Klein, Sascha P.; Spieth, Patrick; Heidenreich, Sven

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ORIGINAL ARTICLE

Facilitating business model innovation: The influence of sustainability and the mediating role of strategic orientations

Sascha P. Klein[1] | **Patrick Spieth**[1] | **Sven Heidenreich**[2]

[1]Technology and Innovation Management, Entrepreneurship, University of Kassel, Kassel, Germany

[2]Technology and Innovation Management, Saarland University, Saarbrücken, Germany

Correspondence
Dr. Patrick Spieth, Technology and Innovation Management, Entrepreneurship, University of Kassel, Nora-Platiel-Street 4, 34109 Kassel, Germany.

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Abstract

Businesses increasingly incorporate the sustainability aspects into their products, services, and processes that drive innovation. While extant research on the linkage between sustainability and innovation has gained momentum over the past years, prior research has predominantly focused on sustainability's performance impacts (e.g., financially and environmentally) and product innovation outputs, neglecting the internal mechanisms that leverage sustainability. While findings from previous studies suggest that sustainability may drive business model innovation (BMI), it still lacks empirical evidence on whether and how sustainability may influence the evolvement of BMI. Relying on the stimulus-organism-response framework, we address these shortcomings and argue that sustainability commitment influences certain strategic orientations that increase the propensity of innovating a business model (BM). Using a sample of 167 German manufacturing firms, we empirically investigate these relationships. Our results from structural equation modeling show that the sustainability commitment has no direct effect on BMIs. Our mediation analysis does, however, reveal that sustainability commitment has complex indirect effects driving BMI through strategic orientations, namely the firm's market, technology, and entrepreneurial orientation. By uncovering the mechanisms through which sustainability commitment drives BMI, our findings provide new impetus on BMI's internal drivers and highlight the important role of certain strategic behaviors that guide managers' strategic choices when planning to innovate a BM. From a managerial perspective, our findings thus provide mangers with guidelines to achieve the right configuration of strategic orientations when responding to sustainability issues by innovating their current BM.

KEYWORDS

business model innovation, entrepreneurial orientation, market orientation, strategic orientation, sustainability, technology orientation

1 | INTRODUCTION

According to the World Commission on Environment and Development (1987, p. 8), sustainability refers to business policies and practices that "meet the needs of the present without compromising the ability of future generations to meet their own needs." Over the past decade, several studies (e.g., McKinsey, 2011; PriceWaterhouseCooper, 2014) confirmed

that firms increasingly commit to and integrate sustainability in their business processes and operations. Governmental regulations (Campbell, 2007; Schulze & Heidenreich, 2017) and the mass media's influence (Nikolaeva & Bicho, 2011) pressurized companies to integrate a comprehensive understanding of sustainability as the balancing of social, environmental, and economic goals (Elkington, 1997; Hall et al., 2010). Sustainability's increasing importance for businesses, therefore, raises the question of its business case (Du et al., 2016). The literature provides mixed and limited findings on the effects of firms' commitment to sustainability. Findings by Adams et al. (2016) confirmed that such commitment has a positive relationship with business performance and might help firms to differentiate themselves from their competitors. Furthermore, a study by Foss and Saebi (2017) suggests that a firms' commitment to sustainability drives the innovations and thus may give firms an opportunity to gain a competitive advantage by changing the current business model (BM) (Wei et al., 2014; Zott & Amit, 2007). According to the componential view of BMs, even a change in a single component of a BM constitutes a business model innovation (BMI) (Futterer et al., 2020; Spieth & Schneider, 2016), such that sustainability seems to be directly linked to such type of innovation. Moreover, since companies are constantly confronted with changing environmental issues (Schulze et al., 2018), a commitment to sustainability most probably leads to BMIs on a regular rather than single basis. However, empirical evidence for the above made propositions is scarce.

While research on the linkage between sustainability and innovation mainly focused on how firms develop sustainable innovations, a deeper understanding of sustainability's effects on firm-internal strategies and strategic planning processes, as well as its other internal consequences (i.e., BMI) remain unexplored. The strategic choices and guidelines that sustainability commitment affects need to be determined to investigate sustainability's firm-internal consequences on a firm's BM and to unravel the mechanisms that leverage sustainability to achieve long-term success. Since the BM reflects a firm's realized strategy, that is, "the particular set of choices an organization makes (…)—and their associated consequences—are the organization's BM" (Casadesus-Masanell & Ricart, 2010, p. 201), innovating a BM is likely to be dependent on these strategic choices induced by a firms' commitment to sustainability. More specifically, research has shown that firms' concrete strategic decisions differ due to their dominant strategic orientation, representing their "broad strategic choices and directions implemented" (Spanjol et al., 2012, p. 967), guiding them to create appropriate behaviors for superior long-term performance (Gatignon & Xuereb, 1997; Narver & Slater, 1990). Strategic orientations, therefore, set a normative frame for how to conduct business competitively (Noble et al., 2002) and which strategy to use (Gatignon & Xuereb, 1997), that is, which BM to apply. While past studies confirmed that strategic orientations affect companies' capability to find new ways of creating value and developing new products (Gatignon & Xuereb, 1997), prior research failed to investigate the strategic orientations' roles in creating BMI. Yet, various findings from adjacent research fields suggest that different strategic orientation types, such as market orientation, technology orientation, and entrepreneurial orientation affect the innovation outcomes and the firm performance. However, empirical evidence on whether and how sustainability commitment affects BMI and whether and how this effect unfolds via strategic orientations is still missing.

In order to close the above mentioned research gaps, we adopt the stimulus-organism-response (SOR) framework (Mehrabian & Russell, 1974), to explain how sustainability commitment (stimulus) induces strategic orientations (organism) (i.e., the market orientation, technology orientation, and entrepreneurial orientation, which in turn affect BMI (response)). Based on a data set of 167 companies, results from structural equation modeling confirm that a firm's sustainability commitment indeed drives BMI via the choice of different strategic orientations, whereas the mediating effect through technological orientation turned out to be the strongest one.

We contribute to sustainability (innovation) research by uncovering sustainability's previously ignored relation with

Practitioner Points

- Our model explains relevant strategic orientations that drive the innovation of business models which could help firms to overcome their inertia in terms of organizational resistance to innovation.
- Our model suggests that a commitment to sustainability can lead to innovation which enforces the managers to develop sustainability policies in order to differentiate their firms from their competitors with possible business model innovation.
- Managers can use our model to understand the effects of commitment to sustainability on firm behavior. Committing to sustainability provides an opportunity to foster entrepreneurial behavior in terms of identifying new opportunities and enhancing innovation activities.
- Finally, our model offers some practical insights into the mechanisms that drive business model innovation. Knowledge about these effects can be valuable to guide firms in dedicating resources to deepen firms' technological knowledge and in promote a proactive search for technological solutions throughout the firm, not limiting this to R&D.

internal strategic orientations and its indirect influence on innovation outcomes, that is, BMI. Moreover, we extend our previous research on the linkage between innovation and sustainability, which mainly relied on qualitative case studies (Adams et al., 2016; Kennedy et al., 2017), by providing empirical insights into underlying relationships from a large-scale empirical study. Furthermore, we add to previous findings suggesting that sustainability is a driver of new BMs (Adams et al., 2016; Foss & Saebi, 2017) by shedding light on how sustainability commitment is related to BMI via strategic orientations. In addition, this paper contributes to the BMI literature in various ways: First, by identifying strategic orientations that influence BMI, we respond to scholars' calls to link concepts from strategy to BMI (Spieth et al., 2016) and to provide additional insights for the ongoing debate on the relationship between strategic management and BMs (Massa et al., 2017). Second, in contrast to research on BMI's consequences and performance implications, identifying different strategic orientations' implications for BMI responds to calls for further inquiry into BMI's internal drivers (Foss & Saebi, 2017, 2018; Teece, 2018). We, therefore, identify guiding behavior that underlies strategic choices, fosters BMI, and helps overcome barriers to BMI. From a managerial perspective, our findings provide companies with guidelines on how to achieve the right configuration of strategic orientations when responding to sustainability issues by innovating their current BM.

The remainder of this paper is structured as follows. First, we describe our study's theoretical underpinnings, develop the conceptual model, and derive the corresponding hypotheses. We thereafter evaluate and test our conceptual model in a large-scale survey. Finally, we describe our findings' implications for theory and management practice, outline the study's limitations, and discuss future research avenues.

2 | THEORETICAL BACKGROUND

2.1 | Sustainability and BMI

Research regarding sustainability and innovation predominantly investigates how to become sustainable or focus on the outcomes of being sustainable. Du et al. (2016) find a positive relationship between sustainability commitment and NPD performance, while Claudy et al. (2016) find that sustainability commitment has a positive effect on NPD success due to the efficiency gains they allow and the firm being differentiated from its competitors. Radical sustainability innovations can specifically lead to new business models, as they often comprise new combinations of products and services, as well as the value that new business models capture (Juntunen et al., 2018; Watson et al., 2018). In conclusion, prior research on sustainability and innovation contend that reaching sustainability goals may call for BMI. However, research on antecedents of BMI has been dominated by a search for external antecedents. Most studies focus on the relevance of new technologies for innovating a BM, like cloud computing (Berman, 2012) or the Internet, which resulted in new BMs that changed an industry's value creation logic and value capture (Wirtz et al., 2010). Other scholars focused on the importance and influence of external stakeholders' demands to innovate a BM (Ferreira et al., 2013) or external tacit knowledge as driver of BMI at the team level (Suh et al., 2020). Miller et al. (2014), for example, show that universities change their BMs due to various stakeholder groups' influence, especially as a reaction to governmental policies. Despite the number of studies on potential antecedents that drive BMI, research lacks a deep understanding of internal drivers in general, and how sustainability may or may not relate to BMI. More specifically, prior BMI research has been limited to the exploration and description of BMs for sustainability (Bocken et al., 2014) and has neglected the circumstances in which sustainability changes a BM innovatively (Foss & Saebi, 2017). Consequently, the internal mechanisms that facilitate BMI as a response to sustainability challenges remain a blind spot in BMI and sustainability research. In the following we thus draw on the SOR model to shed first light on how a firm's sustainability commitment may affect BMI.

2.2 | Stimulus-organism-response perspective on sustainability and BMI

The SOR model (Hebb & Donderi, 1987; Mehrabian & Russell, 1974) explains behavior as a response to a certain stimulus (e.g., from the environment), which an organism processes internally, thereby mediating the relationship between a stimulus and a response. The perception of external stimuli, its assessment, and evaluation of its importance can be partly explained by broad, overarching dedications of managers concerning the general direction of the organization like a commitment to sustainability values (the "S" in the framework). Consequently, sustainability commitment reflects an overarching dedication to sustainability as an important component in several of the firm's procedures and processes (Jansson et al., 2017). A commitment to sustainability guides manager's focus on stimuli not per se linked to the market, technologies, and so forth that are directly related to the firms' products, processes or strategies. Within the SOR framework, the broad viewpoint influences the awareness and selection of external stimuli that are processed and interpreted in the organization. However, firms committing to sustainability nevertheless interpret the perceived stimuli (i.e., information) strategically in order to gain a competitive advantage, influencing the firm's competitive mindset (the "O" in the framework). Generally, a mindset

helps to interpret complex information and is reflected by general behavior within a firm (Gupta & Govindarajan, 2002). Differences between firms regarding the processing, interpretation, and implementation of the gathered information, partly depends on their adopted strategic orientation (Spanjol et al., 2012). Firms usually adopt strategic orientations in order to gain competitive advantages and "to create the proper behaviors for the continuous superior performance [by] employing" (Gatignon & Xuereb, 1997, p. 78) a market orientation (Noble et al., 2002), a technology orientation (Gatignon & Xuereb, 1997; Zhou et al., 2005), or an entrepreneurial orientation (Lumpkin & Dess, 1996). Accordingly, a sustainability-related issue like plastic waste in the oceans might, depending on the firms' commitment to sustainability, act as stimulus and thus trigger internal assessments to find a solution for this issue. Thereby companies might approach their customers (i.e., market orientation), scan for new technologies (technology orientation), or search for new market opportunities (entrepreneurial orientation) to find this potential solution by employing analogical reasoning, conceptual combination, and deductive/inductive reasoning. Either way, the company will have to adapt their BM as the processing of the sustainability issue based on a firm's strategic orientation will change their target customers, product portfolio, value chains, or revenue models. In conclusion, the SOR framework suggests that external stimuli are selected, based on general attitudes like a firm's sustainability commitment, which triggers further processing behavior and interpretation (i.e., analogical reasoning, conceptual combination, and deductive/inductive reasoning) via different strategic orientations (i.e., market, technological, and entrepreneurial orientation), resulting in strategic responses unfolded in changes of the current BM (i.e., BMI).

3 | HYPOTHESES DEVELOPMENT

3.1 | Sustainability commitment's (direct) effect on BMI

The SOR perspective suggests that the level of sustainability commitment influences the gathering and interpretation of information, that is, the competitive mindset reflected in different strategic orientations, which subsequently influences the response to sustainability in terms of changes in the current BM leading to BMI as final response. More specifically, in line with Spieth and Schneider (2016) we expect these changes to unfold in innovations within the three constituting elements of BMI. A value offering innovation (VOI) refers to changes in the value delivered to the target customers as well as changes in the product and service offering. A value architecture innovation (VAI) describes changes to internal and external activities, resources, and competencies that are necessary for value creation as well as to changes in the distribution channels. A revenue model innovation (RMI) refers to changes in the cost drivers of and the mechanisms for revenue generation (Spieth & Schneider, 2016). However, explicit empirical evidence on potential effects of a firms' sustainability commitment on BMI is missing. Yet, recent research has proposed a positive relationship between sustainability and product innovation (Varadarajan, 2017). Claudy et al. (2016) showed that sustainability practices lead to increased NPD success due to efficiency gains. Likewise, findings from Foss and Saebi (2017) confirmed that a firms' commitment to sustainability at least drives product innovations. Furthermore, with respect to effects on BMI prior research at least suggests that sustainability commitment may give firms an opportunity to gain a competitive advantage by changing (i.e., innovating) the current business model (BM) (Wei et al., 2014; Zott & Amit, 2007). Hence, in line with the positive performance implications of a firm's sustainability commitment with respect to sole product innovations, we expect similar effects with regard to BMI. In conclusion, we thus propose:

H1 Sustainability commitment is positively related to business model innovation (BMI).

3.2 | The mediating role of strategic orientations

3.2.1 | The effects of market orientation, technology orientation, and entrepreneurial orientation on BMI

According to the SOR model, we argue that sustainability commitment (stimulus) influences different strategic orientations (organism), inducing different strategic responses—that is, in this case, an innovative change in the value offering, value architecture, and revenue model. Hence, in line with the SOR model we expect that strategic orientations fully mediate the effect of sustainability commitment on BMI, as firms striving to adapt their BM to develop a competitive advantage grounded in sustainability need to deepen their market and technology knowledge (Kennedy et al., 2017) and be more open to new business opportunities (Mousavi et al., 2019). However, in order to better understand this mediation effect, and how it unfolds in changes of the firm's BM, we need to understand how different types of strategic orientations relate to both sustainability commitment and BMI. While there are plenty of different types of strategic orientations available in prior literature, market orientation, technology orientation, and entrepreneurial orientation are consistently reported as the most influential ones with regard to innovation outcomes

(Achtenhagen et al., 2013; Baker & Sinkula, 2007; Zhou et al., 2005).

Market orientation refers to efforts to acquire and disseminate knowledge about existing customers and competitors throughout a firm (Jaworski & Kohli, 1993). Marketing orientation, therefore, seeks to respond to customer needs and to provide superior customer value (Narver & Slater, 1990; Zhou et al., 2005). Market-oriented firms, therefore, accumulate market-based knowledge about their competitors and existing customers in order to integrate their customers' voices into their daily business activities (Narver & Slater, 1990). Since issues regarding sustainability often stem from external stakeholders such as customers and competitors, firms committed to sustainability consistently have to deepen their knowledge about the market, and their existing customers' needs to adequately respond to those issues (Du et al., 2016). Accordingly, research shows that firms committed to sustainability engage in market research in order to address sustainability issues (Hoffmann, 2007). For instance, Kennedy et al. (2017) found that firms seek to integrate customers in order to test and optimize products based on sustainability efforts. Likewise, Claudy et al. (2016) recently found that firms with a sustainability focus enhance their market knowledge processes. With respect to potential effects on BMI as outcome, previous studies indicate that market orientation has positive performance implications with regard to innovation activities (Baker & Sinkula, 2007; Paladino, 2007). A study by Hurley and Hult (1998) for example, confirmed that market orientation provides the firm with effective sources for new ideas, leading to the introduction of new value offerings. Similarly, Spanjol et al. (2012) found that customer orientation enhances innovations especially in service firms, where often an emphasize is put on incorporating the "customer's voice" in all internal processes. Hence, we expect that market orientation also leads to significant changes in the value architecture. Besides, market-oriented companies regularly strive to meet customer expectations by changing their revenue model. For example, companies in different industries have switched their whole revenue mechanisms to alleviate uncertainty avoidance of their customers by introducing "flat rates" as RMI (Futterer et al., 2020). Accordingly, shifts in consumer demand due to sustainability issues might require innovative value propositions, new internal processes, or distribution channels as well as novel revenue models to match customer expectations. In conclusion, sustainability commitment leads to a significant need of companies to respond to environmental issues in order to provide superior customer value. As a response, companies enhance their accumulation of market-based knowledge, such that sustainability commitment unfolds in higher levels of market orientation, which in turn leads to BMIs. Hence, we propose that market orientation acts as a valuable mechanism through which sustainability commitment is positively related to BMI.

Technology orientation refers to a constant monitoring of technological developments and a constant search for new technologies beyond current products and market boundaries (Gatignon & Xuereb, 1997). Sustainability issues might require new technologies to solve them and to create a competitive advantage. For example, in a case study, Kennedy et al. (2017) found that the choice to increase sustainability efforts (i.e., greater commitment to sustainability) intensifies technological knowledge in order to develop solutions to sustainability issues and gain possible competitive advantages. Likewise, new technologies could create opportunities to conform with governmental regulations regarding material usage, energy usage, and production emissions, which might be required to avoid fines (Nikolaeva & Bicho, 2011). Being committed to sustainability thus often requires to be technology oriented. With respect to the effects of technology orientation on BMI, prior research shows that technology-oriented firms promote creativity and encourage employees to think "outside the box" to trace new ideas (Zhou et al., 2005). New BMs may be required to capture the value from technologies and create a competitive advantage, in order to realize a technology's commercial potential (Wei et al., 2014; Zott et al., 2011). Likewise, new technologies can also change the internal processes (e.g., production or distribution) and the way a firm does business. Internet technologies, for example, might enable new distribution channels (Teece, 2010) and may develop the potential to change the value creation architecture. The BM literature has also described emerging technologies that have changed current revenue models (i.e., sources of revenue and cost structures), such as new technical systems for payment that led to new revenue models (Clauss, 2017), and the advent of computers and digital devices that provided new revenue and cost distribution opportunities (Teece, 2010). In conclusion, incorporating a sustainability commitment requires the acquisition of a constant stream of new technologies to solve environmental issues effectively. As response, this leads to innovations in each BM element via a stronger technology orientation within the company. Hence, we propose that technology orientation acts as a significant mediator through which sustainability commitment is positively related to BMI.

Entrepreneurial orientation refers to a risk-taking behavior that comprises proactiveness and aggressiveness toward competitors in search for new opportunities to achieve a competitive advantage (Lumpkin & Dess, 1996). Entrepreneurial-oriented firms have a tendency and willingness to take risks and are proactive in order to explore and exploit opportunities (Lumpkin & Dess, 1996). Such firms seek opportunities to capture value and to create a competitive advantage. Murillo-Luna et al. (2008) found that the more firms are committed to sustainability, the more likely it was that they implemented a more proactive environmental strategy. Likewise, a high commitment to sustainability also fosters the search

for new opportunities (Du et al., 2016). With respect to potential effects on BMI as response, past research highlights the importance of experimentation in order to innovate a BM (Achtenhagen et al., 2013; McGrath, 2010; Teece, 2010), which requires a high level of risk tolerance and proactivity. Scholars have identified trial-and-error learning (Sosna et al., 2010) and the identification, experimentation, and exploitation of opportunities and ideas (Achtenhagen et al., 2013), which occur in entrepreneurial-oriented firms, as the key driving factors of BMI. As such, being proactive in collaboration with new partners (e.g., start-ups) can be risky, but could change the way value is created (VAI). Likewise, entrepreneurial firms continuously challenge established structures leading to constant changes in their internal and external architecture (McGrath, 2010).

In conclusion, firms with a high sustainability commitment are in need to take a proactive and sometimes even aggressive position toward competitors in search for new opportunities to solve environmental issues, which leads to higher levels of entrepreneurial orientation that may unfold in BMIs. Hence, we propose that entrepreneurial orientation acts as an important mechanism through which sustainability commitment is positively related to BMI.

The discussion of the relationships of the different types of strategic orientations in the previous sections indicates that strategic orientations mediate the positive effect of sustainability commitment on the constituting BMI elements (Figure 1). Thus, based on the arguments presented above we hypothesize:

H2 Strategic orientations (i.e., market orientation, technology orientation, and entrepreneurial orientation) mediate the positive effect of sustainability commitment on BMI.

H2a Sustainability commitment is positively related to strategic orientations.

H2b Strategic orientations are positively related to business model innovation (BMI).

4 | METHOD

4.1 | Sample

We chose a quantitative, survey-based research design to answer the research question because of the following considerations. First, we aimed to provide generalizable statements about the mechanisms that are triggered by a firm's sustainability commitment and then, unfold into significant changes of the BM as response to sustainability issues. Our aim was, therefore, not to develop new theory inductively; instead, we aimed to test deductively for relationships that could be derived from previous research, especially from research on the antecedents of BMI. Since a firm's top management team is involved in strategic decisions and shapes the firm's strategic orientation (Noble et al., 2002; Talke et al., 2011), and middle managers execute strategic decisions, they seem both adequate informants for assessing a firm's strategic orientations and their BM. Consequently, we surveyed middle and top managers, who had been shown to be knowledgeable key informants in similar research contexts (Gatignon & Xuereb, 1997; Spanjol et al., 2012; Zhou et al., 2005). While prior research has confirmed that such respondents are uniquely qualified to evaluate the strategic orientations and changes in a firm's BM (Kortmann, 2015), we still employed different criteria to ensure the appropriateness of the respondents. More specifically, we used a commercial panel provider who approached respondents in German manufacturing firms (27% medium-sized and 73% large companies), ensuring that the firms operated in a similar institutional environment. The participating firms came from five manufacturing industries (according to the STOXX industry classification): Chemical (14.4%), Industrial Goods (35.3%), Consumer Goods (34.1%), Health Care (4.2%), and others (12%). We instructed the provider to identify only middle- and top-level manager in their database. We double-checked by asking the respondents to provide their current job title and describe their job experience. Relying on this information, the sample consisted of high-level executives (57.5% CEOs, CTOs, Marketing Managers, and Production Managers) and 34.1% middle managers (mainly project managers), resulting in 167 respondents (others/no answer 8.4%). Most had strong work experience in their company (more than 60% had worked in the company for more than 10 years). Owing to their hierarchical position and their work experience, our respondents were deemed as appropriate key informants regarding firm strategy and BMs.

4.2 | Measures

4.2.1 | Independent and dependent variables

The chosen constructs are based on established measurement scales. In line with relevant research (Claudy et al., 2016; Du et al., 2016), we conceptualized and measured the exogenous latent variable sustainability commitment as a second-order construct of type 1 (Jarvis et al., 2003), consisting of two reflective second-order dimensions, the importance of sustainability and sustainability practices, each comprising three items (Claudy et al., 2016). These items stem from the 2012 PDMA CPAS survey (Markham & Lee, 2013), which other empirical studies have recently validated (Claudy et al., 2016; Du et al., 2016). We asked the participants to assess the importance of different sustainability criteria in their company (e.g., *Measuring new product progress on sustainability*), as well as sustainability practices on a 7-point Likert

scale (1 = *not at all important* to 7 = *extremely important*). Strategic orientations were operationalized as second-order construct of type 2 (Jarvis et al., 2003) with three formative dimensions, all capturing different configurations that might promote the innovation outcomes, that is, market, technology, and entrepreneurial orientation. We measured the market orientation with six items adapted from Narver and Slater's (1990) scales for customer and competitor orientation. In line with previous studies, we excluded inter-functional coordination from our market orientation construct (Frambach et al., 2003; Ozkaya et al., 2015), instead employing a behavioral view of market orientation, since research suggests that inter-functional collaboration has a moderating role (Gatignon & Xuereb, 1997). We measured the technology orientation with four items from Gatignon and Xuereb (1997). Furthermore, we measured the entrepreneurial orientation's components using three items each for proactiveness and risk-taking developed by Covin and Slevin (1989). In line with Spanjol et al. (2012), we omitted the items for innovativeness (part of entrepreneurial orientation) owing to its close overlap with the dependent variable in the innovation context.

We measured the dependent variable BMI as second-order construct of type 4 (Jarvis et al., 2003) with three formative second-order dimensions, namely VOI, VAI, and RMI which were taken from the BM innovativeness scale that Spieth and Schneider (2016) developed. This scale has the advantage of measuring whether there is an innovation new to the firm in one of the constituting elements of BMs. Capturing innovations new to the industry is quite challenging, since respondents may overestimate their firm's innovations compared to their competitors' BMIs and the industry boundaries may become increasingly blurred, which make the scale developed by Spieth and Schneider (2016) the most suitable for answering the research question. We asked the respondents to indicate whether different aspects of the BMI dimensions changed during the previous 3 years. The participants indicated their agreement on a 7-point Likert scale (from 1 = *strongly disagree* to 7 = *strongly agree*).

4.2.2 | Control variables

In line with the literature on strategic orientations and innovation (Spanjol et al., 2012), we included several control variables: environmental turbulence (Jaworski & Kohli, 1993), the organization size, and R&D intensity. We chose the environmental turbulence to control for external influences on BMI, as the amount of new technologies as well as the volatility of customer preferences in the firm's environment may influence the propensity to innovate the existing BM of a firm (Foss & Saebi, 2017). More specifically, we operationalized the environmental turbulence as formative construct with one item measuring market turbulence and one item measuring technological turbulence from the measurement inventory of Jaworski and Kohli (1993). We further used annual revenues as a proxy for organization size, instead of more traditional measures like numbers of employees. BMI is more likely to depend on financial resources than on human resources, since BMI involves major changes to the value creation and architecture, which can be cost-intensive (Teece, 2018). Accordingly, we also included R&D intensity as a percentage of the total sales per year.

4.2.3 | Common method bias

Since our survey data are based on single informants' responses, there might be a potential risk of a common method bias (Podsakoff et al., 2003); however, we applied several techniques to control for this in our research both prior to

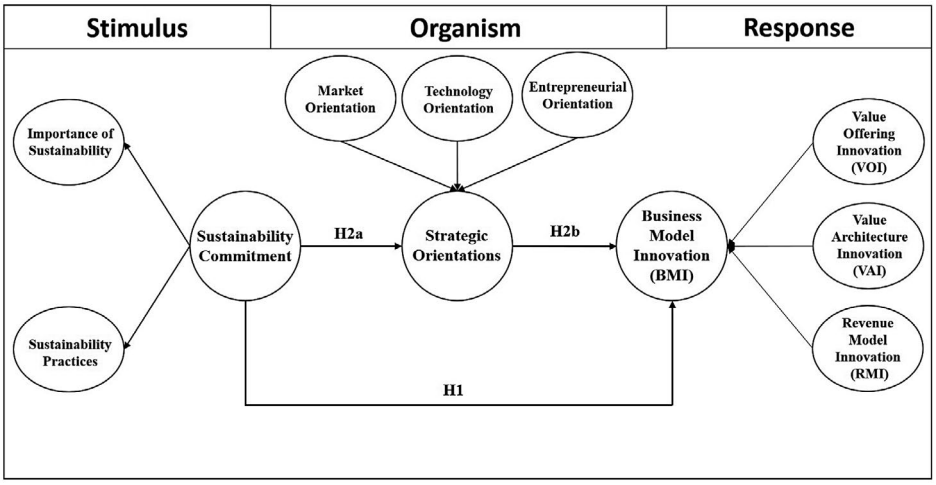

FIGURE 1 Research model

our data collection and by means of statistical tests in the analysis. More specifically, we explained to the respondents that there were no correct or wrong answers, and that their responses would be anonymous; we also relied on established measures (Podsakoff et al., 2003). Furthermore, and in line with previous publications (e.g., Mauerhoefer et al., 2017), we additionally tested for pathological collinearity as indication for common method bias employing the full collinearity assessment approach (Kock, 2015). The highest variance inflation factor (VIFs) of all the constructs turned out to be 2.864 and thus well below the conservative threshold of 5, indicating absence of a common method bias (Kock, 2015). In addition, we performed Harman's single-factor test to assess common method variance's possible impact, finding no single factor to explain more than half of the variance. Based on these two tests, we concluded that common method bias did not threaten our results.

4.2.4 | Accounting for endogeneity of sustainability commitment

A possible concern in estimating the effect of a firm's sustainability commitment on market orientation is that the error term of market orientation might be correlated with a sustainability commitment. Thus, we addressed the potential for endogeneity by performing a two-stage least squares (2SLS) regression analysis, following the procedure suggested by Bascle (2008). Thus, we instrumented sustainability commitment with two instruments. The two instrumental variables (IV) are "technology opportunities" and "technological developments." We assume that both influence sustainability commitment. The first IV consists of two items, for example, asking to assess if "technological changes provide big opportunities in our industry" The second IV "technological development" asks for past technological developments in the industry, for example, "a large number of new product ideas have been made possible through technological breakthroughs in our industry." We used Stata 16.0 for calculation and the command IVREG2 in combination with the first option (Baum et al., 2007) for our analyses, based on the procedure suggested by Bascle (2008). The first-stage *F*-statistics, in which predicted values for endogenous variables are generated, shows that the *F*-value exceeds the commonly used threshold of 10 (*F*-value: 13.39) as suggested by Stock et al. (2002). For testing the exogeneity of the two instrumental variables, we used the first and orthog commands. We found the Sargan/Hansen's *J*-statistic (chi-square: 0.834, p = 0.3612) and the Basmann test nonsignificant (chi-square: 0.818, p = 0.3658). Thus, we assume that the instrumental variables fulfill the exogeneity condition. The IV model showed regression coefficients that are consistent with the ones reported in our model. Subsequently, we ran the IVENDOG command to conduct the Durbin–Wu–Hausmann test. Nonsignificant F and chi-square tests suggest unbiased estimators. Overall, the results of the 2SLS regressions analysis indicate that endogeneity is not a concern.

5 | ANALYSIS AND RESULTS

5.1 | Statistical analysis

We used structural equation modeling (SEM), specifically partial least squares SEM (PLS-SEM), for our analysis and calculation. In contrast to covariance-based SEM, PLS-SEM is a variance-based approach primarily used for the explorative identification of relationships (Hair et al., 2017). We selected this approach rather than a covariance-based approach for the following reasons: First, it is suitable for simultaneously calculating interrelationships between different constructs (Hair et al. 2017). Second, PLS-SEM allows the calculation of formatively measured higher-order constructs (Chin, 2010). Third, it allows a bootstrapping approach for testing the mediation hypothesis (Hair et al., 2017). Furthermore, PLS-SEM is suitable for generating insights based on small- to mid-sized samples (Henseler et al., 2009) and provides higher levels of statistical power in respect of small sample sizes compared to covariance-based approaches (Reinartz et al., 2009). The required sample size for PLS-SEM is 10 times the maximum number of exogenous constructs loading on an endogenous construct, that is, structural paths that load on a specific construct (Chin, 1998; Hair et al., 2017). As our intended sample consists of top-level managers, who are hard to access, PLS-SEM allows for high statistical power.

We applied SmartPLS 3.2.7 to estimate the model's parameters, using a path weighting scheme with 300 iterations and a stop criterion of 10^{-7} (Hair et al., 2013). Subsequently, we applied a nonparametric bootstrapping procedure (no sign changes) with 5000 subsamples for significance testing in the measurement model (item and indicator loadings) and in the structural model (path coefficients) (Hair et al., 2017). To implement the higher-order construct for sustainability commitment, we used the repeated indicator approach, while for strategic orientations and BMI the two stage approach was employed (Hair et al., 2017). For testing the proposed mediation effect, we applied the bootstrapping approach suggested by Hair et al. (2017).

5.2 | Results

5.2.1 | Measurement model results

In order to validate the measurement model, we first evaluated all reflective constructs by assessing the internal

consistency, the convergent and discriminant validity, the indicator and construct reliability. We evaluated the internal consistency reliability by considering the composite reliability (Hair et al., 2013). Since all the constructs' estimations for composite reliability were above 0.7, we could assume internal consistency (Bagozzi & Yi, 1988). All the reflective items' outer loadings were significant, and all standardized outer loadings, except those of two items referring to proactiveness, were above 0.7. The latter two items were not considered to jeopardize the convergent validity (Table 1).

On the construct level, we assessed the convergent validity by considering the average variance extracted (AVE) (Table 2). Since all the constructs' AVEs were above 0.5, the constructs explain more than the half of their indicators' variance and confirm the convergent validity (Chin, 1998; Fornell & Larcker, 1981).

In order to evaluate the discriminant validity, we assessed the correlations' heterotrait-monotrait ratio (HTMT) as the ratio of the between-trait correlations to the within-trait correlations (Henseler et al., 2015). Since traditional approaches to establish discriminant validity (e.g., the Fornell–Larcker criterion or cross-loadings) may have shortcomings when assessed in models with reflective and formative constructs (Hair et al., 2017), we used the HTMT of the correlations to assess the discriminant validity. The HTMT values of all the construct pairs were below the more conservative threshold of 0.85. In addition, we examined whether the HTMT values differed significantly from 1 by calculating the bias-corrected bootstrap confidence intervals. The 95% confidence intervals did not include 1 in any of the construct pairs (Table 3). Consequently, we could conclude discriminant validity for the constructs (Hair et al., 2017).

In the case of the formative constructs, namely the three second-order dimensions of BMI and their formative indicators as well as the second-order dimensions of strategic orientations, we examined the formative indicators' outer VIFs for collinearity issues. Since the VIFs of all the indicators were below 5, we could conclude that we had no collinearity issues. To evaluate the formative indicators' significance and relevance, we applied the bootstrapping method with 5000 subsamples. All the outer weights showed significance (Tables 4 and 5).

5.2.2 | Structural model results

The results at structural model level confirmed a good fit of the estimations with the data, as the R^2 values for the endogenous construct turned out to be 0.42 for strategic orientations and 0.24 for BMI. The highest VIF value at structural model level turned out to be 1.791, well below the most conservative threshold of 3.00. Hence, multicollinearity should not be existent at the structural model level (Figure 2).

In our first hypothesis (H1) we proposed a direct effect of sustainability commitment on BMI. In contrast to our expectations proposed in H1, the direct effect of sustainability commitment on BMI turned out insignificant ($\beta = 0.045$, n.s.). Taking the proposed mediation effect in hypothesis 2 into account, this initial finding indicates a potential full mediation of the effect of sustainability commitment on BMI by strategic orientations. In order to test the proposed mediation effect, we employed the bootstrapping approach in PLS proposed by Hair et al. (2017). In a first step, we examined whether sustainability commitment is positively related to strategic orientations as proposed in our hypothesis H2a. In line with hypothesis 2a, our results confirmed a positive and significant effect of sustainability commitment on strategic orientations ($\beta = 0.651$, $p < 0.01$). In a second step, we examined whether the construct of strategic orientations is positively related to BMI dimension. In line with hypotheses 2b, we found that strategic orientations exhibited a positive and significant effect on BMI ($\beta = 0.295$, $p < 0.01$). In a third step, we then estimated the indirect effect of sustainability commitment via strategic orientations on BMI as well as the corresponding significance of the potential mediation. In order to so, we applied the bootstrapping method for the sampling distribution of the indirect effect following Hair et al. (2017). According to our results, the indirect effect of sustainability commitment through strategic orientations on BMI ($\beta = 0.192$, $p < 0.05$) turned out to be positive and highly significant. Since sustainability commitment had no direct effect on BMI, our results suggest the establishment of a full mediation. All effects of the control variables are outlined in Table 6.

6 | DISCUSSION

In our conceptual model, we integrated different strategic orientations and investigated the influences of firm-internal factors on BMI. To the best of our knowledge, this is the first study to quantitatively analyze sustainability's role as a driver of BMI. Overall, the findings support our research model and most of the hypothesized relationships. First, our SEM analysis results indicate that sustainability commitment had no direct effect on BMI. This might be due to the fact that most commercial firms integrate sustainability without obtaining clear benefits (Adams et al., 2016; Crittenden et al., 2011), which results in efficiency-centered, incremental innovations.

Second, the findings from the mediation analysis revealed that sustainability commitment, while having no direct effect, indeed has an indirect effect on BMI via strategic orientations. More specifically, our hierarchical construct of strategic orientations consisted of three important orientations

TABLE 1 First-order measurement model results: reflective items

First-order construct	Item	Loadings	Significance (bootstrapping; $n = 5000$)
Importance of sustainability	How important are the following to your company?		
Mean = 4.93	Environmental sustainability	0.854	24.603
SD = 1.27	Measuring new product progress on sustainability	0.909	43.102
CR = 0.923	Future importance of sustainability criteria types	0.920	54.890
AVE = 0.801			
Sustainability practices	To what extent does your company do the following?		
Mean = 4.76	Manage your product's carbon footprint	0.924	61.560
SD = 1.37	Use the triple bottom line for product planning	0.936	71.526
CR = 0.939	Select suppliers and partners based on sustainability criteria	0.884	29.577
AVE = 0.837			
Market orientation	Our objectives are driven primarily by customer satisfaction	0.809	27.360
Mean = 5.17	Our strategy for competitive advantage is based on our understanding of our customers' needs	0.805	18.575
SD = 0.99	Our market strategies are driven by our understanding of possibilities for creating value for our customers	0.750	16.988
CR = 0.908	Our salespeople regularly share information within our business concerning competitors' strategies	0.743	18.615
AVE = 0.623	We target customers and customer groups where we have or can develop a competitive advantage	0.820	27.515
	Top management regularly discusses competitors' strengths and strategies	0.808	25.981
Technology orientation	Technological innovation is readily accepted in our program/project management	0.853	28.556
Mean = 5.02	We use sophisticated technologies in our new product development	0.878	39.123
SD = 1.11	Our new products always use state-of-the-art technology	0.884	52.262
CR = 0.918	Technological innovation based on research results is readily accepted in our company	0.815	16.639
AVE = 0.736			
Entrepreneurial orientation	In dealing with its competitors, my firm …		
Mean = 4.57	Typically responds to actions that competitors initiate/Typically initiates actions to which competitors then respond	0.482	3.453
SD = 1.04	Is very seldom/very often the first business to introduce new products/services, administrative techniques, operating technologies, and so forth	0.731	6.891
CR = 0.853	Typically seeks to avoid competitive clashes, preferring a *live-and-let-live* stance/ Typically adopts a very competitive, *undo-the-competitors* stance	0.570	4.003
AVE = 0.501	My firm's top managers generally have …		
	A strong proclivity for low-risk projects (with normal and certain rates of return)/A strong proclivity for high-risk projects (with chances of very high returns)	0.758	6.977
	My firm's top managers generally believe that …		
	Owing to the nature of the environment, it is best to explore it gradually via cautious, incremental behavior/Owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve the firm's objectives	0.824	8.158
	When confronted with decision-making situations involving uncertainty, my firm …		
	Typically adopts a cautious, wait-and-see stance in order to minimize the likelihood of making costly decisions/Typically adopts a bold, aggressive stance in order to maximize the likelihood of exploiting potential opportunities	0.812	7.757

TABLE 2 Inter-construct correlations

Construct	1	2	3	4	5	6	7	8	9	10
1. Sustainability commitment	1									
2. Market orientation	0.559**	1								
3.Technology orientation	0.599**	0.715**	1							
4. Entrepreneurial orientation	0.356**	0.141	0.326**	1						
5. VOI	0.233**	0.191*	0.322**	0.298**	1					
6. VAI	0.367**	0.204**	0.356**	0.393**	0.759**	1				
7. RMI	0.332**	0.238**	0.356**	0.324**	0.689**	0.774**	1			
8. Environmental turbulence	0.315**	0.319**	0.377**	0.085	0.327**	0.373**	0.289**	1		
9. R&D intensity	0.137	0.081	0.220**	0.029	0.091	0.135	0.045	0.052	1	
10. Company size	0.195*	0.164*	0.216**	−0.022	0.137	0.161*	0.152*	0.106	0.309**	1

* ≤ 5%; ** ≤ 1%

TABLE 3 Heterotrait-Monotrait ratio of correlations (HTMT)

Constructs	1	2	3
(1) Sustainability commitment			
(2) Market orientation	0.615 CI_{900}[0.488;0.724]		
(3) Technology orientation	0.661 CI_{900}[0.552;0.765]	0.814 CI_{900}[730;0.889]	
(4) Entrepreneurial orientation	0.408 CI_{900}[0.255;0.551]	0.185 CI_{900}[0.156;0.353]	0.373 CI_{900}[0.237;0.513]

TABLE 4 First-order measurement model results: formative indicators

First-order construct	Indicator	Weights	Significance (bootstrapping; $n = 5000$)
Value offering innovation	Target customers have changed	0.355	17.796
Mean = 4.46	The product and service offering has changed	0.401	20.589
SD = 1.22	The firm's positioning in the market has changed	0.426	20.331
VIF = 2.613			
Value architecture innovation	The firm's core competences and resources have changed	0.308	22.967
Mean = 4.41	Internal value creation activities have changed	0.315	22.040
SD = 1.26	The roles and involvement of partners in the value creation process have changed	0.293	23.846
VIF = 3.491	Distribution has changed	0.268	18.779
Revenue model innovation	Revenue mechanisms have changed	0.402	10.296
Mean = 4.66	Cost mechanisms have changed	0.667	5.545
SD = 1.38			
VIF = 3.445			
Environmental turbulence	In our kind of business, customers' product preferences change quite a bit over time	0.928	8.513
Mean = 4.79	Technological developments in our industry are rather minor (r)	0.430	2.084
SD = 1.09			
VIF = 1.003			

TABLE 5 Second-order measurement model results

Second-order construct	First-order construct	Loadings/weights	*t*-values
Sustainability commitment	Importance of sustainability	0.956	102.611
Mean = 4.85	Sustainability practices	0.959	94.606
SD = 1.26			
CR = 0.948			
AVE = 0.751			
Strategic orientations	Market orientation	0.309	2.144
Mean = 4.96	Technology orientation	0.549	3.805
SD = 0.82	Entrepreneurial orientation	0.417	4.022
VIF = 2.290			
BMI	VOI	0.352	12.298
Mean = 4.47	VAI	0.401	14.987
SD = 1.19	RMI	0.335	8.454
VIF = 3.499			

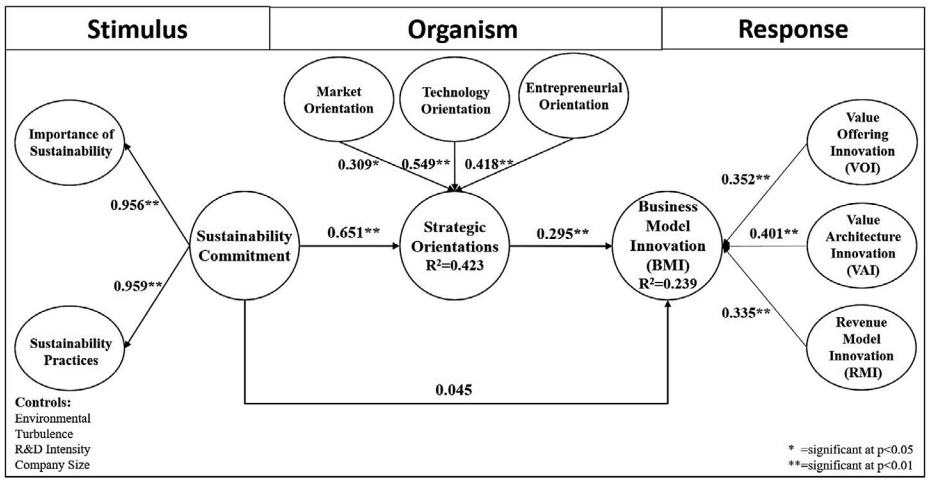

FIGURE 2 Structural model results

with regard to innovation outcomes, namely market orientation, technology orientation and entrepreneurial orientation. According to our results, these orientations as formative second-order dimensions act solely or in combination as mediator for effect of sustainability commitment on each BMI dimension. Accordingly, our findings in this regard provide first empirical evidence that being sustainable extends information-gathering's scope regarding current customers and markets, as well as new technologies and opportunities for value creation. These findings are in line with previous research indicating that firms committed to sustainability engage in market research in order to address sustainability issues (Hoffmann, 2007), and that such market orientation has positive performance implications with regard to innovation activities (Baker & Sinkula, 2007; Paladino, 2007). Similarly, our findings from mediation analyses also provide

TABLE 6 Effects of the control variables

Effect on β (*t*-value)	BMI
Environmental turbulence	0.239 (2.638)
R&D intensity	0.019 (0.275)
Company size	0.079 (1.094)

further evidence for the proposition made by past studies that new technologies need new BMs for value to be captured from them (Amit & Zott, 2001). Building a knowledge base for new developments in a firm's technological environment could achieve a shift in all three BM dimensions. Finally, our findings are also in line with research showing that a high commitment to sustainability also fosters the search for new opportunities (Du et al., 2016), and that this entrepreneurial orientation unfolds in proactiveness and risk-taking behavior

(e.g., by means of a high level of experimentation) influencing value creation's internal mechanisms (Achtenhagen et al., 2013).

6.1 | Theoretical implications

This paper used the SOR model (Hebb & Donderi, 1987; Mehrabian & Russell, 1974) to explain the specific strategic behavior through which sustainability commitment is processed into BMI. To the best of our knowledge, this is the first study to empirically investigate strategic orientations as drivers of BMI. This study had two primary goals: (a) to identify the sustainability commitment's influence on strategic behavior and, (b) to examine the relationship between strategic orientations and BMI. Our findings offer novel insights into the linkage between sustainability and BMI and thereby contribute to two literature streams: sustainability innovation research and research on BMI.

First, we contribute to research on sustainability (innovation) by providing new insights into how a commitment to sustainability influences internal strategic competitive behavior. Thus, we take a different perspective than most research regarding sustainability innovation that concentrates, for example, on bottom of pyramid innovations, new organizational forms to solve sustainability issues, or on the environmental outcomes of being sustainable (Hörisch et al., 2015). We, however, extend previous studies on sustainability management investigating sustainability's business case, thereby focusing on business performance, new product development success (Claudy et al., 2016), or other outcomes of sustainable innovation. Only few studies exist that have shifted the focus to the influence of BMI on sustainability (Pedersen et al., 2018). In contrast to the mainstream literature on sustainable innovation, our study shows that sustainability commitment can lead to specific configurations of strategic behavior in established firms, that is, market, technology as well as entrepreneurial orientation that effectively transform the sustainability issues into necessary changes in a firm's BM. In detail, the results show that sustainability commitment impacts strategic competitive behavior and facilitates behavior that has been associated with competitive advantages (Lumpkin & Dess, 1996; Narver & Slater, 1990). Subsequently, sustainability commitment might be incorporated into strategic behavior and become a strategy itself that combines competitive advantage seeking and sustainability efforts. In this regard, firms may differ in their responses to sustainability challenges, by increasing market-centric, entrepreneurial, or technological strategic behavior. Researchers agree that start-ups and spin-outs are more capable of organizational transformation regarding sustainable BMs than incumbents that predominantly focus on operational sustainable efficiency (Adams et al., 2016). However, we contribute to this view by providing a rationale for why incumbents take efforts to increase efficiency first and engage in organizational transformation "delayed." This can be partly explained with the time span that is needed in order to implement sustainability thinking into the competitive strategic mindset of a firm, that is, the time needed to unfold strategic orientations. After successful integration, firms are able to proactively develop more sustainable BMs and innovations than being reactive to regulations. Thus, we extend extant research that neglected the relationship between sustainability and the corporate strategic context (Kennedy et al., 2017).

Although researchers argue that sustainability may be a key driver of BMI (Adams et al., 2016; Foss & Saebi, 2017), there is little knowledge of the mechanisms that allow sustainability to lead to innovation or to the evolution of BMI. Consequently, this study helps bridge this gap in knowledge by showing that firms with a commitment to sustainability do not "automatically" innovate their business models. Instead, this study suggests that sustainability is a driver to deepen technology-oriented strategic behavior, market-focused information gathering and entrepreneurial behavior, which subsequently lead to the BM's innovation. In conclusion, this study's theoretical contribution provides an explanation of *how* sustainability changes internal strategic behavior, rather than clarifying the measurable outcomes (e.g., sustainability outcomes and performance effects). We, therefore, provide a different perspective on sustainability and innovation, and extend the literature, which mainly discusses how firms can be more sustainable or how they can develop sustainable innovations, by pointing to a commitment to sustainability's direct and indirect influence on internal strategic behavior and actions.

Second, we contribute to the BMI literature by identifying additional antecedents of BMI, and to by adding knowledge on the link between strategy and BMs. We have extended previous findings that a commitment to sustainability influences new product development success positively (Claudy et al., 2016; Du et al., 2016) by replicating these findings in the BMI context. To the best of our knowledge, the results provide first empirical evidence that strategic orientations affect BMI, thus extending findings on market orientation and BM adaptation (Saebi et al., 2016), as well as previous work on strategic orientations in terms of new product development (Atuahene-Gima & Ko, 2001; Spanjol et al., 2012). Our findings, therefore, indicate that collective behavior, which is manifested via a firm's strategic stance, affects BMI. We subsequently responded to calls by Foss and Saebi (2017) and Spieth et al. (2016) to identify the antecedents of BMI by extending research that posits that drivers of BMI can also be internal if there is no exogenous change (Martins et al., 2015; Zott et al., 2011). Market, technology, and entrepreneurial orientation as subdimensions of strategic orientations were shown to directly influence a firm's propensity to innovate

its BM. In contrast to prior research, we did not investigate specific market research methods, technologies or experimental methods as drivers of BMI, but applied a broader, strategic perspective. We, therefore, extended previous research focusing on specific technologies, such as the Internet or on a firm's past technological innovations as driver of BMI (Wei et al., 2014), by showing that, rather than single technologies, a broader technological strategic stance also drives BMI. Likewise, we support previous research that found BMI to be a risky, experimental process (McGrath, 2010; Sosna et al., 2010) resulting from the entrepreneurial exploration of opportunities (Demil et al., 2015). Also in line with previous research, our study indicates that deepening a firm's knowledge about its customers and competitors (i.e., market orientation) also drives BMI, even though not that strong when looking on the second-order weight compared to the other strategic orientation dimensions. Still, our results provide further empirical evidence that consumers are a key driver of BMI (Pynnönen et al., 2012).

Third, we have shed light on the relationship between a firm's strategy and BMI by shedding light on how strategic orientations promote change to a firm's BM. The second-order weights of strategic orientations indicate that the orientations that guide strategic choices have different implications for the propensity to change a BM. Consequently, we confirm Casadesus-Masanell and Ricart's (2010) conceptual work and argumentation that BMs are not a strategy, but the result of strategic choices, since the dominant behavior that the employed strategic orientation proposes, guides choices (Atuahene-Gima et al., 2005). Previous research showed that BMs and strategies are distinct constructs that interactively influence firm performance (Zott & Amit, 2008); however, Zott and Amit (2008) investigated the roles of specific product market strategies and specific BMs. We have contributed to these authors' findings by providing a more holistic perspective that identifies concrete behavior that guides strategic choices, which may in turn innovate a firm's BM. Consequently, our results identify a driving behavior (i.e., strategic orientation) for BMI without focusing on concrete strategies (e.g., cost leadership or differentiation) and concrete BMs (e.g., novelty-centered or efficiency-centered). Thus, we increase the general understanding of the BMI construct and how strategy can facilitate BMI. By extending these previous findings, we contribute to the ongoing debate on whether strategy and BMs are distinct constructs or "old wine in new bottles" (Massa et al., 2017, p. 28).

6.2 | Managerial implications

This study offers managers important insights and practical evidence. We have identified relevant strategic orientations that drive BMs' innovation. These orientations could help firms to overcome their inertia in terms of organizational resistance to innovation (Heidenreich & Talke, 2020), such that conditions are favorable for innovating their BM effectively. Since strategic orientations represent the guidelines for firm specific-behavior, employing strategic orientations that facilitate BMI might reduce the resistance to BM change. Our results also suggest that a commitment to sustainability can lead to innovation, thus adding to a broader understanding of sustainability's business case. We, therefore, show managers the possible benefit of committing to sustainability, as BMI can help firms to differentiate themselves from their competitors and can be a competitive advantage (Zott & Amit, 2007). Managers should, therefore, commit to sustainability strategically and allocate resources to increase their sustainability efforts. Furthermore, they should develop sustainability policies in order to differentiate their firms from their competitors with possible BMI.

Besides, this study shows that a commitment to sustainability has wider implications for the firm behavior (influencing market, technology, and entrepreneurial orientations). Managers should be aware of the internal effects on firm behavior and need to monitor a high commitment's effects on sustainability, because this, for instance, influences the market-oriented behavior. Adding to this understanding, this study shows that sustainability can be an enabler of deepening technological knowledge, which in turn influences the BM. Firms that gather technological information in order to create a competitive advantage could, therefore, broaden their scope by committing to sustainability, which would also help foster entrepreneurial behavior, such as risk-taking and proactiveness. Sustainability thus provides an opportunity to implement behavior that allows one to identify new opportunities and enhances innovation. Finally, managers should dedicate resources to deepen firms' technological knowledge and to promote a proactive search for technological solutions throughout the firm, not limiting this to R&D. By understanding the mechanisms that drive BMI, managers can find new value creation and capture opportunities in order to provide superior customer value, that is, to gain a competitive advantage.

6.3 | Limitations and future research

Despite its insights, this study also has some limitations. First, we used cross-sectional data, but since BMI is a dynamic process, longitudinal data could assess the strategic orientations' impacts on BMI over time. This might shed some light on the dynamic evolvement of strategic orientations and their interplay with sustainability issues and the subsequent transformation of BMs.

Second, although we addressed possible endogeneity issues for the relationship between a firm's sustainability

commitment and its market orientation, future research can investigate possible interdependencies and feedback loops between sustainability commitment and market orientation. Third, we considered the manufacturing firms in our sample. The various strategic orientations may, therefore, have different implications for BMI in service firms; consequently, investigating service firms might offer future research opportunities. Although we controlled for industry effects, our results of market knowledge's influence on BMI may change in respect of other industries, where the BM depends more on customers' needs and demands, or where these demands change swiftly. Forth, we relied on the retrospective assessments of BMI by asking our respondents to indicate whether their firm's BM had changed in the previous 3 years. Future research could, therefore, examine strategic orientation's role in innovating a firm's BM in greater detail. Investigating specific strategic orientations and strategies, and the resulting BMs might be a fruitful avenue for further research to provide additional insights into the strategy and BM debate. Fifth, we did not assess BMI's performance implications in this study and although the relevant research consistently argues that BMI has positive performance effects (Aspara et al., 2010; Foss & Saebi, 2017), it would be interesting to disentangle the BMI (value offering, value architecture, and revenue model) dimensions' performance implications. Finally, we investigated sustainability commitment, strategic orientations, and BMI's relationships, focusing on BMs new to the firm. Future research could assess different types of BMI by, for example, differentiating between BMI's scope and novelty, as suggested by Foss and Saebi (2017).

CONFLICT OF INTERESTS

No co-authors have any conflicts of interest.

ETHICAL APPROVAL

The authors have read and agreed to the Committee on Publication Ethics (COPE) international standards for authors.

ORCID

Patrick Spieth https://orcid.org/0000-0002-4408-1768

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AUTHOR BIOGRAPHIES

Dr. Sascha Klein is Post Doctoral Researcher at the Chair of Technology and Innovation Management at University of Kassel, Germany. He received his bachelor and master degree in industrial engineering from University of Kassel, Germany. Sascha received his Phd with distinction from University of Kassel in 2019. His research focuses on business model innovation and sustainability issues in innovation management.

Dr. Patrick Spieth is Full Professor of Technology and Innovation Management as well as Entrepreneurship at University of Kassel, Germany. From 2010 to 2014 he was Assistant Professor at EBS Business School. In previous years, he was Visiting Professor at Arizona State University as well as Visiting Scholar at Copenhagen Business School. From 2014 to 2018 Patrick was Associate Editor of R&D Management Journal. His research focuses on BM innovation, product & service innovations, new product development and technology strategies. He has published on these topics in such journals as Journal of Product Innovation Management, Journal of Industrial Ecology, IEEE Transactions on Engineering Management, Technological Forecasting & Social Change, Industrial Marketing Management, Long Range Planning, Journal of Business Research, Transportation Research Part A, R&D Management Journal, International Journal of Innovation Management.

Dr. Sven Heidenreich is Full Professor of Technology and Innovation Management at Saarland University in Saarbruecken, Germany. He received his diploma of business administration from the Johannes Gutenberg-University in Mainz and his doctorate from EBS Business School. The main focus of his research is on resistance to innovations, customer co-creation, business models and innovation networks. He has published on these topics in such journals as Journal of Product Innovation Management, Journal of the Academy of Marketing Science, Journal of Service Research or Long Range Planning. Since 2019 Sven is member of the JPIM Editorial Review Board.

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