contrasts with openness-to-change values (Schwartz, 2012). As the term indicates, individuals with high openness-to-change levels are receptive to new ideas, products, and technologies. Of the ten sub-values formulated by Schwartz (1992, 1994), self-direction, stimulation, and hedonism were assigned to this openness-to-change value cluster. Schwartz (2012) describes self-directed individuals as independently thinking and acting, while stimulation refers to a varied and exciting life. It can be assumed that supporters of sustainability-oriented crowdfunding projects demonstrate higher openness-to-change levels and, consequently, lower conservatism levels because crowdfunding generally is a novel financing mechanism that is dependent on the internet and social media networks (Ordanini et al., 2011). In addition, sustainability-oriented projects are innovative and facilitate change (Shepherd and Patzelt, 2011). On these grounds, Hypotheses 8 and 9 are stated below:

H8. *Individuals with high openness-to-change levels are more likely to invest in sustainability-oriented crowdfunding projects.*

H9. *Conservative individuals are less likely to invest in sustainability-oriented crowdfunding projects.*

A summary of the hypotheses presented above is presented in Fig. 1.

3. Methodology

To test the relevance of the characteristics and values identified in the literature review empirically, a quantitative research design was chosen. This approach also allows for comparing the results with earlier research on conventional supporters of crowdfunding campaigns that do not focus on sustainable development (e.g., Bretschneider and Leimeister, 2017; Cecere et al., 2017; Pierrakis, 2019). For this reason, an online survey was conducted. The survey addressed different, specifically selected groups of respondents.

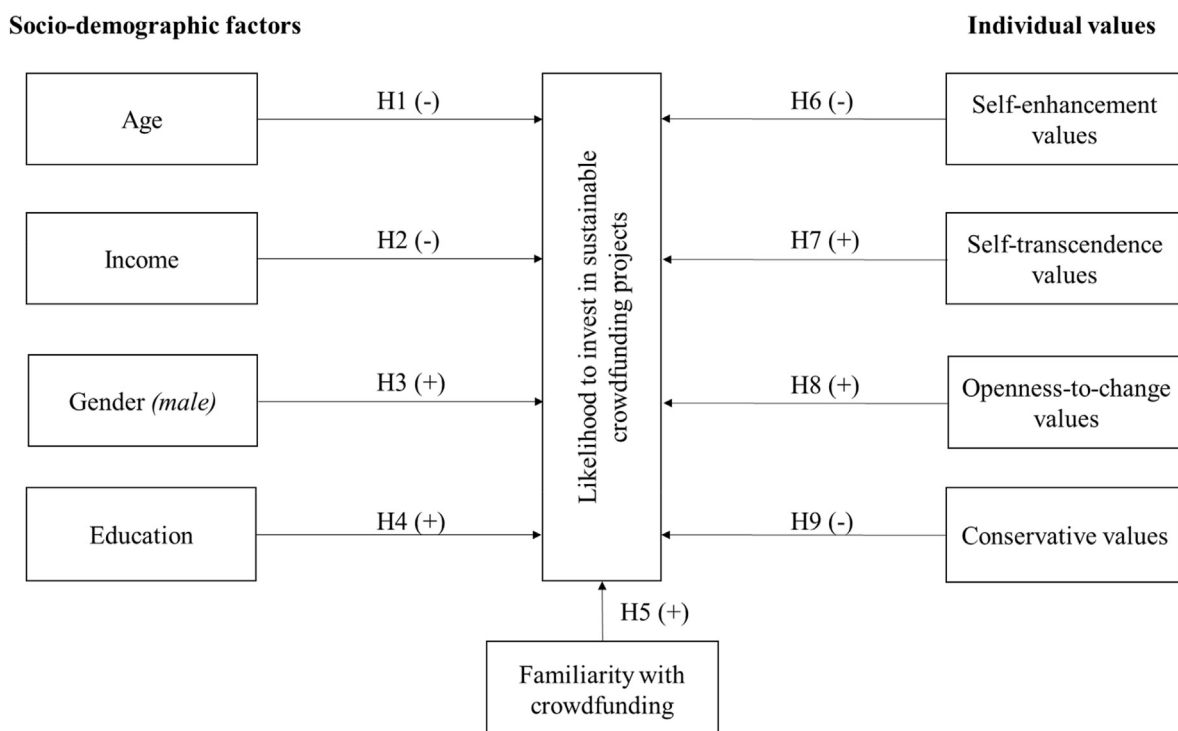


Fig. 1. Summary of hypotheses.

First, 200 individuals representative of the German population with regard to age, gender, and education were surveyed. However, as it can be expected that only a small portion of the German population is active in crowdfunding sustainability-oriented projects, the second target group comprised active crowdfunders on German sustainability-oriented crowdfunding platforms, so that these crowdfunders can be compared with the average of the population. For this purpose, a collaboration with two German crowdfunding-platforms was established (the reward-based platform *Ecocrowd* and the investment-based crowdfunding platform *LeihDeiner-UmweltGeld*). Both platforms included a link to the survey in the e-mail that crowdfunders received as confirmation directly after their funding action, as well as in their newsletter. Overall, 83 responses from users of these crowdfunding platforms were collected, but one respondent stated that the total amount invested in crowdfunding was negative, which was evaluated as an unrealistic response. Consequently, this respondent was excluded from the analysis. Thus, the final sample comprised 282 responses. All respondents were incentivized, as incentivizing respondents was found to decrease bias and improve response quality (James and Bolstein, 1990).

To capture the dependent variable – sustainability-oriented crowdfunding investments – participants first were asked whether they have ever funded at least one crowdfunding project. Subsequently, participants who answered yes to this question were asked to specify the number of supported environmentally oriented and socially oriented crowdfunding projects they helped funding. To avoid too much focus on environmental and social issues, the survey also asked respondents about their investments in projects related to culture and sports. This quantitative measure – requiring respondents to state a specific number of projects – was taken instead of directly asking whether respondents funded sustainability-oriented projects to reduce the risk of social desirability bias (Dickel et al., 2020). Drawing on the questions on the number of environmentally and socially oriented projects invested in, a dummy variable was built to differentiate crowdfunders who have invested in either environmental or social crowdfunding projects ($n = 93$) from the rest. This variable was used as the dependent variable for testing the hypotheses on support for sustainability-oriented projects.

Among the independent variables, an individual's self-enhancement values, self-transcendence values, openness-to-change values, and conservative values were assessed, as presented by Schwartz (1992, 1994) in the theory of basic human values. Based on this theory, two common instruments have been used frequently in empirical research: the Schwartz Value Survey (Schwartz, 1992) and the Portrait Values Questionnaire (Schwartz et al., 2001). The Schwartz Value Survey uses 57 items to address the aforementioned ten values. The Portrait Values Questionnaire was developed as an alternative to the Schwartz Value Survey for use predominantly with children. Because the Schwartz Value Survey is relatively long – and, thus, impractical – in most survey questionnaires due to time constraints, a significantly shorter instrument, the “brief inventory of values,” was developed by Stern et al. (1998), focusing on overarching self-enhancement, self-transcendence, openness-to-change, and conservative values. Against this backdrop, Stern et al. (1995, 1998) developed a reliable and valid instrument that initially was used to analyze environmental attitudes and behavior (Stern et al., 1995). The frequently applied instrument, developed by Stern et al. (1998), was included in the survey, which uses three items for each of the four value clusters suggested by Schwartz (1992, 1994). For each value cluster, the three respective items' mean was calculated, and the reliability analysis showed sufficiently high levels of Cronbach's α (Cronbach's $\alpha_{\text{self-enhancement}} = 0.652$; Cronbach's $\alpha_{\text{self-transcendence}} = 0.686$;

Cronbach's $\alpha_{\text{openness-to-change}} = 0.710$; Cronbach's $\alpha_{\text{conservatism}} = 0.616$), given that the number of items per construct is smaller than ten (Loewenthal, 2004).

Concerning socio-demographic factors, respondents stated their household income per month. A dummy variable was used to differentiate individuals with household incomes smaller than 2250€ from individuals with higher household incomes. The threshold of 2250 € was chosen to split the sample, as well as the German population, into two roughly equal halves. Likewise, respondents stated their gender, year of birth, and highest formal education level achieved. The dummy variable “gender” differentiates male respondents from the rest. Furthermore, dummy variables on age (≥ 50 years) and education (holding at least a university entrance qualification) were included as control variables, as they split the sample, as well as the German population, into roughly equal halves concerning age and education. To capture an individual's familiarity with crowdfunding, four items were designed specifically for this survey. This construct's reliability was confirmed by a Cronbach's α of 0.811. An overview of all included variables and their operationalization is provided in Table 1.

Table 2 displays descriptive statistics, as well as a correlation matrix, for all variables. It documents that the analysis is not affected by multi-collinearity, as none of the correlations between the independent variables within one model is higher than 0.8 (Kennedy, 1992).

4. Results

To assess the hypotheses developed in Section 2, a binary logistic regression analysis was conducted (Table 3). This method was chosen for two reasons. First, the dependent variable is binary; thus, more standard techniques such as ANOVA or linear regression analyses could not be applied. Second, logistic regressions are more robust than, for example, discriminant analyses. Additionally, the sample size of 282 clearly exceeds the required threshold of at least 25 observations per category for the dependent variable (Lourenço and Branco, 2013; Menard, 1995). The model in Table 3 uses “sustainability-oriented crowdfunding supporters” as the dependent variable, and it explains a large share of the variance in this dependent variable, indicated by a Nagelkerkes r^2 value of 0.614. The omnibus test confirms the model's significance. Concerning the socio-demographic variables' influence, Table 3 documents that age significantly affects the likelihood of supporting sustainability-oriented crowdfunding projects negatively, which supports Hypothesis 1. However, we did not find support for Hypotheses 2 and 3, as neither income nor gender significantly affect the likelihood of supporting sustainability-oriented crowdfunding projects. Instead, the positive, significant regression coefficient for education suggests that individuals with higher education levels are significantly more likely to invest in sustainability-oriented crowdfunding projects, which supports Hypothesis 4. Likewise, we found support for Hypothesis 5, as the effect from familiarity with crowdfunding on likelihood to invest in sustainability-oriented crowdfunding projects is positive and significant.

The negative, significant regression coefficient of self-enhancement values documents that individuals with higher levels of such values are less likely to invest in sustainability-oriented crowdfunding projects, which supports Hypothesis 6. However, we did not find significant effects for self-transcendence values or openness-to-change and, thus, could not confirm Hypotheses 7 and 8. Yet, individuals with higher levels of conservative values were found to be significantly less likely to invest in sustainability-oriented crowdfunding projects, supporting Hypothesis 9. Table 4 provides an overview of the evaluation of the hypotheses.

Table 1
Operationalization of variables.

Variable	Operationalization
Sustainability-oriented crowdfunding supporters	1 = supporters of sustainability-oriented crowdfunding projects 0 = non-supporters of sustainability-oriented crowdfunding projects
Age	1 = 50 years and older 0 = younger than 50 years
Income	1 = household income higher than 2250€ per month 0 = household income equal to or lower than 2250€ per month
Gender	1 = male 0 = female/diverse
Education	1 = university entrance degree or higher 0 = lower than university entrance degree
Self-enhancement values	Mean value of three items assessed on a five-point rating scale ranging from “5 = high levels of self-enhancement values” to “1 = low levels of self-enhancement values” Item 1: authority, the right to lead or command Item 2: influential, having an impact on people and events Item 3: wealth, material possessions, money
Self-transcendence values	Mean value of three items assessed on a five-point rating scale ranging from “5 = high levels of self-enhancement values” to “1 = low levels of self-enhancement values” Item 1: protecting the environment, preserving nature Item 2: social justice, correcting injustice, care for the weak Item 3: a world at peace, free of war and conflict
Openness-to-change values	Mean value of three items assessed on a five-point rating scale ranging from “5 = high levels of self-enhancement values” to “1 = low levels of self-enhancement values” Item 1: a varied life, filled with challenges, novelty, and change Item 2: an exciting life, stimulating experiences Item 3: curious, interested in everything, exploring
Conservative values	Mean value of three items assessed on a five-point rating scale ranging from “5 = high levels of self-enhancement values” to “1 = low levels of self-enhancement values” Item 1: family security, safety for loved ones Item 2: honoring parents and elders, showing respect Item 3: self-discipline, self-restraint, resistance to temptation
Familiarity with crowdfunding	Mean value of four items assessed on a five-point rating scale, ranging from “5 = high levels of self-enhancement values” to “1 = low levels of self-enhancement values” Item 1: I could explain to another person what crowdfunding is about. Item 2: I have never heard about crowdfunding before. (reverse-coded) Item 3: I have profound knowledge about crowdfunding. Item 4: I know many people who already have supported a crowdfunding project.

Table 2
Descriptive statistics and correlation analysis.

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
1 Sustainability-oriented crowdfunding supporters	.33	.471	1									
2 Age	.50	.501	-.209**	1								
3 Income	.53	.500	.144*	-.064	1							
4 Gender	.54	.499	.205**	-.157**	.166**	1						
5 Education	.45	.498	.487**	-.113	.221**	.144*	1					
6 Self-enhancement values	2.69	.764	-.144*	-.146*	.026	.112	-.115	1				
7 Self-transcendence values	4.27	.685	-.023	.155**	-.016	-.181**	.016	-.045	1			
8 Openness-to-change values	3.5	.786	.099	-.190**	.082	-.025	.204**	.354**	.268**	1		
9 Conservative values	4.1	.675	-.270**	.050	.031	-.134*	-.216**	.281**	.398**	.224**	1	
10 Familiarity with crowdfunding	2.72	1.144	.605**	-.202**	.253**	.254**	.535**	.031	-.070	.174**	-.223**	1

**p < 0.01; *p < 0.05; N = 282.

5. Discussion and conclusion

Besides alternative financing models – such as ethical banking, social impact investment, and sustainable venture capital (Bocken, 2015; Rizzi et al., 2018) – crowdfunding provides an effective tool for financing sustainability-oriented projects and, thus, holds great potential to facilitate sustainable development. Nevertheless, little work characterizing supporters of sustainability-oriented projects has been conducted so far. Therefore, this paper’s goal was to identify socio-demographic characteristics and individual values of individuals supporting sustainability-oriented crowdfunding projects.

Regarding socio-demographic characteristics, the typical supporter of sustainability-oriented crowdfunding projects is younger than 50 and holds at least a university entrance degree. These

findings are compatible with past literature on conventional crowdfunders. For example, Bretschneider and Leimeister (2017) also reported that most German crowdfunders are in their late 30s. When considering education level, individuals with above-average formal education levels show a higher probability of supporting sustainability-oriented crowdfunding projects. This finding corresponds with results from previous studies focusing on conventional crowdfunders (Bretschneider and Leimeister, 2017; Pierrakis, 2019). Furthermore, gender and income did not significantly affect investment decisions in sustainability-oriented crowdfunding. Therefore, earlier research on crowdfunding in general by Cecere et al. (2017), Bretschneider and Leimeister (2017), Hervé et al. (2019), Mohammadi and Shafi (2018), and Pierrakis (2019), that reported a dominance by male crowdfunders could not be supported by this investigation of sustainability-oriented

Table 3
Binary logistic regression analysis.

Dependent variable	Sustainable Crowdfunding		
Independent variables	Regression Coefficient	Standard Error	Odds Ratios
Age	-0.706*	0.378	0.493
Income	-0.318	0.398	0.728
Gender	0.355	0.399	1.427
Education	1.073**	0.413	2.924
Familiarity with crowdfunding	1.840**	0.296	6.295
Self-enhancement values	-0.671*	0.289	0.511
Self-transcendence values	0.099	0.298	1.104
Openness to change	0.007	0.283	1.007
Conservatism	-0.590*	0.314	0.554
Constant Term	-3.070*	1.617	0.046
Model Fit			
Nagelkerke's r ²	0.614		
N	282		
Sig. Omnibus Test	.000		

p values are based on one-sided tests of significance as directed hypotheses were tested (cf. Cho and Abe, 2013): **p < 0.01; *p < 0.05; †p < 0.1.

Table 4
Evaluation of hypotheses on sustainability-oriented crowdfunding supporters.

Hypothesis	Evaluation
H1 Younger individuals are more likely to invest in sustainability-oriented crowdfunding projects.	Supported
H2 Individuals with lower income levels are more likely to invest in sustainability-oriented crowdfunding projects.	Not supported
H3 Men are more likely to invest in sustainability-oriented crowdfunding projects.	Not supported
H4 Individuals with above-average formal education levels are more likely to invest in sustainability-oriented crowdfunding projects.	Supported
H5 Individuals with higher levels of familiarity with crowdfunding are more likely to invest in sustainability-oriented crowdfunding projects.	Supported
H6 Individuals with high levels of self-enhancement values are less likely to invest in sustainability-oriented crowdfunding projects.	Supported
H7 Individuals with high levels of self-transcendence values are more likely to invest in sustainability-oriented crowdfunding projects.	Not supported
H8 Individuals with high openness-to-change levels are more likely to invest in sustainability-oriented crowdfunding projects.	Not supported
H9 Conservative individuals are less likely to invest in sustainability-oriented crowdfunding projects.	Supported

crowdfunding.

Aside from socio-demographic factors, this study's findings also show that individuals who are highly familiar with crowdfunding are more likely to support sustainability-oriented crowdfunding projects. Considering that crowdfunding is a relatively young instrument through which to invest money (Ordanini et al., 2011), crowdfunding seems to require a certain knowledge of this mechanism, for example, to overcome trust issues concerning promised material or financial rewards. This is an interesting insight, as it has not been assessed yet, neither in sustainability nor conventional crowdfunding contexts.

For purposes of identifying personal values that motivate individuals to support sustainability-oriented crowdfunding projects financially, the theory of basic human values was applied. As hypothesized, individuals with high levels of self-enhancement and conservative values are less likely to invest in sustainability-oriented crowdfunding projects. Potential reasons for this outcome are myriad. First, individuals who attach great importance to self-enhancement values strive for power, status, and prestige (Schwartz, 2012). These ambitions contrast with typical crowdfunding motivations as identified in past research. In particular, Allison et al. (2013), Cecere et al. (2017), and Gleasure and Feller (2016) determined altruistic motivations and warm-glow feelings to be major reasons for individuals' support for sustainability-oriented crowdfunding projects, while financial rewards remained subordinate. Thus, individuals looking for status and prestige seem to prefer bigger investments via traditional financing mechanisms. Second, conservative individuals appreciate conformity, security, and tradition (Schwartz, 2012). These values conflict with the idea behind crowdfunding. Crowdfunding is a relatively new, internet-based phenomenon (Ordanini et al., 2011) that depends on online financial transactions and unfamiliarity with the

project initiator. Thus, crowdfunding runs multiple risks, such as financial loss, non-delivery of promised rewards or that the money invested is used for other purposes than promised. These insecurities might discourage conservative individuals from investing in sustainability-oriented crowdfunding projects. Surprisingly, no influence was found for self-transcendence and openness-to-change values, which were predicted to exert a positive effect on the likelihood of investing in sustainability-oriented crowdfunding projects. Thus, regarding these values, no significant difference exists between individuals who already supported sustainability-oriented crowdfunding projects and those who did not. However, as both constructs contrast with the aforementioned values, it can be assumed that influential factors that diminish the likelihood of supporting sustainability-oriented crowdfunding projects (e.g., self-enhancement and conservative values) are stronger than those that are assumed to increase this likelihood (i.e., self-transcendence and openness-to-change values).

Based on this investigation's findings, several insights and implications can be drawn for research and practice. In terms of research, new insights were gained regarding crowdfunding characteristics and motives, addressing the research gap proposed by Mochkabadi and Volkmann (2018), Gerber and Hui (2013), and Bretschneider and Leimeister (2017). Moreover, this study's findings tie in with past literature, which identified professional investors' characteristics in sustainable entrepreneurship (e.g., Lange and Valliere, 2020; Palacios-González and Chamorro-Mera, 2018). To our knowledge, this is the first study to characterize private investors supporting sustainability-oriented ventures via crowdfunding. Another contribution to future research is the development of an approach for measuring a supporter's familiarity with crowdfunding. Based on its high reliability level, it is recommended for use in future scientific surveys in crowdfunding research.

Moreover, this is the first time a survey was conducted to examine sustainability-oriented crowdfunders' characteristics. Thus, this study expands on findings by Calic and Mosakowski (2016), Vismara (2019), Hörisch (2015), Hörisch and Tenner (2020), and Bento et al. (2019), who investigated sustainability-oriented crowdfunding projects' success factors by conducting content analyses on crowdfunding platforms. In addition, this is the first study to apply Schwartz's (1992, 1994) theory of basic human values for characterizing crowdfunders. While prior studies have generalized crowdfunders' motivations, for example, by highlighting the warm-glow effect's importance (e.g., Cecere et al., 2017), this investigation's results call for a more nuanced analysis, suggesting that individuals' differing values might influence their motivations to support crowdfunding projects. Therefore, future research should test the warm-glow effect for investors with different values, as for example warm-glow effects might be less common among individuals with high levels of self-enhancement values. Furthermore, the study also shows that the theory of basic human values in general, and the "brief inventory of values" developed by Stern et al. (1998) in particular, can be applied fruitfully and reliably to the crowdfunding context. Considering that neither conventional nor sustainability-oriented crowdfunders have been characterized using individual values, this paper contributes to both scientific discourses simultaneously.

This study's outcomes are also of high relevance for practitioners. In particular, initiators of sustainability-oriented crowdfunding projects can benefit from a better understanding of their potential target group. Therefore, project information and communication can be adapted to reach as many supporters as possible and specifically target promising investors. The same applies to providers of sustainability-oriented crowdfunding platforms, as they can address potential supporters directly using insights gained from this study. Therefore, both sustainability-oriented project initiators and platforms are recommended to advertise among younger, well-educated individuals with rather liberal and less-conservative values. Groups of individuals with these traits, such as university students or members of specific milieus (e.g., liberal intellectuals, LOHAS; cf. Kuchler-Krischun et al., 2015), can be promising target groups for sustainability-oriented crowdfunding. Practitioners, primarily crowdfunding platforms, also can learn from this study which groups of individuals are currently not supporting sustainability-oriented crowdfunding to a substantial degree, but potentially could be promising target groups to attract in the future. This group primarily includes individuals with high income levels, as their individual contributions could contribute substantially to sustainability-oriented projects' success. Interesting milieus to address for this purpose are not only liberal intellectuals, but also so-called performers and expeditives (cf. Kuchler-Krischun et al., 2015), as these combine high income levels with traits typical among supporters of sustainability-oriented crowdfunding projects, such as low conservatism levels. If sustainability-oriented crowdfunding practitioners use these insights, they are more likely to experience higher success rates, enabling them to realize and implement their proposed intentions.

Besides these insights, this study has limitations. First, the data were collected by approaching different types of crowdfunders; therefore, it remains to be identified in future research which differences exist between supporters in reward-based and investment-based crowdfunding. The latter should be separated further into debt and equity crowdfunding. Moreover, it should be verified whether similar outcomes are achieved for supporters in donation-based crowdfunding, as they have not been included in this study. Second, this study's participants comprised only German citizens. The German context was chosen because the amount funded via crowdfunding in Germany per capita is close to the

European average (Hörisch, 2019; Hörisch and Tenner, 2020). Additionally, research needs for including non-English-speaking contexts (Allison et al., 2013), as well as the German context specifically (Angerer et al., 2017), in crowdfunding research have been identified. Nevertheless, surveying crowdfunders in only one country raises the question of generalizability. Thus, future studies are recommended to validate this investigation's results by surveying different nationalities. Third, although this paper provides a first successful attempt at applying the theory of basic human values in the crowdfunding context, it would be beneficial to conduct a more detailed approach by including each of the ten values proposed by Schwartz (1992; 1994) separately. This would lead to a more fine-grained and sophisticated value profile of sustainability-oriented crowdfunders.

In conclusion, this study reveals which segments of the population currently are supporting sustainability-oriented crowdfunding projects. By identifying socio-demographic characteristics and individual values of such supporters, sustainability-oriented project initiators who aim to raise money via crowdfunding can better address their target groups, and in doing so, increase their funding and marketing success. In this way, crowdfunding can close the funding gap for sustainable entrepreneurship, holding great potential to facilitate sustainable development.

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CRediT authorship contribution statement

Isabell Tenner: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data curation, Writing - original draft, Writing - review & editing, Visualization, Supervision, Project administration. **Jacob Hörisch:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data curation, Writing - original draft, Writing - review & editing, Visualization, Supervision, Project administration.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Diversity matters: the influence of gender diversity on the environmental orientation of entrepreneurial ventures

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Abstract

Environmental entrepreneurship bears great potential to promote sustainable development. Several influencing factors on the level of environmental orientation have been identified by past literature. In this respect, mixed results occur with regard to the influence of gender on environmental entrepreneurship. However, these studies simply investigated the level of a single entrepreneur by distinguishing between male and female individuals, although ventures are increasingly founded by entrepreneurial teams. Consequently, this study quantitatively addresses the research question how the gender of founding teams influences the environmental orientation of entrepreneurial ventures. Based on a dataset of entrepreneurial ventures from the US and Germany, our results indicate that the level of environmental orientation is not dependent on the share of female members, but rather on the gender diversity of the founding team. We conclude that gender diversity within the entrepreneurial team is necessary to address both ecological and economic goals of environmental entrepreneurship. Based on this finding, theoretical and practical implications are drawn, in particular for policy, entrepreneurial teams and entrepreneurship training.

Keywords Gender · Diversity · Environmental entrepreneurship · Founder · Sustainable development

JEL Classification M13 · M21 · Q01 · Q56

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1 Introduction

Environmental entrepreneurship has received much attention in recent years due to its potentials for stimulating sustainable development (Dean and McMullen 2007; Lenox and York 2011; Fellnhofer et al. 2014; Gast et al. 2017). It can be defined as “*the process of discovering, evaluating, and exploiting economic opportunities that are present in environmentally relevant market failures*” (Dean and McMullen 2007, p. 58). The insight that environmental entrepreneurs promote sustainable development triggered a debate on what factors positively influence the emergence of environmentally oriented entrepreneurship. In-depth knowledge exists about influencing factors on the national and political level (Meek et al. 2010; Hörisch et al. 2017). Researchers have also started dealing with influencing factors on the individual level (Kuckertz and Wagner 2010; Hörisch et al. 2017) and specifically with the influence of gender (Braun 2010; Hechavarría et al. 2012; Hechavarría 2016; Hörisch et al. 2017).

Still, two research gaps emerge with regard to past literature focusing on the influence of gender on the environmental orientation of ventures. First, former studies partly depicted women as having an influence on the level of environmental orientation of a venture. These studies focussed either on the director board of corporate ventures (Kassinis et al. 2016; Ben-Amar et al. 2017) or on single entrepreneurs of small businesses (Braun 2010; Hechavarría et al. 2012, 2017; Hechavarría 2016; Hörisch et al. 2017). Yet, an increasing number of new ventures are founded by entrepreneurial teams (Henneke and Lüthje 2007; West 2007; Klotz et al. 2014). For this reason, there remains a need to assess whether gender also holds a significant influence on the environmental orientation of entrepreneurial ventures in case several founding members exist, who start the venture as an *entrepreneurial team*. Second, previous work that deals with the influence of gender on the environmental orientation of entrepreneurial ventures so far only differentiated between female and male founders by using a bivariate variable (e.g. Braun 2010; Hechavarría et al. 2012, 2017; Hechavarría 2016; Meek and Sullivan 2018). Still, entrepreneurial teams may also represent both genders. Therefore, the question arises whether gender diversity in entrepreneurial teams holds an influence on the degree of a ventures’ environmental orientation. So far, past literature only addressed this question on the corporate level by examining gender diversity among the board of directors in large organisations. However, large organisations differ in establishing their environmental orientation compared to smaller entrepreneurial ventures (Hockerts and Wüstenhagen 2010): while environmental entrepreneurs often integrate idealistic ideas right from the launch of a venture, large organisations frequently face the challenge to implement such ideas retrospectively into existing business routines. These different approaches call for analysing the effect of gender diversity on the environmental orientation for entrepreneurial ventures separately.

In order to approach the above-mentioned research gaps, this study addresses the research question *how the gender of founding teams influences the environmental orientation of entrepreneurial ventures*. In doing so, it contributes to existing literature by analysing two competing discourses, which lead to alternative hypotheses. It

will be investigated whether the environmental orientation of entrepreneurial ventures is dependent upon the share of women or, alternatively, upon the gender diversity among the founding team. In this way, this study helps to clarify our understanding of gender as an important influencing factor of environmental entrepreneurship, which, in turn, holds great potential to promote sustainable development.

For the empirical analysis, a dataset of 315 entrepreneurial ventures was collected from crowdfunding platforms in the US and Germany. The share of women refers to the percentage of female members within the founding team. In contrast, the gender diversity is highest if male and female founding members are represented in equal parts (i.e. 50% men and 50% women). Since the Blau Index is a common measure for gender diversity (Blau 1977), it will be applied in this study. To our knowledge, this is the first study that does not only distinguish between male and female entrepreneurs, but assesses the gender diversity of entrepreneurial teams. An important contribution is made to existing literature by recognising that an increasing number of new ventures are founded by entrepreneurial teams rather than single individuals (Henneke and Lüthje 2007; West 2007; Klotz et al. 2014).

Based on previous findings of different gender roles in the work environment (e.g. Rigg and Sparrow 1994; Schein et al. 1996; Ryan et al. 2011), we argue that for environmental entrepreneurship, which aims at producing “*economic and ecological benefits*” (Thompson et al. 2011, p. 220), both, female and male expertise and caches of knowledge are beneficial in order to fulfil the two responsibilities successfully. Our results indicate that the level of environmental orientation is dependent on gender diversity rather than the share of females within the founding team. The environmental orientation in gender diverse entrepreneurial teams is higher compared to entrepreneurial teams dominated by either gender. This finding emphasises the strong positive societal effect of gender diverse entrepreneurial teams to tackle environmental issues and contribute to sustainable development.

The remainder of the paper is structured as follows. The next section presents extant literature on how gender influences environmental orientation on the corporate and entrepreneurial level. On this basis and informed by previous research on different types of gender diversity, two alternative hypotheses are developed at the end of section two. The third section describes the quantitative methodology, the dataset and the measurement constructs. The results of the empirical analysis are presented in section four, while the last section discusses the findings and presents theoretical and practical implications.

2 Literature review

2.1 The influence of gender on the environmental orientation of ventures

The emergence of environmentally oriented ventures is determined by various factors such as environmental pressures, state-sponsored incentives, bureaucratic barriers, social norms or demographic characteristics of the entrepreneur (Meek et al. 2010; Hörisch et al. 2017). Several studies have already revealed a significant influence of gender on pro-environmental behaviour, by showing that women are

generally more environmentally conscious than men (Tindall et al. 2003; Kennedy and Kmec 2018). The question arises whether the gender effect can also be regarded as an influencing factor on the level of environmental orientation of organisations. Past literature has addressed various aspects of this question.

Mixed results occur with regard to the influence of gender composition of director boards on environmental orientation in large organisations. Glass et al. (2016) for example quantitatively analysed data of Fortune 500 organisations and found that gender diverse boards are not necessarily more environmentally oriented than purely male boards. In line with their findings, Alazzani et al. (2017) revealed that, among Malaysian firms, the presence of female directors positively affect a companies' engagement towards social issues. However, their results indicate that firms' environmental performance does not increase as a result of gender diverse boards. Galbreath (2018) came to similar conclusions with regard to Australian corporations by showing that gender diversity is related to social responsiveness but does not impact environmental quality. In contrast, Kassinis et al. (2016) reported that female directors on the boards of US firms raise the environmental consciousness of the corporation. Based on The Canadian Spencer Stuart Board Index, Ben-Amar et al. (2017) also confirmed that the presence of female board directors increase the likelihood to respond to carbon disclosure questionnaire, which is regarded as a first step to reduce greenhouse gas emissions. However, this positive effect is only significant in case a critical mass of two women on the board is reached (Ben-Amar et al. 2017). By looking at these studies, which addressed gender influences on the environmental orientation of large corporations, the question arises whether such effects also occur in the field of entrepreneurial ventures.

Much research in recent years has focused on gender influences on the environmental orientation of entrepreneurial ventures by distinguishing between female and male entrepreneurs. Based on data from the Global Entrepreneurship Monitor 2009, Hechavarría et al. (2012) indicated that women are more likely to engage with environmental entrepreneurship. In turn, male entrepreneurs tend to show a higher engagement with conventional entrepreneurship (Hechavarría et al. 2012), while their engagement with environmental issues remains weak (Hörisch et al. 2017). This phenomenon was also demonstrated by Hechavarría (2016, p. 158) who stated that "*female founders in societies with strong gender roles are slightly more likely to create ecological ventures as compared to male entrepreneurs*". She identified gender socialisation stereotypes as major reinforcement for women to be more environmentally oriented. In another investigation on small- and medium-sized Australian ventures, female entrepreneurs were found to be generally more concerned about environmental issues compared to male entrepreneurs; however, these positive attitudes are not automatically connected to corresponding behaviour (Braun 2010). Despite the above-mentioned studies, Meek and Sullivan (2018) could not find support for female entrepreneurs having higher levels of environmental orientation among US franchising ventures. Likewise, an investigation by Hechavarría et al. (2017) revealed that female founders rather tend to create social values whereas no significant effect was identified for gender influences on environmental value creation.

The question arises whether not only the gender of a single entrepreneur influences a venture's orientation towards environmental issues but how the gender composition of

the team affects environmental orientation. Two alternative hypotheses will be developed in the following sub-section in order to approach this question.

2.2 Conceptual framework and development of hypotheses

As summarised above, past literature provides indication that gender influences the environmental orientation of an entrepreneurial venture. In the following, two conceptual models by Harrison and Klein (2007) and Thompson et al. (2011) are combined to explain this potential influence. Harrison and Klein (2007) established a conceptual framework by differentiating between different types of diversity. Diversity can be defined as “*the distribution of differences among the members of a unit with respect to a common attribute*” (Harrison and Klein 2007, p. 1200). In the context of the present study, *unit* refers to the founding team of an entrepreneurial venture, while the gender of each founding member represents the *attribute*. With reference to diversity, Harrison and Klein (2007) differentiate between separation, variety and disparity. *Separation* describes the difference between unit members regarding their opinions, values or positions towards a specific issue, measured on a continuous scale. The group is homogenous if all members provide a similar position on this issue. In turn, a high diversity can lead to dissimilarities and disagreement within the group (Harrison and Klein 2007). Diversity as *variety* describes differences in knowledge, experience and skills of members within a unit. Variety is assessed categorically by distinguishing different sources of information (e.g. education). The maximum variety is achieved in case each category is represented within the group. It enriches the “*cognitive and behavioural repertoire*” (Harrison and Klein 2007, p. 1204) of a unit and improves problem-solving and decision-making abilities within the group. Diversity as *disparity* refers to the difference between social values, such as status, power or salary. Disparity is highest if one member surpasses the others within the same unit.

According to Harrison and Klein (2007), gender diversity is multifarious because men and women are suggested to vary on different levels, such as beliefs, knowledge and power. Against this background, gender diversity can also be assessed through the lenses of separation, variety and disparity. In terms of separation, men and women can hold opposing attitudes towards a specific subject, for example environmental issues (cf. Schahn and Holzer 1990). Different educational backgrounds of men and women (cf. McWhirter 1997; Buchmann et al. 2008) provide a reason to approach gender diversity as variety, whereas power differences between both genders (cf. Ridgeway 2011) rather justifies applying the disparity lenses. In this study, gender diversity will be assessed by using the concept of separation for our first hypothesis and variety for the second hypothesis.

As discussed in the previous section, female founders are found to have a stronger commitment towards environmental entrepreneurship compared to their male counterparts (Braun 2010; Hechavarría 2016; Hörisch et al. 2017). This can be explained by the fact, that women hold a stronger attitude towards environmental issues in general (Tindall et al. 2003; Kennedy and Kmec 2018). Socialisation stereotypes were identified as major driver for women to be more environmentally oriented in

the entrepreneurship area, as they are traditionally raised as ‘caretakers’ (Hechavarría 2016). Against this backdrop, gender diversity can be assessed as separation, provided that the attitude towards environmental issues is assessed on a continuous scale. Since women tend to show a higher concern towards environmental problems, they are expected to implement environmental measures within the venture to a higher extent if they are among each other. Consequently, gender diversity (i.e. the equal representation of women and men) does not lead to the highest level of entrepreneurial environmental orientation. It can rather be expected that the level of environmental orientation increases continually with the share of females in the entrepreneurial founding team. With reference to Harrison and Klein’s (2007) concept of separation, a homogenous female founding team is more harmonious and expected to hold stronger similarities with respect to environmental attitudes. Therefore, our first hypothesis is formulated as follows:

H1: The higher the share of female members among the founding team, the higher the environmental orientation of an entrepreneurial venture.

Beside the attitude towards environmental issues, male and female founding members also vary in their expertise and caches of knowledge due to different educational and functional backgrounds (McWhirter 1997; Ackerman et al. 2001; Buchmann et al. 2008). Consequently, specific gender roles evolved among female and male managers according to their skills. In a study conducted in five different countries, Schein et al. (1996) reported a strong tendency of management students to perceive managers to have typical male characteristics. This association was also evident in a study by Ryan et al. (2011), however, they specified that the ‘think manager—think male’ phenomenon is stronger in companies that show a good performance. In times of a crisis, female expertise were preferred over male traits. This is argued to be due to the tendency of most women in managerial positions to show more concern for people (e.g. employees, clients) while men are reported to be rather distant and focus on work effort and traditional values (Rigg and Sparrow 1994).

Thompson et al. (2011) distinguished between different types of entrepreneurship. In their framework social entrepreneurship is strongly linked to the non-profit sector by aiming at tackling relevant social issues and not focusing on generating profits. Findings by past literature reveal that the expertise of women are important for and indeed prevailing in social entrepreneurship. Hechavarría et al. (2012, 2017) for example report that female entrepreneurs tend to show a higher social orientation than male entrepreneurs do. In contrast, conventional entrepreneurship aims at making profit and therefore a strong bias to male entrepreneurs was identified by past literature (e.g. Malach-Pines and Schwartz 2008; Hechavarría et al. 2012; Swartz and Amatucci 2018). According to Thompson et al. (2011), the goal of environmental entrepreneurship is twofold: on the one hand environmental entrepreneurs aim at making economic profit and on the other hand, they strive for establishing environmental benefits (Thompson et al. 2011). In line with Thompson et al. (2011), we argue that enduring environmental entrepreneurship requires diverse expertise and caches of knowledge in order to address economic and ecological responsibilities. Different categories of expertise, knowledge and skills due to different educational and functional backgrounds represent a promising assessment of gender diversity

as variety. Such variety within a gender diverse entrepreneurial team is likely to tackle the challenges environmental entrepreneurship faces. Furthermore, diversity among teams in the work environment can potentially enhance the creativity and innovativeness by providing different perspectives (Ellemers and Rink 2016). Indeed, on the corporate level, gender diversity of board members is found to be linked to higher levels of environmental orientation (Kassinis et al. 2016; Ben-Amar et al. 2017). On this ground, we set up an alternative hypothesis by assuming that the level of environmental orientation increases with higher levels of gender diversity in an entrepreneurial team. Hypothesis 2 is formulated accordingly:

H2: The higher the gender diversity among the founding team, the higher the environmental orientation of an entrepreneurial venture.

3 Methodology

3.1 Data collection

In order to test the hypotheses, the current study analyses ventures with regard to their gender composition and environmental orientation by using a quantitative research design. The entrepreneurial ventures analysed were selected from entrepreneurial crowdfunding platforms in the US and Germany, the largest north American and respectively European economies. Entrepreneurial ventures using crowdfunding are used as a database as these ventures need to display information on the composition of the founding team. Whereas large corporations are usually required to publish comprehensive information in annual and sustainability reports (see Directive 2014/95/EU), there is a general lack of publicly available data on entrepreneurial ventures. Including ventures that make use of crowdfunding as a database helps to overcome this obstacle of lacking data in entrepreneurship research. Therefore, we use the database also described by Hörisch and Tenner (2020). For this dataset, data on 320 ventures was collected during April 2018 by manually screening content from the US platforms First Democracy VC and Start Engine, as well as the German platforms Seedmatch and Companisto. The selected platforms were the largest crowdfunding platforms in the respective country, which provide open access to the content on the project sites. Furthermore, all of these platforms follow an investment-based mechanism (i.e. offering monetary returns to investors), thus ensuring that all ventures are economically oriented. The sample consists of both, environmentally oriented as well as conventional ventures, as the platforms are thematically open. Furthermore, the dataset involves both, start-ups as well as already established ventures. All ventures using any of these platforms are included in the dataset, although five projects had to be excluded from the sample because they did not provide any information on the gender of the founding team. Thus, the final sample consists of 315 ventures.

Table 1 displays the distribution of the crowdfunding projects among the four investigated crowdfunding platforms. In total, the dataset comprises 188 German and 127 US crowdfunding projects. 136 ventures (43.2%) were founded by single entrepreneurs and 179 ventures (56.8%) by entrepreneurial teams with more than one founder. The average size of the founding team is 1.85 with a standard deviation of 0.954.

Table 1 Distribution of crowdfunding projects among platforms

Platform	N projects	% Projects (%)
Seedmatch	104	33.0
Companisto	84	26.7
First Democracy VC	35	11.1
Start Engine	92	29.2
Total	315	100

3.2 Measures

3.2.1 Dependent variable

For each entrepreneurial venture, the level of *environmental orientation* was assessed by using a manual coding technique, which follows and extends research by Calic and Mosakowski (2016). Two coders independently coded each project according to a seven-point-rating-scale between -3 (strong negative environmental impact) and 3 (strong positive environmental impact), in order to distinguish between different levels of environmental orientation. A coder training was operated in advance, including clear coding instructions. The coding instructions for the dependent variable can be found in Appendix 3. The inter-coder-reliability expressed by Krippendorff's alpha, is 0.807 and hence clearly exceeds the critical value of 0.7 (Krippendorff 2013).

3.3 Independent variables

Within the scope of the data collection, gender was defined as “*the socially constructed characteristics of women and men—such as norms, roles and relationships of and between groups of women and men*” (World Health Organization 2019). Based on this understanding, two variables were determined with regard to the gender of the entrepreneurial founding team. The *share of females* is measured as the percentage of women within the founding team. For capturing *gender diversity*, the Blau Index (Blau 1977) was applied, which is a common measure for gender diversity as variety (cf. Harrison and Klein 2007). The Blau Index is defined as $1 - \sum_{i=1}^n P_i^2$ where n represents the number of categories (i.e. male and female) and P_i denotes the proportion of founding team members in each category (Solanas et al. 2012). The gender of each entrepreneur was determined according to the picture and name of the person, declared as founder, co-founder or chief executive officer.

3.4 Control variables

Based on past literature, several control variables are included in order to capture possible interfering effects on the environmental orientation of ventures. According to past research by Gallo and Christensen (2011), Hörisch et al. (2015) and Doluca et al. (2018), firm size holds a significant positive influence on the level

of sustainability-related activities. Therefore, this study includes the continuous variables *team size* and *maximum target amount* as two measures of the size of the entrepreneurial venture. The variable team size is operationalised as a simple count variable (i.e. the number of team members). The maximum funding target is defined as the highest possible funding amount a venture aims for during their crowdfunding campaign. Furthermore, it can be expected that country-specific differences exist with regard to entrepreneurial environmental orientation (e.g. Hechavarría et al. 2017; Hörisch et al. 2017). Therefore, it is also controlled for *country*, i.e. German (country=0) versus US ventures (country=1). Moreover, the type of *offering* is included as another control variable (e.g. Gallo and Christensen 2011), differentiating service offerings (offering=1) from product offerings (offering=0), which are to be funded by the respective crowdfunding campaign. Additionally, public exposure might hold a significant influence on the level of environmental orientation. Therefore, a link to *social media* sites is included as a further control variable. It is measured as a dummy variable indicating whether social media sites were provided on the crowdfunding site (social media=1) or not (social media=0). Last, the number of *third party endorsements*, operationalised as a count variable is included as a control variable, as ventures endorsed by third parties can be expected to have higher levels of environmental orientation.

4 Results

The descriptive statistics of the dataset are displayed in Table 2, including mean (M), standard deviation (SD) and the correlations between the previously introduced variables. Correlations higher than 0.80 and variance-inflation factors (VIFs) above 10 (Kennedy 1992) indicate problems associated with multicollinearity. In Table 2, no variable shows a correlation higher than 0.8. Thus, the relatively low correlation coefficients as well as the VIF-values displayed in Table 3, indicate that multicollinearity is unlikely to be a concern in the present study.

To test the hypotheses formulated in Sect. 2, linear regression analyses were performed (see Table 3). Model 1 tests whether the share of female founders significantly influences environmental orientation. As displayed in Table 3, model 1 is significant and the adjusted R^2 explains a relevant share of the variance in environmental orientation (adj. $R^2=0.075$). Yet, no support can be found for the first hypothesis, as there is no significant effect of the share of female founders on the environmental orientation of an entrepreneurial venture. In order to ensure that the regression analyses are not affected by extreme values, Cook's Distance was calculated for each observation in the dataset. For model 1, the values for Cook's Distance were well below the critical value of 1 ($D_{\max}=0.160$) (Cook and Weisberg 1995), indicating that the regression analysis is not affected by outliers.

Concerning the alternative hypothesis 2, the positive significant coefficient of the gender diversity variable in model 2 documents that the level of environmental orientation indeed increases with higher levels of gender diversity within the founding team ($b=0.963$; $p<0.05$). Therefore, the second hypothesis can be supported.

Table 2 Descriptive statistics and correlations of variables

Variable	M	SD	1	2	3	4	5	6	7	8	9
1 Env. orientation	0.475	1.004	1								
2 Share of females	9.1640	25.581	-0.003	1							
3 Gender diversity	0.036	0.126	0.127*	0.414**	1						
4 Team size	5.25	3.715	0.035	0.052	0.121*	1					
5 Country	0.40	0.491	-0.050	0.024	0.013	0.130*	1				
6 Max. target amount	2,243,423.54	3,395,695.65	0.144*	-0.040	-0.041	-0.018	-0.166**	1			
7 Offering	0.54	0.499	-0.182**	-0.078	-0.055	-0.065	-0.150**	-0.032	1		
8 Social media	0.36	0.479	-0.028	-0.056	0.006	-0.085	-0.597**	0.068	-0.006	1	
9 Third party endorsements	3.37	4.920	0.150**	0.060	0.042	0.043**	0.147**	-0.147**	-0.135*	0.069	1

* $p < 0.05$; ** $p < 0.01$

Table 3 Regression models

	Control model	Model 1	Model 2
Dependent variable	Environmental orientation		
Independent variables			
Share of females		-0.001 (0.002)	
Gender diversity			0.963 (0.432)*
Team size	-0.003 (0.015)	-0.002 (0.015)	-0.007 (0.015)
Country	-0.349 (0.146)*	-0.352 (0.146)*	-0.364 (0.145)*
Max. target amount	4.371 ⁻⁸ (0.000)**	4.340 ⁻⁸ (0.000)**	4.525 ⁻⁸ (0.000)**
Offering	-0.361 (0.112)**	-0.365 (0.112)**	-0.349 (0.111)**
Social media	-0.323 (0.145)*	-0.328 (0.146)*	-0.326 (0.144)*
Third party endorsements	0.038 (0.012)**	0.038 (0.012)**	0.038 (0.012)**
Constant term	0.713 (0.163)**	0.727 (0.165)**	0.689 (0.162)**
Model fit			
Adj. R ²	0.077	0.075	0.089
P (model)	0.000	0.000	0.000
VIF (max)	1.727	1.730	1.727
N	315	315	315

Dependent variable: Environmental orientation. The cells display the unstandardised regression coefficients. Standard errors are reported in brackets

† $p < 0.1$; * $p < 0.05$; ** $p < 0.01$

Similar to the first model, the values for Cook's Distance stayed below the critical value of 1 ($D_{\max} = 0.192$), hence ensuring that model 2 is not affected by outliers (Cook and Weisberg 1995). Of the control variables, the maximum target amount and the amount of third party endorsements are found to hold a positive effect on the dependent variable. Moreover, ventures offering services tend to be less environmentally oriented compared to those offering products. Similarly, a link to social media sites decreases the level of environmental orientation. Last, German ventures are more likely to show high levels of environmental orientation than US American ventures.

As the proportion of male founding teams is much higher than that of female and gender diverse founding teams, the above summarised results need to be interpreted with care. Gender diverse teams account for only 7.6%, i.e. 24 cases, while 273 are purely male founding teams and 18 are purely female founding teams. Due to these differences in group size, five random subsamples of 42 male founding teams were drawn in a second step, in order to assure approximately comparable groups sizes and consequently increase the robustness of our findings. For this purpose, the same regression analyses as displayed above were performed with each subsample. The corresponding results are documented in the "Appendices 1 and 2". With regard to the first hypothesis, the robustness check confirms the findings drawing on the entire sample by showing that there is no influence of the share of female founding members on the environmental orientation of an entrepreneurial venture, as none of the subsamples shows a significant effect (see Appendix 1). In turn, the effect of

gender diversity on the level of environmental orientation is significant ($p < 0.05$ or $p < 0.01$) for all subsamples (see Appendix 2). Interestingly, the variance explained by these models is consistently higher ($\text{adj. } R^2_{\text{max}} = 0.205$), than of that in model 2 (Table 3), suggesting that the relatively low model fit for the main model can also be explained by the high share of purely male founding teams in the sample. Therefore, the robustness check provides additional support against the assumption that environmental orientation is dependent upon female entrepreneurs (cf. Braun 2010; Hechavarría et al. 2012, 2017; Hörisch et al. 2017). The positive effect of gender diversity on environmental orientation seems to be due to the diversity of the teams and not due to the fact that these teams include females. This finding provides new insights for research and practice, which will be discussed in the following section.

5 Discussion and Conclusion

Prior work has documented the effect gender exerts on the level of environmental orientation of entrepreneurial ventures. However, these studies focused on the level of a single entrepreneur by using a bivariate variable, which simply distinguishes between male and female founders (Braun 2010; Hechavarría et al. 2012, 2017; Hechavarría 2016; Meek and Sullivan 2018). The differentiation between gender diverse and gender homogenous teams on the entrepreneurial level remained unstudied until now. Furthermore, entrepreneurial teams often comprise several members, while past literature only considered lone founders as research objects. Therefore, this study contributes to the current debate by addressing the research question *how the gender of founding teams influences the environmental orientation of entrepreneurial ventures*. In doing so, two competing discourses were addressed by formulating two alternative hypotheses. On the one side, past literature emphasises the dependence of environmental orientation upon female entrepreneurship while on the other side, at least at the corporate level, gender diversity was argued to stimulate high levels of environmental orientation. The results of this investigation indicate that the environmental orientation is higher for entrepreneurial ventures with a gender diverse founding team. In contrast, the share of female members does not exert a significant influence on environmental orientation, as suggested by past literature. Therefore, gender diverse entrepreneurial teams hold the potential to provide strong societal effects by tackling pressing environmental issues and, thus, bear great potential to contributing to sustainable development.

The results of this study are in good agreement with Kassinis et al. (2016) and Ben-Amar et al. (2017) who found that gender diverse boards of directors increase the environmental consciousness of the corporation. Nevertheless, further studies on gender diversity in large organisations could not find any effect on environmental orientation (Glass et al. 2016; Alazzani et al. 2017; Galbreath 2018). Because our study represents a new approach in the entrepreneurship literature, it also goes beyond the existing literature in this field. Contrary to Hechavarría et al. (2012), Hechavarría (2016) as well as Hörisch et al. (2017), who found that female entrepreneurs show higher levels of environmental orientation than male entrepreneurs, our empirical findings revealed that gender diverse teams are more environmentally

oriented than purely male or female teams. Thus, our results are also in line with Meek and Sullivan (2018), who could not confirm for the context of US firms that female entrepreneurs have higher levels of environmental orientation than males.

The findings of this investigation can inform research on both, gender diversity as well as environmental entrepreneurship. First, they demonstrate that Harrison and Klein's (2007) concept of variety can be fruitfully applied to explain why gender diversity raises the level of entrepreneurial environmental orientation. Since environmental entrepreneurship aims at creating "*economic and ecological benefits*" (Thompson et al. 2011, p. 220), the results of this study indicate that female and male expertise and skills are beneficial for a venture to persist and fulfil both responsibilities successfully. Similar to the findings by Rigg and Sparrow (1994), it can be assumed that women tend to show more concern for people and the environment while by tendency men rather seek for profit and work effort. Therefore, entrepreneurial founding teams that consist of both genders show higher levels of environmental orientation.

Based on the insights generated by this article, several practical implications can be drawn for policy and practice as well as for entrepreneurship education that aims at contributing to sustainable development on a societal level. Founders aiming to launch an environmentally oriented venture can be informed by our analysis to consider gender diversity when setting up the entrepreneurial team. Furthermore, we recommend entrepreneurs to consider gender diversity for internal working groups, especially for those aiming to create environmentally oriented business ideas. Still, far more males than females get active in entrepreneurial activity (Malach-Pines and Schwartz 2008; Hechavarría et al. 2012; Swartz and Amatucci 2018). The results of this analysis therefore reveal that increasing the engagement of women in entrepreneurial activity can also stimulate the impact of entrepreneurship to sustainable development. Particularly, if an increase in active female entrepreneurship leads to higher levels of gender diversity in entrepreneurial teams instead of an increase in the number of purely female teams or females pursuing venture creation alone. Moreover, entrepreneurial teams are advised to make their gender diversity transparent and visible in order to represent a variety of skills and competencies to the public or potential investors. Last, with regard to entrepreneurial education that aims at contributing to sustainable development on a societal level, this study suggests that setting up specific courses solely for female students is not the most promising path to increase environmental orientation in entrepreneurship. Rather, we recommend engagement schemes to aim at creating complementary teams to value and combine gender specific skills. Thus, based on our findings, we recommend that if entrepreneurship education aims at supporting sustainable development, it should promote both, environmental orientation and gender diversity.

This study also comes along with limitations, which should be addressed by future research. First, potential problems regarding reverse causality exist, as maybe environmental orientation in venture creation lead to higher levels of gender diversity of the founding team and not vice versa. It could, for instance, be that founding team members are attracted to each other by their homogeneity in environmental orientation, i.e. environmentally oriented founders might attract environmentally oriented co-founders. As females tend to have higher levels of environmental orientation (Braun 2010), one can then expect teams with a higher environmental orientation to also feature a higher

gender diversity, as they attract a higher share of the less represented gender (females). As a consequence, it would not be the gender diversity, which induces the environmental orientation, but rather the homogeneity in environmental orientation that results in founding teams with higher gender diversity. Moreover, stereotypic gender roles identifying women as ‘caretakers’ (Hechavarría 2016) may lead male founders to perceive females with an ecological vision to add more benefit to the venture. Consequently, the possibility exists that it is not the gender diversity that influences the level of environmental orientation but rather the environmental orientation that disproportionately directs a certain gender to the entrepreneurial team. In order to minimise this effect, we derived our independent variables from the core founding team, which initially launched the venture, instead of current members of the wider team at the point of data collection. Still, technically, it was not possible to completely eliminate the above-mentioned issues of reverse causality. Therefore, we call for future qualitative research to replicate our findings by paying particular attention to homogeneity effects among the founding members and by analysing whether environmentally oriented founders are more likely to attract or even actively seek female co-founders.

Second, the incorporated gender roles in Germany and the US are assumed to be similar, since women are widely acknowledged in the labour market in both countries (André et al. 2013), leading to homogenous results in this study. However, since gender is socially constructed and contextual, it varies between different cultures and societies (cf. World Health Organization 2019). The question arises if similar results can be derived for countries that incorporate a different traditional image of women. For example, the involvement of women in social or environmental entrepreneurship in non-Western cultures rather depend upon other influencing factors than in western countries, for example relationship networks (Spiegler and Halberstadt 2018). The findings of this study strongly depend on the gender role within the examined society. Thus, the question arises whether the results can be replicated for countries that incorporate a different traditional image of women. Consequently, future researcher are recommended to replicate our results in other national contexts.

Third, limitations occur with regard to the gender variables. The coding of this variable was carried out based on name and picture of the respective person as proxies for this person’s gender. Therefore, no conclusions can be drawn concerning the influence of the biological sex of a person on environmental orientation of an entrepreneurial venture. We were also unable to include a third category for gender (e.g. “diverse”), which gained increasing importance in recent years. Moreover, gender was only examined as one aspect of diversity. Future studies should test whether additional aspects of diversity also influence the environmental orientation of entrepreneurial ventures, such as age, ethnicity, educational and academic background (Neuschel et al. 2012). In fact, by solely distinguishing between male and female founders, this study focused on surface-level diversity and neglected deep-level diversity, such as opinions, attitudes, values and information (cf. Phillips and Loyd 2006). Future research is recommended to conduct studies on the influence of deep-level diversity on the level of environmental orientation in entrepreneurial ventures. For example, previous experience and attitudes towards ecological vision can be expected to hold a strong effect in this respect, which is worth studying in future.

Fourth, some limitations arise for the conceptual model based on Harrison and Klein (2007), which assumes that women and men hold different expertise and knowledge according to their educational and functional background. However, latter can also be held by the opposite gender.

Fifth, we drew our data on a relatively specific dataset, i.e. entrepreneurial ventures making use of crowdfunding. Thus, further research should replicate the analysis based on more general datasets, such as the Global Entrepreneurship Monitor (Amorós et al. 2013; Bergmann et al. 2014). Last, we analysed the environmental orientation according to the statements made by the entrepreneurs on the crowdfunding page of each venture. However, earlier research indicated that there is a discrepancy between intentions and actual behaviour with regard to environmental orientation in entrepreneurship (Braun 2010; Hörisch et al. 2019). For this reason, we suggest that future research should replicate our findings drawing on data which analyses the implementation of entrepreneurial ideas.

Acknowledging the above limitations, this paper provides a first attempt to analyse the influence of gender diversity on the environmental orientation of entrepreneurial ventures. The abovementioned further research steps can help to extend our knowledge about this phenomenon and, in doing so, help to realise successful environmental entrepreneurship and respectively promote sustainable development.

Appendix

Appendix 1: Robustnesscheck for hypothesis 1

	Model 3a	Model 3b	Model 3c	Model 3d	Model 3e
Dependent variable	Environmental orientation				
Independent variables					
Share of females	-0.001 (0.003)	-0.004 (0.003)	0.002 (0.003)	-0.003 (0.003)	-0.001 (0.003)
Team size	-0.009 (0.035)	-0.009 (0.031)	-0.024 (0.030)	-0.027 (0.027)	-0.031 (0.035)
Country	0.652 (0.476)	0.457 (0.440)	0.117 (0.281)	0.047 (0.299)	-0.056 (0.359)
Max. target amount	2.729 ⁻⁷ (0.000)	3.651 ⁻⁷ (0.000)*	4.973 ⁻⁸ (0.000)*	3.355 ⁻⁸ (0.000)†	-1.036 ⁻⁷ (0.000)
Offering	-0.200 (0.244)	-0.616 (0.227)**	-0.299 (0.223)	-0.410 (0.212)†	-0.433 (0.236)†
Social media	-0.022 (0.313)	-0.153 (0.285)	0.009 (0.286)	-0.330 (0.296)	0.113 (0.319)
Third party endorsements	0.018 (0.026)	0.008 (0.024)	0.004 (0.024)	0.011 (0.021)	-0.012 (0.022)
Constant term	-0.149 (0.634)	0.211 (0.606)	0.432 (0.321)	0.982 (0.336)**	1.149 (0.476)*

	Model 3a	Model 3b	Model 3c	Model 3d	Model 3e
Model fit					
Adj. R ²	-0.031	0.093	0.051	0.068	-0.003
P (model)	0.717	0.042	0.139	0.087	0.460
VIF (max)	3.946	3.850	1.760	2.116	2.629
N	84	84	84	84	84

Dependent variable: Environmental orientation. The cells display the unstandardised regression coefficients. Standard errors are reported in brackets

†p < 0.1; *p < 0.05; **p < 0.01

Appendix 2: Robustnesscheck for hypothesis 2

	Model 4a	Model 4b	Model 4c	Model 4d	Model 4e
Dependent variable	Environmental orientation				
Independent variables					
Gender diversity	1.438 (0.545)*	1.187 (0.517)*	1.822 (0.468)**	1.209 (0.464)*	1.383 (0.518)**
Team size	-0.029 (0.034)	-0.017 (0.031)	-0.052 (0.029)*	-0.037 (0.027)	-0.058 (0.034)†
Country	0.740 (0.456)	0.608 (0.430)	0.114 (0.256)	0.102 (0.286)	0.004 (0.342)
Max. target amount	3.603 ⁻⁷ (0.000)*	4.837 ⁻⁷ (0.000)**	5.564 ⁻⁸ (0.000)**	4.171 ⁻⁸ (0.000)*	-8.287 ⁻⁸ (0.000)
Offering	-0.207 (0.234)	-0.539 (0.221)*	-0.252 (0.202)	-0.360 (0.203)†	-0.387 (0.224)†
Social media	-0.091 (0.301)	-0.157 (0.278)	-0.054 (0.259)	-0.254 (0.279)	0.054 (0.305)
Third party endorsements	0.023 (0.025)	0.013 (0.023)	0.003 (0.022)	0.009 (0.020)	-0.008 (0.021)
Constant term	-0.483 (0.597)	-0.396 (0.574)	0.377 (0.275)	0.690 (0.294)*	0.983 (0.442)*
Model fit					
Adj. R ²	0.053	0.132	0.205	0.133	0.082
P (model)	0.130	0.012	0.001	0.012	0.059
VIF (max)	3.939	3.849	1.742	2.083	2.600
N	84	84	84	84	84

Dependent variable: Environmental orientation. The cells display the unstandardised regression coefficients. Standard errors are reported in brackets

†p < 0.1; *p < 0.05; **p < 0.01

Appendix 3: Anonymised coding instructions for dependent variable

Rate each project according to its environmental orientation.

Bear in mind the following question: Does the project in some way benefit or harm the environment, nature and the Earth's life support systems? Consider both, the founders' motivation as well as the implementation to achieve such goals.

Highly environmentally harmful – 3 – 2 – 1 – 0 – 1 – 2 – 3 highly environmentally friendly

The distances between each rating (from –3 to 3) are of equal size.

Examples:

Rating	Crowdfunding project	Reason for evaluation
– 3	<i>Anonymised#1</i> Offer luxury short-trips with charter airline on request	Short-trips with airplane with low passenger density = highly climate-damaging
– 2	<i>Anonymised#2</i> Sell shares of ski-area in order to develop the area	Skiing + development of the area for touristic use = destruction of flora and fauna
– 1	n.a	n.a
0	<i>Anonymised#3</i> New cancer screening test for women	No direct effect on the environment
1	<i>Anonymised#4</i> Digital quality management system for gastronomy	Paper is saved (as mentioned on project site)
2	<i>Anonymised#5</i> 3D-printer for individually designed children's toys	Environmentally friendly material (recycable), use of green power, produced in Germany (local)
3	<i>Anonymised#6</i> Green insurance company	Revenue is only invested in highly environmentally friendly projects

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