Exploring entrepreneurship related to the sustainable development goals - mapping new venture activities with semi-automated content analysis

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ABSTRACT

It is widely agreed that humanity faces major sustainability challenges that require immediate action. The Sustainable Development Goals (SDG) are the most recent political call for action in this direction. In this study, we examine what role entrepreneurship in Germany plays in achieving the German SDGs. Thus, we pick up the discussion on sustainable entrepreneurship as a lever for change and search for empirical evidence that entrepreneurs in Germany identify and develop opportunities along the entire SDG spectrum. For our study, we examined a total of 193 venture competitions in Germany, collected data on a total of 588 rewarded ventures and used a semi-automated content analysis process to allocate those ventures to the main 17 SDGs based on their business activities. With our work offer a scalable and repeatable approach to map SDG related activity of new ventures, and we provide a detailed analysis of Germany's entrepreneurship landscape along the 17 SDGs. We found a very heterogeneous distribution of entrepreneurial activities along the goals, but also significant correlations between multiple goals that are frequently addressed jointly. Contrasting entrepreneurial activity along the SDGs with the national overall SDG performance of Germany we identified multiple SDGs that are rarely addressed by entrepreneurs despite strong needs for improvements. The identified patterns constitute a starting point for additional research on the potential of SDG related entrepreneurship and they direct policy makers and entrepreneurs where they can make the largest contribution to the SDGs.

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1. Introduction

The 17 Sustainable Development Goals (SDG) that the General Assembly adopted in September 2015 constitute the most widely accepted agenda for sustainable development today (General Assembly, 2015). They build up on the famous call for sustainable development in the Brundtland Report (Brundtland Commission, 1987) and expand the incomplete Millennium Development Goals (MDG) with their narrow focus on poverty reduction (General Assembly, 2015) to create the first global set of goals addressing all three pillars of sustainability. In doing so, the SDGs pick-up the scientific call for global sustainable development goals (Griggs et al., 2013) and help to keep sustainable development a priority on political agendas worldwide. Today they provide the legitimate political framework upon which governments, civil society, and businesses can plan, measure and communicate their contribution to sustainable development.

The SDGs underline the immediate need to change the unsustainable development path that humanity pursues today. Humanity must take the "*bold and transformative steps which are urgently needed to shift the world on to a sustainable and resilient path*" (General Assembly, 2015). In this transformation, businesses play an important role and particularly entrepreneurs (Apostolopoulos et al., 2018; General Assembly, 2015; Loorbach, Wijsman, 2013; Sullivan et al., 2018; Figge and Hahn, 2004; Hockerts and Wüstenhagen, 2010; Weissbrod and Bocken, 2017; Bocken and Short, 2016). With their ventures, entrepreneurs can create and catalyze the necessary structural changes that incumbents fail to perform for reasons like organizational inertia or the risk to cannibalize or destabilize existing unsustainable business models

(Hockerts and Wüstenhagen, 2010; Lüdeke-Freund et al., 2016). Accordingly, it is of special importance to understand whether and in which areas new ventures support the transition towards sustainable development measured along the 17 SDGs (Apostolopoulos et al., 2018). The last years showed increasing numbers of entrepreneurs and new ventures founded in Germany, especially those focusing on environmental and social challenges (SEND and KPMG DSM 2018). To the authors' knowledge, there is limited scientific research that tries to create transparency on entrepreneurship's role towards achieving the SDGs (e.g. Moon, 2018).

Therefore, we developed a structured and scalable approach that allows to map the activities of new ventures in Germany along the 17 SDGs, assuming that there is theoretical potential for each SDG to be addressed by new ventures (Apostolopoulos et al., 2018; Pomare, 2018). We used software supported semi-automated content analysis (Krippendorff, 2012; Weber, 1992; Neuendorf, 2016) to examine a total of 588 ventures that were rewarded in one of 193 venture competitions in Germany in 2017. By doing so, we can draw conclusions on the activity patterns of German entrepreneurs regarding the national SDG targets.

Current SDG performance in Germany indicates some great progress in reducing poverty, improving education and fostering innovation. But on the other hand, major challenges remain towards responsible consumption and production, climate, as well as life below water (rf. Fig. 1), underlining the urgent need for contribution to achieve the SDGs.

Our data reveal a very heterogeneous distribution of entrepreneurial activities along the SDGs as well as a significant correlation between goals that entrepreneurs frequently address together. For the interpretation of the results, we contrasted the SDG activity of entrepreneurs in Germany with the national overall SDG performance (Sachs et al., 2017). This revealed in which areas entrepreneurship already contributes strongly to sustainable development and in which areas there is a strong need.

Following this introduction, we discuss existing attempts to progress measurement along the SDGs. Then, we outline the methodology we used to map the SDG contribution of German ventures, we present our empirical results, and we discuss the findings and limitations of our approach.

2. Theoretical foundation

2.1. Measuring country level progress along the SDGs

To date, SDG progress measurement relies on national statistical authorities or independent researchers that so far focus on the national progress along the SDGs (United Nations, 2017; Nilsson et al., 2016; Costanza et al., 2016; Sachs et al., 2017). To our knowledge, the contribution of a specific stakeholder group — like entrepreneurs — to the achievement of the SDGs is not tracked scientifically.

Experiences from the measurement of national SDG progress show that measurement is challenging as there are interaction effects, trade-offs and vaguely defined goals (United Nations, 2017; Nilsson et al., 2016; Costanza et al., 2016; Sachs et al., 2017). Already the official resolution states that there is a gap in data collection and that in some cases there are no clear numerical targets (General Assembly, 2015). These problems explain the challenge to comprehensively and consistently measure progress towards the SDGs. However, measuring progress on the 2030 Agenda is crucial to properly manage the transformation to sustainability. Accordingly, there are numerous attempts to overcome the stated challenges on the national level (United Nations, 2017; Nilsson et al., 2016; Costanza et al., 2016; Sachs et al., 2017). In the context of progress measurement Costanza et al. (2016) explain well that in theory, it is necessary to track progress with an integrated system dynamics model that captures all interdependencies between the goals, but in practice progress is mostly tracked separately for each of the 17 SDGs in a dashboard logic (Costanza et al., 2016). Sachs et al. (2017) provide a good example of such a dashboard. For each SDG the dashboard integrates a wide range of statistical indicators on a national level and communicates the progress performance in a traffic light logic. For instance, Germany's performance for SDG 1 (no poverty) has been rated green as all three indicators for SDG 1 are above a predefined threshold. Used indicators are the poverty headcount ratio at \$1.90/day today and in 2030 as well as the poverty rate after taxes and transfers (cf. Sachs et al., 2017).

2.2. New ventures and their contribution to the SDGs

In the business sphere we could not find similar attempts to track and aggregate progress in a dashboard logic — neither for large corporates nor small and medium-sized enterprises. Existing guidelines as the SDG compass focus on measurement and reporting for large corporates linking SDG progress to sustainability reporting efforts (Global Reporting Initiative et al., 2015). Additionally, there are studies on social/sustainable entrepreneurship that focus on specific sustainability dimensions like the environment (Weiß and Fichter, 2015), studies that are based on self-assessment surveys (SEND and KPMG DSM 2018) and there are studies that combine self-assessment and expert assessments (Engström et al., 2018).

But there is a lack of more objective, data-driven approaches to assess the contribution of entrepreneurs to the SDGs. Hence,
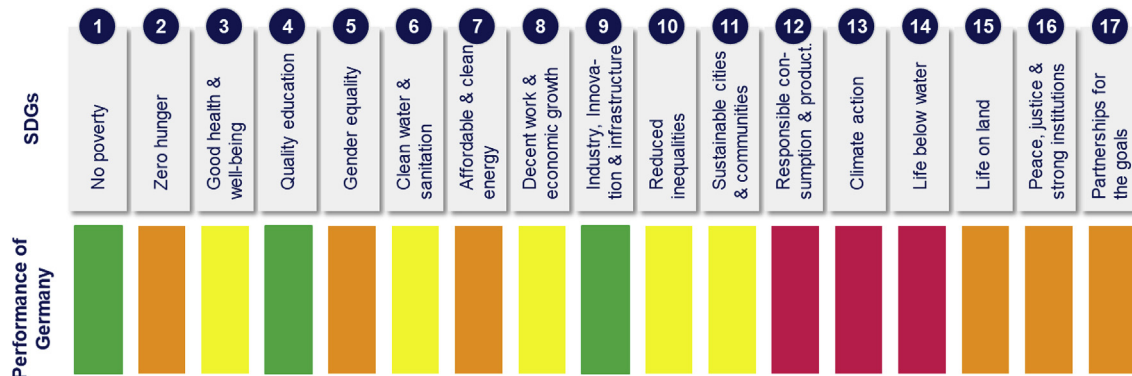

Fig. 1. — **Exemplary SDG dashboard for Germany in the color code of** Sachs et al. (2017). Green is used only if all sub-target indicators are achieved, yellow, orange and red indicate the distance to achieving the SDG targets. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

mapping the activity of entrepreneurs related to the national SDGs constitutes a research gap, and due to the importance of the SDGs, the mapping is of significant relevance for a wide range of stakeholders, like policymakers, investors or entrepreneurs.

Assessing the SDG related activity of entrepreneurs is linked to well-known challenges in the field of sustainable impact measurement and entrepreneurship research, most importantly the lack of historical data to be studied and the lack of resources in new ventures to start collecting missing data and reporting them (Clifford, 2014; Dichter et al., 2016; Horne and Michelfelder, 2017; Johnson and Schaltegger, 2016; Recker and Michelfelder, 2017). These challenges make our ambition — to track the country level activity of new ventures related to the national SDGs — more challenging.

Given our choice to focus our analyses on Germany (see choice of empirical setting in the next section), this article addresses the following two research questions.

(RQ1) '*How can we map the SDG related activity of entrepreneurs in Germany*?' and
(RQ2) '*Which SDGs show high entrepreneurial activity in Germany and which SDGs remain unaddressed*?'

3. Research design

3.1. Empirical setting & data

We decided to focus our analysis on new ventures in Germany. This excludes country level differences, which helped during the assessment of the validity of our methodological approach and limited the scope of ventures to be analyzed to a manageable size. Given relatively good data availability in Germany and Germany's position as leading economy in Europe, we believe to have identified a valuable empirical setting. By focusing on German new ventures solely, we do not neglect the fact that foreign ventures contribute to German SDG performance as well, however studying the potential contribution bottom-up, the sample selection would become infinitely large by including global new ventures active in Germany. The study's sample is based on major venture competitions in Germany, including non-profit and for-profit ventures.

Using existing competition overviews (Bundesministerium für Wirtschaft und Energie, 2017; Für-Gründer.de 2017) we generated a list of 193 venture competitions that were the starting point for the sample. By selecting a German new venture sample, we discard the contribution of non-German ventures to Germany and its national SDG performance indicators. The leading perspective is understanding SDG related activity of German entrepreneurs and comparing it to the national SDG performance, understanding that additional progress is generated by foreign stakeholders.

Out of those competitions, we collected award-winning and distinguished ventures only for categories with a focus on new ventures (independent of topic) and only if their full name was given. Price categories for general innovation were excluded if they did not differentiate between new ventures and incumbent ventures. All competitions and the respective award texts are from 2017. Additional webpage information was downloaded end of 2017 and early 2018. In the sampling process, we had to discard 75 competitions: 32 did not offer an award in 2017, 25 did not focus on ventures, 18 did not provide sufficient information online.

Overall, we created a sample of 588 ventures. The data set of each venture consists of the award text, provided by the award jury, and information found on the venture's webpage (or in some cases Facebook), in either German or English language. The used information contains basically the product or service description, business model explanation, company visions and missions as well as

other explanation relevant to assess the ventures contribution to SDGs found on the landing page and on other pages. The analyzed text varied in its length between 1 and more than 50 pages, containing between 250 and more than 1000 words.

Following our research set-up and focus on Germany, we excluded foreign companies. In addition, we collected venture specific information during the sample creation, allowing us to better describe the sample and analyze the results afterward. This way we collected basic control variables like the founding year, legal entity and postal code where available. Additionally, each venture was allocated to one category out of the International Standard Industrial Classification of All Economic Activities (United Nations Statistics Division, 2018) and categorized as either startup, unclear or non-startup. Here we followed the general notion of startups as young and innovative growth ventures (Brettel et al., 2007; Kollmann und Hensellek, 2017). More specifically, we applied the three criteria of the German startup monitor: startups are (I.) ventures that are younger than ten years, (II.) highly innovative in technology or their business model and (III.) strive for significant growth in employees or revenue. To be considered a startup a venture must fulfill the first criteria and at least one of the other two criteria (Kollmann et al., 2018). The two coders used this categorization to characterize the sample regarding its startup focus and to compare startups and other entrepreneurship forms regarding their potential contribution.

Our mapping of activities collects data based on the inputs, activities, and outputs of businesses and does not try to assess the potential outcomes and impacts as it would be done in a comprehensive impact assessment (cf. Clifford, 2014). The depth of analysis is thus similar to that of the widely used Global Reporting Initiative (Global Reporting Initiative, 2016). Accordingly, it is important to note that mapping activities to SDGs can only indicate a potential correlation of a business model to the SDGs, but it is no evidence for causation (causation would require a more detailed impact assessment along an input-output-outcome-impact logic for each venture, which is out of scope for our quantitative research approach).

We built our research on data that are most widely available for new ventures, i.e., information from their own websites and those published in venture competitions. These two sources provide numerous information on a venture's business model, its industry sector and meta-information on the venture itself. Moreover, focusing on rewarded ventures provides some quality control in the very dynamic venture environment that allows to filter out immature ideas and ventures. The downside to this approach is a self-selection bias of ventures that participate in competitions. Some ventures might decide against venture competitions for example if they are already very successful. Accordingly, there is a risk that we systematically neglect certain groups of ventures.

Our approach offers a structured and scalable way to map the activities of new ventures in Germany along the 17 SDGs and draw conclusions on the potential contribution of German entrepreneurs to the national SDG targets. We can thus follow the dashboard logic and create an SDG heat map for entrepreneurship in Germany. The mapping helps to understand which SDGs are primarily addressed, which remain unaddressed and it allows to identify patterns of SDGs that are typically addressed in combination.

3.2. Method

To answer our research questions, we selected content analysis as an appropriate research method to classify new ventures regarding their potential contribution to SDGs. Other studies with comparable objectives showed that content analysis is an appropriate and insightful method (Barringer et al., 2005; Perry und

Bodkin, 2000; Ritala et al., 2018; Roca and Searcy, 2012; Weare and Lin, 2016; Uotila et al., 2009).

Content analysis is defined as a systematic approach to compress a large amount of text and words into predefined content categories based on rules of coding (Krippendorff, 2012; Weber, 1992; Uotila et al., 2009; Neuendorf, 2016). In this study, the approach is used to create SDG categories based on coded keywords and search through venture texts. With the help of modern content analysis and qualitative data analysis software, it is possible to apply this approach to a large amount of texts efficiently. We selected atlas.ti software due to its semi-automated auto-coding function for our study (Atlas.ti, 2018).

Literature differentiates two types of content analysis: first *emergent coding* also called *inductive coding* and second, *a priori coding* or *deductive coding (*Weber, 1992*)*. The deductive approach is based on a pre-existing coding system with predefined keywords, seen as the more directed approach whereas the inductive approach is based on developing the codes from the data themselves and refining them through the process, being the more conventional approach (Elo and Kyngäs, 2008; Hsieh and Shannon, 2005). Since we base our mapping on existing definitions and documentation of the SGD goals, we executed a deductive approach by using predefined keywords, which we used to code the venture texts.

Our content analysis contains four common steps: sampling (discussed in chapter 3.1), defining and piloting the coding scheme (see chapter 3.3), coding (see chapter 3.4) and analyzing and reporting (see chapter 4 ff.) (adapted from Neuendorf, 2016).

3.3. Defining and piloting the coding scheme

The coding scheme is developed to support the coding process with defined keywords for each SDG based on the official SDG resolution (General Assembly, 2015) (see the full list in the appendix). If a respective keyword is found in the award text or online information, it indicates potential SDG-related activities of a venture.

The objective was first to identify keywords that holistically describe each SDG and its sub-targets based on the available definitions. Second, the selected words had to comprise different aspects, for example, a description of the problem a venture wants to address, details about their approach and information on the aspired effects. Since we included both English and German texts in the sample, the described scheme was developed for both languages with the respective official documents (Die Bundesregierung, 2016; General Assembly, 2015). For the semi-automated coding in atlas.ti we combined the word strings for both languages.

The coding scheme was tested on a sample of ventures. During the test, we identified and resolved problems with regard to wrong matches. For example, the German term "arm" (for poor) generated many wrong matches since it occurs in "warm" and other unrelated words, consequently we restricted matches to the exact word with the help of quotation marks. Nevertheless, some keywords like "jobs" or "career" occurred on nearly every website and not only in the context of SDG 8 (decent work and economic growth). This confirmed our decision to use semi-automated coding with manual confirmation by two researchers instead of fully automated coding.

The pilot could also invalidate concerns around different wording between the UN descriptions of the SDGs and the venture text material. We observed that both use similar words and a mixture of problem description and solution specification. Accordingly, there was no need to adjust the coding scheme to properly match venture text material to the SDG problem descriptions with the selected keywords.

3.4. Coding the text sources

The content analysis methodology is based on the number of occurrences of keywords in the analyzed data and helps to quantify content in terms of predefined search words (Bryman and Bell, 2015). Accordingly, we documented the frequency of Sustainable Development Goal keywords from our coding scheme for each venture.

We decided to perform semi-automated content analysis, combining the advantage of an automated scan of all documents uploaded to atlats.ti with the opportunity to verify the search results, reducing random and wrong context matches (e.g., random keywords in the CVs of employees or event notes). The auto coding function was set-up with the following characteristics - ignore cases, strategy: expression, context: word, selected confirm matches, expand to: exact match. The match review was based on general and SDG specific conditions. Additionally, we defined specific coding rules for some SDGs since those can generate wrong matches based on wording and context (see Table 1).

4. Analyses & results

After coding the documents, we exported the results in a code-summary table and cleaned the data in preparation for further analysis. The final data set contained the number of matches per SDG for each venture of the sample across all available documents.

Following the research questions, we applied descriptive statistics to get a first overview of general distribution and characteristics of the results. A correlation matrix was additionally used to better understand interdependencies between SDGs and general patterns.

The final discussion of results was done with the help of a matrix that plots entrepreneurial activity against the national SDG performance. Additionally, we prepared a dashboard (adapted from Sachs et al., 2017) to indicate main areas of entrepreneurial activity and interdependencies between SDGs.

Our final sample is based on data from 588 new ventures and a total of 1315 individual data sources (556 award descriptions and 759 websites) with a minimum of two data sources per venture. Following our before stated definition of startup (cf. Brettel et al., 2007; Kollmann und Hensellek, 2017) 74% of the ventures could be classified as startups, less than 5% were clearly no startups, and the remainder is unclear due to limited information. 34% of the ventures were active in manufacturing, 21% in information and communication and 10% in professional, scientific and technical activities. The remaining third spread over 13 other categories of the International Standard Industrial Classification of All Economic Activities (United Nations Statistics Division, 2018). For 70% of the sample, we had information about their legal entity that show that more than 60% are registered as a GmbH (limited liability companies), nearly 10% as UG (usually smaller limited liability company), around 8% as a private person and about 5% as e.V. (associations). Only 40% of the ventures provided information about their founding year. Among those ventures 41% were founded in 2017, 20% in 2016, 16% in 2015. Less than 24% were 3 years or older. We also collected geographic information for 80% of the sample and these data show that 50% of the ventures come from only three federal states Bavaria (17%), Berlin (17%) and North Rhine-Westphalia (16%). Baden-Württemberg (9%) and Hesse (8%) also have a meaningful number of awarded ventures. The remaining 33% spread over the remaining 11 federal states.

In our sample of 588 ventures, the frequency for the different SDG keywords varied strongly between ventures and across the different goals from 0 to a maximum of 75 SDG matches for a single venture (Table 2 summarizes the sample statistics). The strong

Table 1
Overview of SDG specific coding rules that were necessary for a consistent coding process.

SDG 3: Good health & well-being	Basic research innovation that can be used for medical purposes but have no direct health benefits were excluded from SDG 3 (instead, SDG 9).
SDG 4: Quality education	If trainings enable customers to use a project they were excluded. Trainings that enable customers beyond the use of a specific product were included.
SDG 7: Affordable & clean energy	We included energy efficiency related ventures with products that reduce energy consumption compared to alternative solutions in the market.
SDG 8: Decent work & economic growth	Job creation of new ventures has only been included, if a venture specifically concentrates on the creation or allocation of jobs. Jobs that result primarily from educational activities were not considered for SDG 8.
SDG 9: Industry, innovation & infrastructure	The SDG definition is very broad which makes a clear differentiation challenging. We focused on the enabling aspects of new ventures - i.e. innovations that have a high chance to improve the productivity of other industries or provide significant benefits compared to previous solutions. Infrastructure innovation that affect an industry were included, infrastructure innovation that focus on urban/personal mobility were included in SDG 11.
SDG 10: Reduced inequalities	We excluded ventures that simply aim for markets in a developing country without specifically targeting the eradication of inequalities.
SDG 11: Sustainable cities & communities	For SDG 11 transport related activities were only included when they affect urban communities or human settlements.
SDG 16: Peace, justice & strong institutions	Aspects concerning inclusion from SDG 5 and SDG 10 were not included. Security related business models were only included if they create more transparency and/or accountability on a broader societal level.
SDG 17: Partnership for the goals	Aspects of fair trade were only included when they are part of broader cooperation with developing countries, not when organizations only purchase fair trade products (this was integrated in SDG 12).

variation results in the high standard deviations and sample variance – especially, for the most frequent SDGs 3, 4 and 9 (each with more than 10% of matches). To some extent, the maxima can be attributed to ventures with a strong marketing focus, comprehensive text material on their website and ventures that won multiple awards. Additionally, differences between SDGs result from an unequal distribution/availability of suitable keywords per SDG. For example, we found a wide range of keywords for SDG 3, while there is only a limited number of suitable keywords for SDG 1 (no poverty). Also, some SDGs have keywords that need additional contextual information and interpretation, for example, SDG 17 (partnership for the goals) (cf. appendix).

To avoid biased results due to variance we assessed only whether a venture is active in an SDG or not. The absolute number of keyword matches per SDG per venture was not used as the available text material per venture varied strongly, and the absolute frequency of keywords is not a reliable indicator to differentiate

between levels of SDG activity. Additionally, we took out all ventures with less than two matches per SDG. This threshold reduced the risk of miss-allocation to an SDG due to individual remarks on a website or award text. This means we only examined ventures with at least two keyword matches from one data source or two matches from different data sources per SDG. Using these quality criteria, we discarded 236 ventures (40% of our sample) coming to a sample of 352 ventures with at least one valid SDG match for detailed analysis.

Out of the discarded 236, 177 ventures had no match, and 59 ventures had only SDG matches below the threshold. A review of the 177 ventures without any matches showed two principal reasons, either a venture had no clear activity related to an SDG or there was hardly any written material for our analysis. A more detailed analysis of the split between the two groups would require manual coding of each website for the 177 ventures and is therefore out of scope for this paper on semi-automated coding. We

Table 2
Descriptive statistical overview of the total and two reduced samples based on quality thresholds for SDG matches.

Ventures in sample	All ventures (no threshold, all SDG matches)						Ventures (count threshold >0)		Ventures (count threshold >1)	
	588	100%					−177 411 70%		−59 352 60%	
Total SDG matches	Total 6159						Total 798		Total 602	
SDG	Sum of SDG matches	% of total	Min.	Max.	Standard Deviation	Sample Variance	Count of SDG matches (>0)	% of total	Count of SDG matches (>1)	% of total
SDG 1: No poverty	11 11	0%	0	3	0,19	0,04	7	1%	3	0%
SDG 2: Zero hunger	481 481	8%	0	56	4,24	18	52	7%	40	7%
SDG 3: Good health & well-being	1092 1092	18%	0	70	6,36	40,5	133	17%	97	16%
SDG 4: Quality education	833 833	14%	0	53	5,83	34	86	11%	63	10%
SDG 5: Gender equality	80 80	1%	0	25	1,39	1,92	12	2%	9	1%
SDG 6: Clean water & sanitation	95 95	2%	0	56	2,49	6,22	11	1%	7	1%
SDG 7: Affordable & clean energy	632 632	10%	0	75	5,93	35,2	51	6%	42	7%
SDG 8: Decent work & economic growth	107 107	2%	0	22	1,75	3,06	17	2%	9	1%
SDG 9: Industry, innovation & infrastructure	1085 1085	18%	0	40	4,77	22,8	160	20%	130	22%
SDG 10: Reduced inequalities	409 409	7%	0	64	4,12	17	49	6%	38	6%
SDG 11: Sustainable cities & communities	483 483	8%	0	52	4,17	17,4	58	7%	49	8%
SDG 12: Responsible consumption & production	594 594	10%	0	36	3,44	11,9	111	14%	82	14%
SDG 13: Climate action	72 72	1%	0	13	0,87	0,75	26	3%	14	2%
SDG 14: Life below water	24 24	0%	0	11	0,61	0,37	3	0%	3	0%
SDG 15: Life on land	14 14	0%	0	6	0,3	0,09	6	1%	3	0%
SDG 16: Peace, justice & strong institutions	139 139	2%	0	57	2,77	7,68	12	2%	11	2%
SDG 17: Partnerships for the Goals	8 8	0%	0	4	0,2	0,04	4	1%	2	0%

definitely expect that some of the 177 ventures are active in an SDG domain.

In the remaining sample of 352 ventures, we found a very heterogeneous distribution. Based on our search string SDG 1 (no poverty), 5 (gender equality), 6 (clean water and sanitation), 8 (decent work and economic growth), 14 (life below water), 15 (life on land) and 17 (partnership for the goals) had less than 10 ventures with a SDG match while there was a clear concentration on SDG 3 (good health and well-being), 4 (quality education), 9 (industry, innovation and infrastructure) and 12 (responsible consumption and production) out of which each contributed more than 10% to the total matches.

Of the 352 ventures above the threshold, 198 ventures (56%) had only one SDG match, 96 ventures (27%) had two SDG matches, 33 ventures (9%) had three matches, 18 ventures (5%) had four SDG matches and some isolated cases had even more SDG matches (the maximum was one case with 8 SDG matches). To better understand the patterns behind ventures that are active in multiple SDGs we examined the correlation between different goals. As we translated the absolute frequency of matches per SDG into a binary system (which only indicates SDG activity or non-activity) a suitable test statistic for nominal data had to be used. We used Chi^2 test (Kaplan, 2004) that allowed us to analyze the relationship between individual pairs of SDGs. Therefore, we first analyzed the pairs and then aggregated the results for the 136 pairs into a correlation matrix. For easier interpretation, we translated the Chi^2 values into corrected contingency coefficient ranging between 0 (low relationship) and 1 (strong relationship). By doing so, we could identify 40 significant correlations between SDGs (29 with $p < 0.01$ and an additional 11 with $p < 0.05$).

For example, the strongest correlation could be observed between SDG 4 (quality education) and SDG 10 (reduced inequalities) with 0.55 ($p < 0.01$). In our sample, this result can be explained with various initiatives that provide training/enablement for refugees to facilitate integration into Germany. Another strong relationship could be observed between SDG 2 (zero hunger) and SDG 12 (responsible consumption and production) with 0.45 ($p < 0.01$) that can be linked to various ventures that sell organic and/or healthy food. The correlation is based on our search string with keyword matches like food, farm*, fish* for nutrition (SDG 2) and sustainable, local, etc. for sustainable/conscious consumption (SDG 12). Table 3 provides an overview of all 40 identified correlations.

The results of our sample create some transparency about the SDG domains that German ventures are directly involved in and we can observe some patterns between SDGs. However, due to the earlier mentioned interdependencies, trade-offs and vaguely defined goals (United Nations, 2017; Nilsson et al., 2016; Costanza et al., 2016; Sachs et al., 2017) it is important to analyze the observed results more into detail to avoid premature conclusions.

5. Discussion

In the following section, we review our approach and discuss our results with regard to our two research questions. In addition to this, we explore the potential role of entrepreneurship for sustainable development to support future research and policymakers.

RQ1: *How can we map the SDG related activity of entrepreneurs in Germany?*
Response: *Based on freely available web-material, the semi-automated content analysis provides a scalable approach to map entrepreneurial activities along the 17 SDGs.*

Compared to interview, expert and survey-based data collection, the selected approach does not rely on response rates and an

individual's willingness to answer, in order to obtain a larger sample size (Albino et al., 2009). In addition, using a predefined coding scheme on existing information for new ventures, either created by the venture itself (primary data) or by third-parties (secondary data), reduces the subjective influence compared to above mentioned approaches, although there is a possible remaining bias inherent with semi-automated approach. In addition, it allows to create a larger and more diverse sample, and in combination with filter criteria (e.g., only ventures that were rewarded in a venture competition), it is possible to exclude immature ideas and ventures.

Therefore, this option is more suitable to identify patterns of SDG related entrepreneurship on a large scale (e.g., for Germany). Natural downsides are the level of detail per venture, which is generally lower than in interviews, expert assessments or surveys, as well as a potential self-selection bias of ventures that take part in competitions. Scaling the approach to different geographical regions is possible but requires adjusting the coding scheme to specific cultural and language contexts.

The scalable approach creates a large set of data, and it is important to understand the inherent limitations of these data. As mentioned in the methodology section we analyzed the data with a semi-automated content analysis using search strings of keywords in atlas.ti. This means atlas.ti scanned source documents automatically for relevant German and English keywords and the authors collectively reviewed the allocations to discount false matches. The central element of this approach is the selection of suitable keywords for each of the 17 SDG. As we discussed before the goals contain numerous interdependencies, trade-offs and they are vaguely defined goals (United Nations, 2017; Nilsson et al., 2016; Costanza et al., 2016; Sachs et al., 2017). This complicates a highly selective coding for related SDGs like SDG 5 (gender equality) and SDG 10 (reduced inequalities), and it makes it impossible to code highly selective search strings for each of the 169 sub-targets that make up the 17 SDGs. Accordingly, when our search string classifies a venture as a contributor to a certain SDG, it is likely that only certain sub-targets of an SDG are actually addressed. Transferring this thought to our entire sample we expect that certain sub-targets in each SDG remain unaddressed even though the SDG itself is addressed. The specific pattern of addressed sub-targets should reflect the specific development needs of Germany with its specific social, economic and ecological conditions. For instance, in Germany, the eradication of hunger (SDG 2 − zero hunger) is not a major concern whereas obesity and malnutrition are serious problems mentioned (Sachs et al., 2017). Accordingly, we must interpret the observed patterns for the 17 SDGs in combination with background knowledge on Germany to draw valid conclusions with our methodology on a more detailed level.

RQ2: *Which SDGs show high entrepreneurial activity in Germany and which SDGs remain unaddressed*
Response: *Entrepreneurs do not address all SDGs. There is strong direct engagement around SDG 9 (industry, innovation & infrastructure), SDG 3 (good health and well-being) and SDG 12 (responsible consumption and production). On the other end of the spectrum we find SDG 1 (no poverty) and SDG 17 (partnership for the goals) with little-observed activity.*

In order to discuss entrepreneurial contributions to SDGs in more depth, we relate the found activity to the national context, specifically the national German SDG performance (cf. Fig. 2). In our research, we follow the assumption that venture activity in an SDG is an indicator for future progress towards achieving the SDG. This assumption is not blind to the fact that many ventures in our

Table 3
Correlation matrix with corrected contingency coefficients for the reduced sample (threshold >1). Chi^2 test statistics between SDG pairs (n = 558; df = 1).

Matrix: Corrected contingency coefficients

	SDG 1: No poverty	SDG 2: Zero hunger	SDG 3: Good health & well-being	SDG 4: Quality education	SDG 5: Gender equality	SDG 6: Clean water & sanitation	SDG 7: Affordable & clean energy	SDG 8: Decent work & economic growth	SDG 9: Industry, innovation & infrastruct.	SDG 10: Reduced inequalities	SDG 11: Sustainable cities & communities	SDG 12: Responsible consumpt. & product.	SDG 13: Climate action	SDG 14: Life below water	SDG 15: Life on land	SDG 16: Peace, justice & strong institutions	SDG 17: Partner-ships for the Goals
SDG 1	/	0,36**	0,04	0,18**	0,26**	0,01	0,03	0,26**	0,02	0,03	0,03	0,25**	0,02	0,01	0,01	0,01	0,01
SDG 2		/	0,23**	0,05	0,03	0,13*	0,00	0,03	0,15*	0,11	0,02	0,45**	0,12*	0,11	0,36**	0,06	0,02
SDG 3			/	0,00	0,08	0,17**	0,03	0,08	0,07	0,02	0,01	0,00	0,02	0,05	0,04	0,09	0,07
SDG 4				/	0,25**	0,09	0,08	0,25*	0,14*	0,55**	0,07	0,04	0,07	0,04	0,07	0,10	0,03
SDG 5					/	0,02	0,05	0,14*	0,05	0,34**	0,01	0,19**	0,03	0,01	0,01	0,03	0,01
SDG 6						/	0,13*	0,02	0,09	0,04	0,03	0,31**	0,03	0,03	0,01	0,02	0,36**
SDG 7							/	0,05	0,23**	0,34**	0,24**	0,02	0,35**	0,01	0,10	0,06	0,14*
SDG 8								/	0,00	0,19**	0,06	0,12*	0,03	0,02	0,06	0,03	0,01
SDG 9									/		0,14**	0,04	0,22**	0,03	0,03	0,06	0,05
SDG 10										/	0,13*		0,06	0,03	0,09	0,16**	0,02
SDG 11											/	0,17**	0,16**	0,05	0,25**	0,13*	0,03
SDG 12												/	0,35**	0,02	0,02	0,02	0,20**
SDG 13													/			0,03	0,01
SDG 14														/	0,44**	0,01	0,01
SDG 15															/		0,01
SDG 16																/	
SDG 17																	/

**: Significance level p < 0.01; *: Significance level p < 0.05.

sample might not be game changers with regard to sustainable development and some might actually create negative effects - considering, for example, the discussions about the rebound effect (Figge and Hahn, 2004; Bocken and Short, 2016). However, the absence of entrepreneurial activity in an SDG domain shows clearly that entrepreneurs do not find suitable opportunities to directly affect an SDG, regardless of the specific impact. In absence of active entrepreneurs in an SDG domain, we cannot expect many innovative solutions from the private sector for sustainable development — something that the 2030 agenda calls for (General Assembly, 2015). Therefore, we consider the frequency of entrepreneurial activity in an SDG domain a prerequisite for progress and a valid, but not an exhaustive indicator. It is not an exhaustive indicator because it requires interpretation concerning the specific national conditions and the various interdependencies between the goals.

Patterns of national SDG performance & entrepreneurial activity: Applying this thought we contrast our results for entrepreneurship in Germany with the national SDG dashboard (Fig. 2), which aggregates the national SDG performance by aggregating available indicators (cf. Sachs et al., 2017). The findings of this comparison are best illustrated in a matrix with, first entrepreneurial activity and second national SDG performance (Fig. 3). The matrix supports the synthesis and development of patterns and targeted policy recommendations (see Fig. 4).

The simplified matrix shows four patterns of SDGs (Fig. 3). We have two categories where national performance and entrepreneurial activity are consistent (i.e., both dimensions are high or low). In the top right corner, we find those SDGs with consistent high national SDG performance and high entrepreneurial activity for SDGs 3, 4, 9, 10 and 11 - pattern "maintain". In the low left corner SDGs with low national SDG performance and low entrepreneurial activities for SDGs 5, 13, 14, 15, 16, 17 - pattern "boost". If both indicators show high performance, the correlation suggests that entrepreneurs are active in relevant SDG domains, while weak performance in both indicators suggests low societal SDG performance and no relevant entrepreneurial activities.

The remaining two quadrants indicate contradictory results, where national SDG performance and entrepreneurial activity do not go in the same direction. In the top left corner we have high SDG performance in Germany but low entrepreneurial activity for SDGs 1, 6 and 8 - pattern "*encourage*"). In the low right quadrant, we have low national SDG performance and high entrepreneurial activity for SDGs 2, 7 and 12- pattern "*scale*".

Interdependencies: The observed patterns represent the direct entrepreneurial activities, but they neglect indirect effects, or broader contributions to several SDGs (Littlewood and Holt, 2018). If we take the eradication of poverty (SDG 1) as an example, we have an SDG with low entrepreneurial activity, but high national performance. The underlying reason for this contradiction can be found in the applied macro-economic indicators that capture progress on a national level for SDG 1. Progress is measured with indicators like the poverty headcount ratio or the population with an income below 50% of the median disposable income (Sachs et al., 2017). New ventures can not directly address such indicators. However, ventures can indirectly fight the causes of poverty like a lack of education (SDG 4) or weak economies (SDG 9). Accordingly, we can assume that entrepreneurs primarily contribute indirectly to SDG 1 via other SDGs like SDG 4 and 9. Generalizing this thought, we assume that there are SDGs where there are little opportunities for entrepreneurs to contribute directly.

Considering the wide range of potential business models (Pacheco et al., 2010) it is certainly possible to find entrepreneurial examples for all SDGs. However, our analysis reveals that
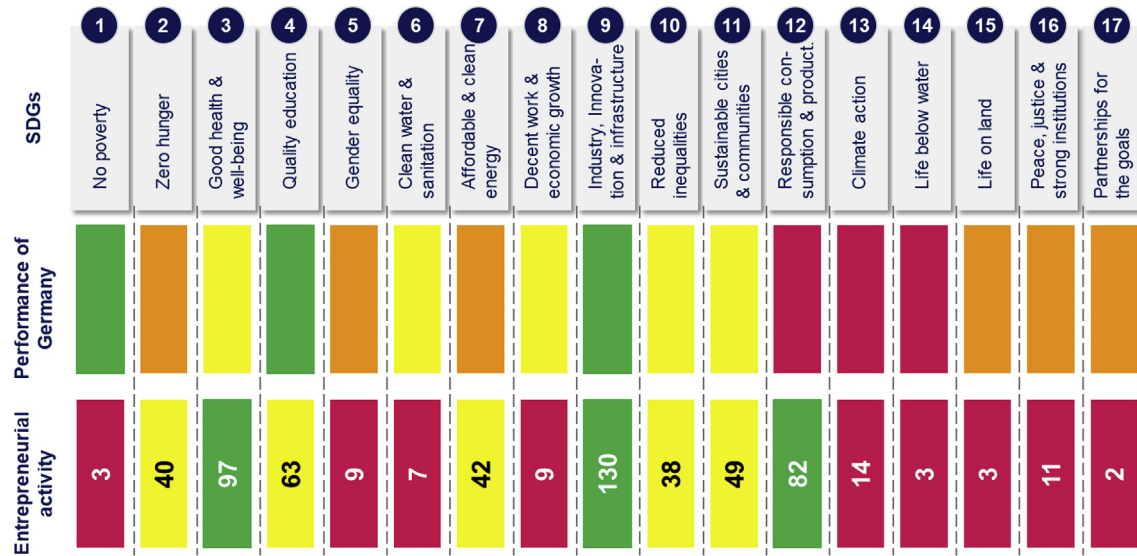
Fig. 2. — **Comparison of national SDG performance** (color coding based on Sachs et al., 2017) **and entrepreneurial SDG activity in Germany** (color code based on difference to mean − i.e. Green ≥ 71; Yellow 70-36; orange 36-18; red <18). (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

entrepreneurs rarely address certain SDGs although national performance generates a visible need (pattern "boost"). Explaining this pattern, we offer three principal reasons: (1) many SDGs are addressed indirectly and (2) some SDGs are not suitable and/or
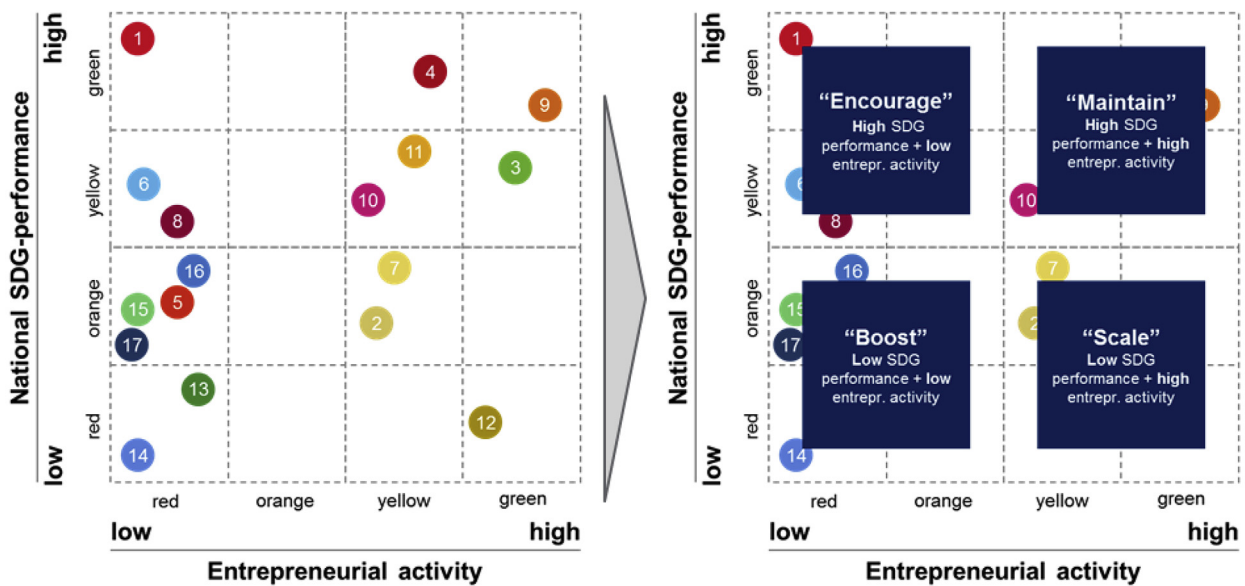
Fig. 3. Matrix: Plotting SDGs according to national SDG performance and mapped entrepreneurial activity (national performance scores were distributed within their color category according to their scores in Sachs et al., 2017, entrepreneurial activity according to their difference to the mean; SDG logos edited from https://sustainabledevelopment.un.org/). (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)
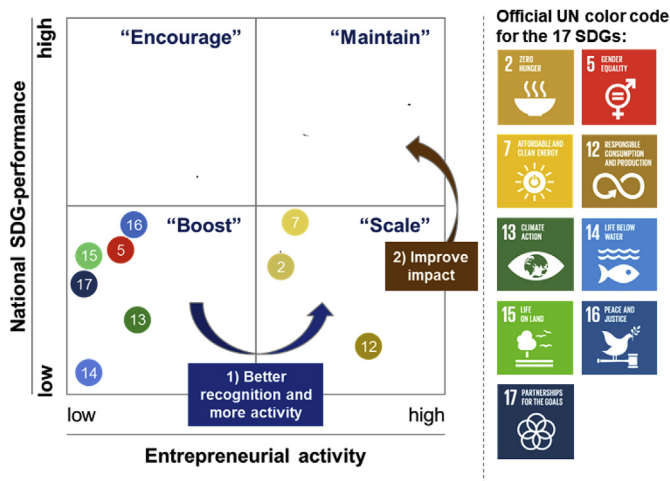
Fig. 4. **Improvement path** — **Boost awareness for SDGs with low entrepreneurial activity and develop measures to scale activities in areas with low national SDG performance** (SDG logos edited from https://sustainabledevelopment.un.org/).

attractive to be addressed by entrepreneurs. Moreover, we find SDGs with strong entrepreneurial activity, but low national performance (pattern "scale"), which we attribute to (3) missing scale of entrepreneurial activities and/or ineffective entrepreneurial activities that lead to low impact.

(1) In some SDGs progress in one SDG is tied to progress in another SDG. SDG 13 (climate action) (Pattern "boost") is arguably one of the best examples for strong interdependency with other SDGs. The key indicator of progress is CO2 emissions. This means progress is linked to all energy consuming elements of society in our fossil fuel dependent societies. Accordingly, progress requires countless actions across the entire spectrum of SDGs. For instance, progress needs a wide range of technological innovation (SDG 9) — most importantly new sources of energy (SDG 10), we have to change the way we produce food (SDG 2) and we have to change the way we live and consume (SDG 11 and 12) and to enable all those things we need suitable education (SDG 4). We conclude that especially SDG 1 (no poverty), 8 (decent work and economic growth), 13 (climate action), 14 (life below water) and 15 (life on land) depend strongly on progress on other SDGs, but we must emphasize that more detailed assessments of interactions are necessary to draw reliable conclusions (Nilsson et al. 2016).

(2) Despite the indirect and aggregated effects of entrepreneurs, some goals are less suitable for meaningful entrepreneurial contributions, most notably SDG 17 (partnership for the goals) (pattern "boost"). Sachs et al. (2017) measure progress via government spending on health and education, tax revenues or the national financial secrecy score. The selected indicators depend primarily on the government with little room for independent entrepreneurial solutions. Similarly, SDG 16 (peace, justice, and strong institutions) (Pattern "boost") depends largely on governmental action to improve indicators in the field of public safety, property rights or corruption. Even though there are examples like Parlamentwatch e.V. with their activities around transparent and

accountable institutions or Mein Notruf GmbH in the field of public safety, the scope for entrepreneurship is limited (Parlamentwatch e.V. 2018; Mein-Notruf GmbH, 2018).[1] Pomare (2018) summarizes external factors, stimulating new ventures' awareness and internal resources and capabilities, limiting the SDG focus, as further criteria for meaningful contribution.

(3) Identifying active entrepreneurs along the 17 SDGs, we cannot draw causal conclusions on the scale and potential impact of ventures. Therefore, a strong entrepreneurial activity does not automatically mean strong SDG contribution of ventures, and it should not be mistaken as a causal driver for strong national performance. Nevertheless, strong entrepreneurial activity is an important prerequisite and driver for entrepreneurial contribution, especially with regard to future developments in an industry (Bidmon and Knab, 2018; Hockerts and Wüstenhagen, 2010).

SDG 7 (affordable and clean energy) constitutes a good example of the lack of scale/impact despite strong entrepreneurial activity today. For meaningful performance on a national level, these SDGs require a system transition (Loorbach and Wijsman, 2013). For the SDG 7 (affordable and clean energy) sub-level indicator "share of national renewable energy in total final energy consumption" (Sachs et al., 2017) this means that effective clean energy ventures obtain a dominant market share. This requires massive structural changes as part of the long-term transformation of the German energy system, the so-called "Energiewende". Consequently, we can assume that today's entrepreneurial activities can improve national performance only where structural circumstances allow effective clean energy ventures to scale-up and gain meaningful market shares. This requires strong political involvement, and it leads to a time lag between entrepreneurial activities and measurable performance improvements.

Additionally, our sample shows, that most of the Germany's new venture activity is centered in 3 federal states. This might also limit the entrepreneurial scale across the nation and so affect the national performance overall. In order to improve the contribution to certain goals, policy makers should create support systems and reliable ecosystems to further spread SDG related entrepreneurship across the entire country.

6. Conclusion

The purpose of this article was to increase our understanding to what extent new ventures contribute to achieving the SDGs on a regional or country level. We examined 193 venture competitions in Germany and collected data on 588 rewarded ventures. The method chosen was a semi-automated content analysis that helped to allocate those ventures based on their activities to the 17 SDGs. Our research results revealed a very heterogeneous distribution of entrepreneurial activities along the SDGs that we contrasted with the national overall performance of German ventures (Figs. 2 and 3). Plotting the SDGs in a matrix of entrepreneurial activity and national SDG performance, we identified four simplified patterns of entrepreneurial activities and national SDG performance. The need for action differs strongly between these four patterns. In terms of contributions to practice, we suggest policymakers should focus their attention on those areas with low national SDG performance and low entrepreneurial activity (pattern "boost") and those areas with low national SDG performance and unscaled entrepreneurial activity (pattern "scale"). Identifying and removing institutional and structural barriers for entrepreneurs particularly in these patterns has the largest potential to make entrepreneurship a more important contributor to sustainable development. Contributions

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[1] The stated examples are not part of our sample. They were only selected to exemplify the situation.

to science are primarily the development of a novel and scalable method to map contributions of new ventures to achieving the SDGs on a regional and country level.

Key limitations include the fact that the approach chosen does not take the actual magnitude of a venture's contribution to achieving an SDG into account and that the content analysis depends on publicly available data which certainly leads to some inaccuracy. Nevertheless, we believe the benefits of this method clearly outweigh the disadvantages. We suggest that this attempt to identify entrepreneurial activity towards the SDGs needs to be continued by research, both in scale and geography, as well as in depth regarding contributions and impact. Continuing this research will improve our understanding of SDG related entrepreneurship and it will help to better direct political and entrepreneurial actions towards sustainable development.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclepro.2019.118052.

References

Albino, Vito, Balice, Azzurra, Dangelico, Rosa Maria, 2009. Environmental strategies and green product development. An overview on sustainability-driven companies. Bus. Strateg. Environ. 18 (2), 83–96.

Apostolopoulos, Nikolaos, Al-Dajani, Haya, Holt, Diane, Jones, Paul, Newbery, Robert, 2018. Entrepreneurship and the sustainable development goals. In: *Entrepreneurship and the Sustainable Development Goals*, Contemporary Issues in Entrepreneurship Research, vol. 8, pp. 1–7. https://doi.org/10.1108/S2040-724620180000008005.

Atlasti Scientific Software Development GmbH, 2018. Atlas.ti: Qualitative Data Analysis. Scientific Software Development, Berlin.

Barringer, Bruce R., Jones, Foard F., Neubaum, Donald O., 2005. A quantitative content analysis of the characteristics of rapid-growth firms and their founders. J. Bus. Ventur. 20 (5), 663–687.

Bidmon, Christina M., Knab, Sebastian F., 2018. The three roles of business models in societal transitions. New linkages between business model and transition research. J. Clean. Prod. 178, 903–916. https://doi.org/10.1016/j.jclepro.2017.12.198.

Bocken, N.M.P., Short, S.W., 2016. Towards a sufficiency-driven business model. Experiences and opportunities. In: Environmental Innovation and Societal Transitions, vol. 18, pp. 41–61. https://doi.org/10.1016/j.eist.2015.07.010.

Brettel, Malte, Faaß, Kerstin, Heinemann, Florian, 2007. Controlling für innovative junge Unternehmen. Zeitschrift für Controling und Management 51 (S3), 52–67. https://doi.org/10.1365/s12176-012-0176-1.

Brundtland Commission, 1987. Our Common Future. Report of the World Commission on Environment and Development.

Bryman, Alan, Bell, Emma, 2015. Business Research Methods, vol. 4. Oxford Univ. Press, Oxford u.a.

Bundesministerium für Wirtschaft und Energie, 2017. Gründerwettbewerbe. Links zu bundesweiten und regionalen Gründerwettbewerben. Hg. v. BMWi-Existenzgründungsportal. Online verfügbar unter. http://www.existenzgruender.de/DE/Service/Beratung-Adressen/Linksammlung/Gruenderwettbewerbe/inhalt.html, zuletzt geprüft am 12.02.2018.

Clifford, Jim, 2014. Proposed Approaches to Social Impact Measurement in European Commission Legislation and in Practice Relating to EuSEFs and the EaSI. GECES Sub-group on Impact Measurement 2014. Publications Office, Luxembourg.

Costanza, Robert, Daly, Lew, Fioramonti, Lorenzo, Giovannini, Enrico, Kubiszewski, Ida, Mortensen, Lars Fogh, et al., 2016. Modelling and measuring sustainable wellbeing in connection with the UN Sustainable Development Goals. In: Ecological Economics, vol. 130, pp. 350–355. https://doi.org/10.1016/j.ecolecon.2016.07.009.

Dichter, Sasha, Adams, Tom, Ebrahim, Alnoor, 2016. The power of lean data. Stanf. Soc. Innov. Rev. Available online at: https://ssir.org/articles/entry/the_power_of_lean_data checked on 3/15/2017.

Die Bundesregierung, 2016. Deutsche Nachhaltigkeitsstrategie. Neuauflage 2016 zuletzt geprüft am 19.02.2018.

Elo, Satu, Kyngäs, Helvi, 2008. The qualitative content analysis process. J. Adv. Nurs. 62 (1), 107–115.

Engström, Richard Georg, Trock, Jacob, Regnell, Helene, Nielsen, Morten, Olsen, Mikkel Skott, 2018. Impact X. Online verfügbar unter. https://thehub.dk am 01.06.2018.

Figge, Frank, Hahn, Tobias, 2004. Sustainable Value Added—measuring corporate contributions to sustainability beyond eco-efficiency. Ecol. Econ. 48 (2), 173–187. https://doi.org/10.1016/j.ecolecon.2003.08.005.

Für-Gründerde, 2017. Aus über 170 Gründerwettbewerben den richtigen finden. Hg. v. Für-Gründer.de. Online verfügbar unter zuletzt geprüft am 12.02.2018. https://www.fuer-gruender.de/beratung/gruenderwettbewerb/studie-2016/auswahl-gruenderwettbewerbe/.

General Assembly, 2015. Resolution Adopted by the General Assembly on 25 September 2015. Transforming Our World: the 2030 Agenda for Sustainable Development (United Nations).

Global Reporting Initiative, 2016. Consolidated Set of GRI Sustainability Reporting Standards 2016.

Global Reporting Initiative, United Nations, WBCSD, 2015. SDG Compass. The Guide for Business Action on the SDGs.

Griggs, David, Stafford-Smith, Mark, Gaffney, Owen, Rockström, Johan, Ohman, Marcus C., Shyamsundar, Priya, et al., 2013. Sustainable development goals for people and planet. Nature 495 (7441), 305–307.

Hockerts, Kai, Wüstenhagen, Rolf, 2010. Greening Goliaths versus emerging Davids — theorizing about the role of incumbents and new entrants in sustainable entrepreneurship. J. Bus. Ventur. 25 (5), 481–492. https://doi.org/10.1016/j.jbusvent.2009.07.005.

Horne, Jannic, Michelfelder, Ingo, 2017. Introducing a new approach to measure and forecast the sustainability impact of new ventures. In: Presented at the "G-Forum 2017 — the 21th Annual Interdisciplinary Conference on Entrepreneurship and Innovation", October 5th - 6th, 2017, University of Wuppertal (Germany).

Hsieh, Hsiu-Fang, Shannon, Sarah E., 2005. Three approaches to qualitative content analysis. Qual. Health Res. 15 (9), 1277–1288.

Johnson, Matthew P., Schaltegger, Stefan, 2016. Two decades of sustainability management tools for SMEs. How far have we come? J. Small Bus. Manag. 54 (2), 481–505. https://doi.org/10.1111/jsbm.12154.

Kaplan, David (Ed.), 2004. The Sage Handbook of Quantitative Methodology for the Social Sciences. SAGE, Thousand Oaks, California.

Kollmann, Tobias, Prof Dr, Stöckmann, Christoph Dr, Kensbock, Julia, 2017. Deutscher Startup Monitor 2018. Mut und Macher. Hg. v. KPMG in Deutschland. Bundesverband Deutsche Startups e.V. Online verfügbar unter. http://deutscherstartupmonitor.de/dsm-17/. zuletzt geprüft am 12.02.2018.

Kollmann, Tobias, Hensellek, Simon, 2017. KPI-steuerung von Start-ups der Digitalen Wirtschaft. CON 29 (2), 47–54. https://doi.org/10.15358/0935-0381-2017-2-47.

Krippendorff, Klaus, 2012. Content Analysis. An Introduction to its Methodology, third ed. SAGE Publications, Inc, Thousand Oaks.

Littlewood, David, Holt, Diane, 2018. How social enterprises can contribute to the sustainable development goals (SDGs) — a conceptual framework. In: *Entrepreneurship and the Sustainable Development Goals*, Contemporary Issues in Entrepreneurship Research, vol. 8, pp. 33–46. https://doi.org/10.1108/S2040-724620180000008005.

Loorbach, Derk, Wijsman, Katinka, 2013. Business transition management. Exploring a new role for business in sustainability transitions. J. Clean. Prod. 45, 20–28. https://doi.org/10.1016/j.jclepro.2012.11.002.

Lüdeke-Freund, Florian, Massa, Lorenzo, Bocken, Nancy, Brent, Alan, Musango, Josephine, 2016. Business Models for Shared Value. Main Report. Network for Business Sustainability.

Mein-Notruf GmbH, 2018. Mein Notruf App. Erhöhen Sie Ihre persönliche Sicherheit. Available online at: https://mein-notruf.de/. checked on 2/13/2018.

Moon, Chris J., 2018. Contributions to the SDGs through social and eco entrepreneurship: new mindsets for sustainable solutions. In: *Entrepreneurship and the Sustainable Development Goals*, Contemporary Issues in Entrepreneurship Research, vol. 8, pp. 47–68. https://doi.org/10.1108/S2040-724620180000008005.

Neuendorf, Kimberly A., 2016. The Content Analysis Guidebook, second ed. SAGE, Los Angeles.

Nilsson, Mans, Griggs, Dave, Visbeck, Martin, 2016. Policy: map the interactions between sustainable development goals. Nature 534 (7607), 320–322. https://doi.org/10.1038/534320a.

Pacheco, Desirée F., Dean, Thomas J., Payne, David S., 2010. Escaping the green prison. Entrepreneurship and the creation of opportunities for sustainable development. J. Bus. Ventur. 25 (5), 464–480. https://doi.org/10.1016/j.jbusvent.2009.07.006.

Parlamentwatch e.V, 2018. Über uns. Available online at: https://www.abgeordnetenwatch.de/ueber-uns. checked on 2/13/2018.

Perry, Monica, Bodkin, Charles, 2000. Content analysis of Fortune 100 company Web sites. Corp. Commun. Int. J. 5 (2), 87–97.

Pomare, Carol, 2018. A multiple framework approach to sustainable development goals (SDGs) and entrepreneurship. In: *Entrepreneurship and the Sustainable Development Goals*, Contemporary Issues in Entrepreneurship Research, vol. 8, pp. 11–31. https://doi.org/10.1108/S2040-724620180000008005.

Recker, Malte, Michelfelder, Ingo, 2017. Sustainable Entrepreneurship. How to measure future sustainable impact for early stage new ventures. In: Innovation Management, Entrepreneurship and Sustainability. Proceedings of the 5th International Conference. Prague, Czech Republic, 25-26.05.

Ritala, Paavo, Huotari, Pontus, Bocken, Nancy, Albareda, Laura, Puumalainen, Kaisu,

2018. Sustainable business model adoption among S&P 500 firms. A longitudinal content analysis study. J. Clean. Prod. 170, 216—226.

Roca, Laurence Clément, Searcy, Cory, 2012. An analysis of indicators disclosed in corporate sustainability reports. J. Clean. Prod. 20 (1), 103—118.

Sachs, Jeffrey, Schmidt-Traub, Guido, Knoll, Christian, Durand-Delacre, David, Teksoz, Katerina, 2017. SDG Index and Dashboards Report 2017. Global Responsibilities. International Spillovers in Achieving the Goals. Bertelsmann Stiftung. Sustainable Development Solutions Network.

Sullivan, Kieran, Thomas, Sebastian, Rosano, Michele, 2018. Using industrial ecology and strategic management concepts to pursue the Sustainable Development Goals. J. Clean. Prod. 174, 237—246. https://doi.org/10.1016/j.jclepro.2017.10.201.

United Nations, 2017. The Sustainable Development Goals Report 2017.

United Nations Statistics Division, 2018. International Standard Industrial Classification of All Economic Activities, Rev.4. Detailed Structure and Explanatory Notes.

Uotila, Juha, Maula, Markku, Keil, Thomas, Zahra, Shaker A., 2009. Exploration, exploitation, and financial performance. Analysis of S&P 500 corporations. Strat. Mgmt. J. 30 (2), 221—231. https://doi.org/10.1002/smj.738.

Weare, Christopher, Lin, Wan-Ying, 2016. Content analysis of the world wide web. Opportunities and challenges. Soc. Sci. Comput. Rev. 18 (3), 272—292.

Weber, Robert P., 1992. Basic Content Analysis, vol. 2. Sage Publ (Sage university papers: Quantitative applications in the social sciences, 49), Newbury Park Calif u.a.

Weiß, Ralf, Fichter, Klaus, 2015. Green Economy Gründungsmonitor 2014. Grüne Wirtschaft als Gründungs- und Beschäftigungsmotor in Deutschland. Borderstep.

Weissbrod, Ilka, Bocken, Nancy M.P., 2017. Developing sustainable business experimentation capability — a case study. J. Clean. Prod. 142, 2663—2676. https://doi.org/10.1016/j.jclepro.2016.11.009.