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Tenner, Isabell; Hörisch, Jacob

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

Isabell Tenner<sup>1</sup> · Jacob Hörisch<sup>1,2</sup>

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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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✉ Isabell Tenner  
isabell.tenner@leuphana.de

<sup>1</sup> Centre for Sustainability Management (CSM), Leuphana University Lüneburg, Universitätsallee 1, 21335 Lüneburg, Germany

<sup>2</sup> Yunus Centre for Social Business and Values, Leuphana University Lüneburg, Universitätsallee 1, 21335 Lüneburg, Germany

## 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 <sup>-8</sup> (0.000)**	4.340 <sup>-8</sup> (0.000)**	4.525 <sup>-8</sup> (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 <sup>2</sup>	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 (adj.  $R^2_{\max} = 0.205$ ), 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 <sup>-7</sup> (0.000)	3.651 <sup>-7</sup> (0.000)*	4.973 <sup>-8</sup> (0.000)*	3.355 <sup>-8</sup> (0.000)†	-1.036 <sup>-7</sup> (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 <sup>2</sup>	-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 <sup>-7</sup> (0.000)*	4.837 <sup>-7</sup> (0.000)**	5.564 <sup>-8</sup> (0.000)**	4.171 <sup>-8</sup> (0.000)*	-8.287 <sup>-8</sup> (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 <sup>2</sup>	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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