



Potentially Disruptive Innovations and Business Models: (How) Do Established SMEs Respond?

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Abstract. This study analyses how established SMEs respond to potentially disruptive innovations and business models in the course of increasing digitization. Drawing on the strategic entrepreneurship approach we argue that SMEs showing opportunity-seeking behaviour are more likely to respond to potentially disruptive innovations and business models proactively. Using a data base of 268 established SMEs in Germany, we show that established SMEs that recognize disruptive innovations and business models as a business opportunity (thereby showing an opportunity-seeking mindset) apply significantly more frequently strategic measures to exploit these opportunities (advantage seeking). Observing and actively evaluating relevant new technologies and developments is a key determinant of belonging to the group of SMEs demonstrating entrepreneurial, opportunity-seeking behaviour. In our sample only a minority belongs to this group of proactive established SMEs.

Keywords: SMEs, strategic entrepreneurship, digitization, disruptive innovations, new business models.

JEL-Codes: L26, L21, M21

1. Introduction

In the course of the ongoing process of digitization, disruptive product and business model innovations occur more and more. For established small and medium-sized enterprises (SMEs), these developments come along with both opportunities and risks. On the one hand, competitors – newcomers to the market or established companies themselves – may bring new (disruptive) products or business models onto the market resulting possibly in a reduction of established SMEs' market shares or lower profit margins (Burke et al., 2016). On the other hand, new information and communication technologies and related business

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models may also provide established SMEs with new business opportunities e.g. through developing or improving products and services and an easier access to new markets.

Hence, for established SMEs it is one of the main challenges to find a promising way to handle successfully the rapid change induced by the emergence of new global players like Amazon, Uber and Airbnb. These firms changed the rules of the game and reshaped their respective industries in building up virtual platforms that reduced information and transaction costs as well as barriers to market entry (Andersson and Eriksson 2018). Yet, the emergence of disruptive innovations and new business models does probably not have the same impact on all business sectors alike. Nevertheless, the underlying internet based technologies are general purpose technologies. They therefore profoundly affect, at least in the medium to long run, the way of value creation as well as customer preferences on the whole (Bleicher and Stanley 2016, Kagermann 2015, Loebbecke and Picot 2015). So it might be critical for an SME's prospects to enhance its knowledge base concerning game changer technologies. In so doing SMEs might be able to evaluate those technologies' impact on their current business model and draw conclusions on appropriate strategic measures. Given the fact that SMEs represent more than 99 percent of all firms in Europe it is of general economic and social importance how SMEs are mastering the ambidexterity of exploring and exploiting opportunities in the context of disruptive product and business model innovations.

Surprisingly, there is little empirical evidence on whether and to what extent existing SMEs both recognize these new technologies as a business opportunity and are able to use this knowledge for reshaping their existing business model - while running the day to day business effectively (Cozzolino et al. 2018). Against this background, this paper focuses on SMEs and their varying responses to emerging opportunities and risks of digitization. We argue that the strategic entrepreneurship approach is appropriate to explain how established SMEs deal with potentially disruptive developments. In this paper we therefore aim to explore whether SMEs' assessment and review activities concerning innovation and future trends drive the perception of "game-changer" technologies (associated with opportunity-seeking behaviour) and thus the subsequent implementation of strategic measures (associated with advantage-seeking behaviour). This nexus of opportunity-seeking and advantage-seeking behaviour is distinctive for being a strategic entrepreneur (Hitt and Wright 2017, Hitt et al. 2001, Ireland et al. 2003, Ireland and Webb 2007 and 2009, Kuratko and Audretsch 2009). In this vein we also follow the proposition of scholars to advance the strategic entrepreneurship concept (e.g. Mazzei 2018, Simsek et al. 2017). Our empirical work sheds some light on the behaviour of SMEs in the context of the ongoing digitization and provides additional empirical evidence for a better understanding of how firms tackle the challenges caused by disruptive innovations and new business models. In contrast to other studies we focus on

established SMEs and how they respond to disruptive innovations and business models instead of on innovative start-ups in the ICT-sector.

We conduct an empirical analysis based on a sample of 268 SMEs located in Germany. Applying a path model approach we examine firstly whether external search activities affect opportunity-seeking behaviour and secondly whether opportunity-seeking behaviour in turn is positively interrelated with advantage-seeking behaviour. We found that one-fifth of the analysed SMEs regard disruptive innovations and business models as a business opportunity. These SMEs take significantly more often strategic measures in dealing with the increasing digitization, compared to the remaining SMEs. More precisely, they set up pilot projects to gain experience, they cooperate with competitors, they work closely with their customers and suppliers, they seek advice by external specialist or they invest in research and development activities to exploit the recognized opportunities. Observing and actively evaluating relevant new technologies and developments is a key determinant for belonging to the group of SMEs that demonstrate entrepreneurial, opportunity-seeking behaviour.

We organise the paper as follows. In section two we present our theoretical framework and develop our hypotheses. Section three contains the description of our dataset and descriptive statistics, while we present our empirical results in section four. In the last section we discuss our findings and draw some conclusions.

2. Theoretical Framework and Hypotheses

Technology by itself has no economic value. It needs to be commercialized in some way via a business model (Chesbrough 2010). Although all businesses, either explicitly or implicitly, employ a particular business model, firms differ in their ability to commercialize new technologies by adapting their respective business models (Teece 2010). Thereby, business model innovation is required in responding to changing sources of value creation, namely by rearranging the established ways of doing business (Zott and Amit, 2010; Schneider and Spieht 2013).

Following Teece's (2010, p. 191) proposition that "a business model describes the design or architecture of the value creation, delivery and capture mechanisms employed", one can argue that firms that do not adjust or reinvent their current business model in the face of an upcoming comprehensive technological change endanger their competitiveness. Such a technology and hence a key driver for business model innovation is the broadband internet, enabling ubiquitous communications and cheap ways to receive and send rich amounts of useful information (McGrath 2010). Complementary developments in information and communication technologies (ICT) enable the exploitation of opportunities provided by broadband internet. Thus, complementary ICT changes

the business environment in a dynamic and significant way. As a result, firms need to ask themselves how these technology driven changes threaten their current business models concerning customer needs, the firm's value proposition and the value constellation as well as what it needs to innovate the own business model (Andersson and Eriksson 2018, Paap and Katz 2004).

Business model innovation means the discovery of a slightly or fundamentally different business model in an existing business (Markides, 2006, Zott and Amit 2010). It aims at consciously renewing a firm's core business logic rather than limiting its scope of innovation on single products or services. Furthermore, it builds on the business model's capacity to integrate all of the firm's current business model elements, its external environment, and its interfaces with customers and partners (Schneider and Spieth 2013). Though business model innovation is not costless as e.g. intra-organizational adjustment costs may occur, investments in research and development (R&D) activities are often higher (Zott and Amit 2010). Extant literature shows that business model innovations are just as relevant as developing new technologies (Chesbrough, 2010) and are therefore important for remaining competitive (Pohle and Chapman, 2006) and the business success especially for SMEs (Aspara et al. 2010).

A suitable theoretical foundation of the business model innovation process is provided by the strategic entrepreneurship perspective (Schneider and Spieth 2013). Strategic entrepreneurship is based on the integration of entrepreneurship and strategic management (Hitt et al. 2001). Strategic entrepreneurs are able to create wealth by identifying opportunities in their external environment as well as to build up sustainable competitive advantages to exploit those opportunities (Ireland et al. 2003, p. 966). It is an approach for pursuing superior performance through both incremental and discontinuous innovation and a blend of strategic and entrepreneurial activities (Mazzei 2018). We draw on these two elements – the entrepreneurial and the strategic – to explain how SMEs deal with upcoming opportunities induced by new technologies and disruptive business models.

Hitt et al. (2001) define entrepreneurship as the identification and exploitation of previously unexploited opportunities. Such unexploited opportunities arise from change – be it the development of new knowledge by individuals and organizations or changes in the environment. Comprehensive changes induced by general purpose technologies like ICT and broadband internet offer new opportunities for firms to benefit from these changes (Grégoire et al. 2010). However, the question remains what is a promising way to explore these opportunities.

Giernik et al. (2014) highlight the role of active information search for business opportunity identification. They found that active information search enhances the positive effect of divergent thinking on business opportunity identification. Divergent thinking is the individual's general ability to generate multiple and original ideas. It enables the individual to combine various pieces of

information to generate innovation (Gielnik et al. 2014). Baron (2006) argues that active search activities in combination with entrepreneurial experience and changes in the external world help to "connect the dots" hence to identify opportunities in seemingly unrelated events. Casadesus-Masanell and Zhu (2013) observed that incumbents often learn about new business models from entrants and respond to these new business models by incorporating these innovations (in full or in part) into their businesses. This implies that the learning process comprises an internal review process with regard to the competitor's business model as the adaption of a new business model requires appropriate resources. If these resources are not available the implementation does not work effectively or fails entirely (Wessel and Christensen 2012).

We argue that observing and assessing innovations and future trends is a promising way for established SMEs to seek for new business opportunities. This is especially the case within a rapidly changing business environment due to the ongoing digitization. To explore these opportunities established SMEs need to observe their environment and evaluate new technologic developments regarding their relevance for the current business model. Hence we hypothesize:

Hypothesis 1: SMEs' assessment and review activities concerning innovations and future trends are positively associated with *opportunity-seeking* behaviour.

A key element for firms in sustaining competitiveness is managing resources strategically (Ireland et al. 2003). Firms hold heterogeneous and idiosyncratic resources on which their strategies are based. Competitive advantages are achieved when the strategies are successful in leveraging these resources (Hitt et al. 2001). As time goes by and environmental conditions change, the existing resources may lose value. Thus the acquiring and developing of new resources and the subsequent structuring of the resource portfolio, bundling of resources and leveraging capabilities lead to sustainable competitive advantages (Hitt et al. 2001). Ireland et al. (2003) draw special attention to human and social capital as valuable resources. These intangible resources are less imitable than tangible ones.

External networks can serve as sources of implicit and explicit new knowledge. The establishment of an external network is thus a suitable strategy for SMEs for enhancing their human and social capital. Such networks involve relationships with customers, suppliers, and competitors among others and facilitate SMEs' access to complementary and thus beneficial resources (Brunswick and Vanhaverbeke 2015, Gronum et al. 2012, Hitt et al. 2001). Both informal networks and formal cooperation are supportive in building up trust. They also enhance the organizational ability to work effectively together with other organizations (Hitt et al. 2001).

Lasagni's (2012) empirical results based on 500 SMEs in six European countries indicate that innovation performance is higher in those SMEs which are

proactive in strengthening their relationships with innovative suppliers, users, and customers. Furthermore, these findings support the view that SMEs will have better new product development results if they improve their relationships with laboratories and research institutes. Moreover, Kleijn et al. (2011) find that cooperation with externals increases the innovation behaviour of medium-sized firms. However, crucial for realising the benefits of new knowledge is the absorptive capacity e.g. through research and development activities or the set-up of pilot projects to gain experience (Cohen and Levinthal 1990).

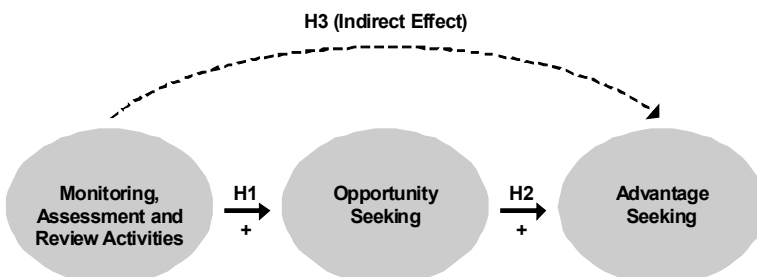
We argue that SMEs having an entrepreneurial mindset towards the ongoing process of digitization are more likely to implement specific strategies exploiting these opportunities. Assuming that applying strategic measures enhances firms' ability to sustain their competitive advantage through exploiting opportunities we hypothesize:

Hypothesis 2: Opportunity-seeking behaviour is positively interrelated with implementing specific strategies to cope with potentially disruptive innovations and new business models (i.e. *advantage-seeking* behaviour).

Figure 1 illustrates the theoretical framework of this study. We expect that monitoring, assessment and review activities are positively interrelated with opportunity seeking (hypothesis 1). Opportunity seeking is expected to have a positive relationship with advantage seeking (hypothesis 2). Combining both single direct effects of hypothesis 1 and 2 we can formulate a hypothesis regarding the relationship between monitoring, assessment and review activities and implementing specific strategies to cope with potentially disruptive innovations and new business models (advantage seeking). Because both direct effects are assumed to be positive, we also expect a positive relationship between monitoring, assessment and review activities and advantage seeking. Hence, we hypothesize:

Hypothesis 3: The relationship between monitoring, assessment and review activities on the one hand and advantage-seeking behaviour on the other hand is positive. This indirect effect is mediated by opportunity-seeking behaviour.

Figure 1: Theoretical Framework and Hypotheses



3. Data and Descriptive Statistics

3.1. Sample

This study uses data from an online survey that was conducted by the end of 2016 in the area of Düsseldorf, western Germany. We contacted about 5,000 firms of all industries and sizes, of which 327 answered the questionnaire completely. Since we focus on SMEs (with less than 500 employees and turnover below 50 million €), all large firms were excluded. Furthermore, some firms had to be excluded because of missing values in some variables. Our final sample comprises 268 SMEs.

The applied questionnaire contains a set of questions on digitization, disruptive innovations and various entrepreneurial responses to these issues. In particular, it comprises questions on strategies firms have implemented to deal with disruptive innovations and new business models as well as on the importance of new technologies and business models with regard to a firm's business model. We utilize this information to represent the constructs opportunity seeking and advantage seeking.

3.2. Variables

According to our hypotheses there are two dependent variables: opportunity seeking and advantage seeking. As we apply a path model to test our hypotheses, opportunity seeking constitutes an independent variable as well. For capturing the construct opportunity seeking we use information on a firm's assessment of the importance of new technologies and business models for the firm's prospects. The respondents could choose among the following possible answers where they were allowed to choose multiple answers. The emergence of new technologies and business models ...

- are only of slight importance
- are not assessable yet
- are crucial for the firm's development
- can significantly weaken the market position
- can significantly improve the market position
- can enable continuous improvements
- can enable radical new business potentials.

In order to identify SMEs that respond proactively to upcoming technologies and business models and thus in an opportunity-seeking way we run a cluster analysis using this specific information. The results of the cluster analysis are presented in Table 1. We identified two groups of SMEs. The first one comprises

opportunity-seeking SMEs, the second one the remaining, more conservative SMEs.

Table 1: Cluster analysis to detect opportunity-seeking SMEs

	Opportunity-seeking SMEs	Other SMEs
	Mean	Mean
Slight importance	0.039	0.539
Importance not yet assessable	0.137	0.318
Crucial for the firm's development	0.275	0.097
Can significantly weaken our market position	0.196	0.101
Can significantly improve our market position	0.824	0.023
Enables continuous improvements	0.588	0.129
Enables radical new business potentials	0.412	0.018
Number of observations	51	217
Share of SMEs	0.190	0.810

An opportunity-seeking SME is one that recognizes the opportunities of potentially disruptive technologies for its business model and its significance for the firm's development. Accordingly, opportunity-seeking SMEs are more likely to answer that potentially disruptive innovations and business models are crucial for the firm's development (27.5% versus 9.7%). They also state more frequently that potentially disruptive innovations can weaken or improve a firm's market position significantly. Furthermore, they are more likely to see the potential of technology based developments for continuous improvements or for radical new business potentials. In contrast, SMEs of the remaining group are characterized by either having problems with evaluating the relevance of potentially disruptive innovations and new business models for their own business or by attaching only minor importance to potentially disruptive innovations. Most SMEs in our sample belong to the second, conservative group. Only less than one out of five SMEs belongs to the proactive opportunity-seeking group showing entrepreneurial behaviour.

Based on the result of this cluster analysis the variable *opportunity seeking* is coded as a dummy variable taking the value of one if an SME belongs to the proactive, opportunity-seeking group and zero otherwise.

For capturing the construct advantage seeking, we use information on strategies SMEs have implemented in order to deal with the emergence of potentially disruptive innovations. Possible answers were cooperation with customers and suppliers, setting up own pilot projects, seeking advice by external specialists, investing in own R&D, cooperation with universities and other research institutions, and cooperation with competitors. For each item we create a dummy variable taking the value of one if the respective strategy has been implemented, and zero otherwise. This set of dummy variables represents the

advantage-seeking behaviour of SMEs. Table 2 reports descriptive statistics for each strategy.

Table 2: Strategies to deal with disruptive innovations (advantage-seeking behaviour): Descriptive statistics

Variable	Mean	Std. Dev.
Cooperation with customers and suppliers	0.369	0.484
Own pilot projects	0.183	0.387
Seek advice by external specialists	0.291	0.455
Invest in own R&D	0.146	0.353
Cooperation with universities and other research institutions	0.063	0.244
Cooperation with competitors	0.149	0.357

The most frequently implemented strategy to respond to potentially disruptive innovations and business models is the cooperation with customers and suppliers, followed by seeking advice by external specialists. More than 18 percent of all SMEs have started own pilot projects. About 15 percent have cooperated with competitors. The share that invested in own R&D is also 15 percent. Only a few SMEs in our sample have entered a cooperation with universities or other research institutions.

A second independent variable refers to assessing innovation and future trends. For capturing this behaviour we use information on specific monitoring and assessment activities of SMEs. We generate two dummy variables. The first one *monitoring* takes the value one if a firm reports to monitor new technologies and business models, and zero otherwise. The second one *assessing* takes the value one if a firm states it conducts assessments and reviews concerning innovations and future trends, and zero otherwise. Descriptive statistics of these two dummy variables as well as of all control variables are presented in Appendix A1.

We also include a set of control variables in our empirical model. Firstly, we control for the importance of ICT for a firm's business model because we assume that SMEs having a business model that is based on ICT are in a better position to successfully respond to opportunities and risks resulting from digitization. To take this into account we include two dummy variables taking the value of one if ICT is important or if it is very important for the own business, and zero otherwise. Secondly, we also include the age of the firm, a dummy variable for export activities, dummy variables for size and industry, and dummy variables for the sales development in the past three years. Concretely, we distinguish between decreasing, increasing and consistent (+/- 2 percent) sales within the past three years.

4. Results

To test our hypotheses we estimate a path model using the structural equation modelling (SEM) procedure implemented in Stata. This procedure treats all dependent variables as metric. Hence, we estimate linear probability models as it is common when estimating path models. Nevertheless, we test the robustness of our results by using the general structural equation modeling procedure (GSEM) which is also implemented in Stata. This procedure takes into account the binary character of our dependent variables. With respect to the signs of the coefficients and their significance levels the results are quite identical. For reasons of space we only report the results using the SEM-procedure.² By estimating a path model, we can test all hypotheses simultaneously within one model. For reasons of clarity, we report each stage of our model separately for both (groups of) dependent variables. We start with the results of the model regarding opportunity seeking (Table 3).

Table 3: Being a proactive, opportunity-seeking SME: Results of the path model

Variables	(1)
Monitoring new technologies and business models	0.030 (0.050)
Conducting assessments and reviews concerning innovations and future trends	0.186*** (0.057)
ICT very important for business model	0.119* (0.063)
ICT important for business model	0.161** (0.074)
Firm age	0.001 (0.001)
Export: Yes	0.077 (0.054)
Sales: Increased	0.036 (0.050)
Sales: Decreased	0.021 (0.075)
Size categories included	Yes
Industry categories included	Yes
Constant	-0.064 (0.075)
R-Square	0.131
Observations	268

Notes: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

2. The respective results based on the GSEM-procedure are available upon request from the authors.

SMEs observing their environment and evaluating upcoming trends and technologies with regard to their relevance for the own business model have a significant higher probability to belong to the group of proactive SMEs. In particular, evaluating new, upcoming trends and innovations is positively related to opportunity seeking. Simply observing potentially disruptive technologies and business models has no statistically significant effect. Thus, our empirical results provide support for hypothesis one. Our empirical results also show that SMEs for which' business model ICT is (very) important are more likely to belong to the group of proactive, opportunity-seeking SMEs. The remaining control variables have no statistically significant effect.

In table 4 we report the effects of opportunity seeking on the probability of implementing various strategies dealing with disruptive innovations (advantage seeking).

Table 4: Strategic actions: Results of the path model

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Proactive firm	0.171** (0.075)	0.146** (0.057)	0.132* (0.069)	0.162*** (0.053)	-0.027 (0.038)	0.111** (0.056)
ICT very important for business model	-0.044 (0.080)	-0.051 (0.061)	0.078 (0.073)	0.109* (0.056)	-0.032 (0.040)	-0.053 (0.060)
ICT important for business model	-0.156* (0.094)	-0.022 (0.071)	0.016 (0.085)	-0.006 (0.066)	-0.059 (0.047)	-0.109 (0.070)
Firm age	-0.000 (0.001)	0.000 (0.001)	0.002** (0.001)	0.000 (0.001)	0.001* (0.001)	0.000 (0.001)
Export: Yes	-0.035 (0.068)	0.079 (0.051)	-0.145** (0.062)	0.195*** (0.047)	0.060* (0.034)	-0.021 (0.051)
Sales: Increased	0.123* (0.063)	-0.012 (0.048)	0.078 (0.058)	0.024 (0.045)	0.071** (0.032)	0.022 (0.047)
Sales: Decreased	-0.007 (0.094)	0.033 (0.071)	0.059 (0.086)	-0.047 (0.066)	0.069 (0.047)	0.030 (0.070)
Size categories	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.352*** (0.090)	0.070 (0.068)	-0.019 (0.082)	0.030 (0.063)	-0.036 (0.045)	0.075 (0.067)
R-Square	0.085	0.178	0.140	0.157	0.106	0.127
Observations	268	268	268	268	268	268

Notes: Standard errors in parentheses. Dependent variables represent various dimensions of advantage seeking (strategic actions), as follows: Column 1: Cooperation with customers and suppliers, Column 2: Own pilot projects, Column 3: Seeking advice by external specialists, Column 4: Invest in own R&D, Column 5: Cooperation with universities and other research institutions, Column 6: Cooperation with competitors, *** p<0.01, ** p<0.05, * p<0.1.

Our estimations reveal that opportunity-seeking SMEs are indeed more likely to implement specific strategies to deal with disruptive innovations, compared to

non-entrepreneurial SMEs. In particular, they have both a higher probability to cooperate with customers and suppliers and to start own pilot projects. Furthermore, they are more likely to seek advice by external specialists, to cooperate with competitors and to conduct own R&D. Surprisingly, cooperation with universities and other research institutions is negatively correlated with opportunity seeking. However, the corresponding coefficient is statistically insignificant. In general, the results of our empirical analyses provide strong support for the second hypothesis that opportunity seeking is positively related to advantage seeking.

Additionally, we estimated the indirect effects of monitoring and assessing on implementing specific strategies to deal with potentially disruptive innovations and business models via belonging to the group of opportunity-seeking SMEs. These indirect effects are calculated by multiplying each direct effect of monitoring and assessing the business environment on being a proactive, opportunity-seeking SME with each direct effect of being a proactive, opportunity-seeking SME on each strategy, respectively. Table 5 reports the results.

Table 5: Indirect effects of observing the business environment on implementing concrete strategies: Results of the path model

Variable	Monitoring new technologies and business models		Conducting assessments and reviews concerning innovations and future trends	
	Coefficient	Std. Error	Coefficient	Std. Error
Cooperation with customers and suppliers	0.005	0.009	0.032*	0.017
Own pilot projects	0.004	0.007	0.027**	0.014
Seeking advice by external specialists	0.004	0.007	0.025*	0.015
Invest in own R&D	0.005	0.008	0.030**	0.013
Cooperation with universities and other research institutions	-0.001	0.002	-0.005	0.007
Cooperation with competitors	0.003	0.006	0.021*	0.012

Notes: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The indirect effects of monitoring new technologies and business models on the implementation of various strategies to deal with disruptive innovations and business models are not statistically significant. With regard to conducting assessments and reviews concerning innovations and future trends we find a positive statistically significant indirect effect on each strategy except the cooperation with universities and other research institutions. Cooperation with universities and other research institutes has a negative indirect effect which is, however, statistically insignificant. The positive statistically significant indirect effects we found are the result of statistically significant positive direct effects we found when testing hypotheses one and two.

Finally, few control variables affect the advantage-seeking behaviour of SMEs (see table 4). SMEs reporting that ICT is very important for their business

model have a higher probability to invest in own R&D, while SMEs rating the role of ICT for their business model as important are less likely to cooperate with customers and suppliers. Firm age is positively related with seeking advice by external specialists as well as with cooperation with universities and other research institutions. Furthermore, our results indicate that exporting SMEs are more likely to invest in own R&D as well as to cooperate with universities and other research institutions. However, they less often seek advice by external specialists. SMEs reporting increased sales in the past three years have a higher probability to cooperate with suppliers and customers and to cooperate with universities and other research institutions.

5. Discussion and Implications

The aim of this study is to analyse how established SMEs respond to potentially disruptive innovations and business models. On the one hand, these trends could be regarded as a risk for established SMEs because new firms may enter the market, possibly reducing established firms' market shares drastically. On the other hand, these innovations and new business models provide established SMEs with new business opportunities as well. Drawing on the strategic entrepreneurship approach we argue that established SMEs that reveal entrepreneurial behaviour are more likely to respond proactively to potentially disruptive innovations and business models. To be able to respond to these new trends a firm needs to recognise them beforehand. Hence, we also argue that SMEs observing and evaluating relevant new trends and technological developments are more likely to belong to the group of strategic entrepreneurs.

We tested our hypotheses using a sample covering 268 SMEs located in the area of Düsseldorf in western Germany. Basically, we find empirical evidence supporting all of our hypotheses. Based on a cluster analysis we split our sample into two different groups. The first group (proactive SMEs) is actively seeking potential opportunities resulting from new technologies and business models driven by the ongoing process of digitization. However, this group is at the same time aware of the potential risks resulting from potentially disruptive innovations and business models. In contrast, the second group of SMEs rate innovations and new business models driven by the digitization as less important for their business' prospects. Furthermore, they are not able to evaluate the impact of these developments on their own business. In our sample, the group of so called proactive, opportunity-seeking SMEs (entrepreneurs) are a distinct minority (19%). Results of our path model indicate that the entrepreneurial SMEs are more likely to implement specific strategies to deal with potentially disruptive innovations and business models. In this case, SMEs act as strategic entrepreneurs.

This study also provides relevant practical implications. Our results point to established SMEs' need to observe and analyse their business environment to identify new relevant technologies and business models. In particular, our empirical findings suggest that it is not sufficient just to observe the own business' environment. There seems to be a need of regularly assessing and reviewing innovations and upcoming trends which are relevant for the own business' prospects. Identifying those developments and weighing the related opportunities and risks enables established SMEs to deal with potentially disruptive innovations and business models. Hence, the results of our study suggest that strategic entrepreneurship is a suitable theoretical concept to explain SMEs' varying responses to potentially disruptive innovations.

Our study also indicates issues left for future research. First, due to the cross-sectional nature of our data base, we were not able to investigate whether the link between opportunity-seeking behaviour and advantage-seeking behaviour is in fact causal. Future research using longitudinal data may look into this. Second, the results of our study suggest that proactive SMEs are more likely to implement specific strategies responding to potentially disruptive innovations and business models. However, it is unclear whether all SMEs are affected by these developments in the same intensity. It is possible that in the group of the so called conservative SMEs some are only slightly affected. From their point of view, there might be no need for implementing specific strategies dealing with potentially disruptive innovations and business models. For a final assessment of the behaviour of SMEs, an analysis is needed whether SMEs implementing specific strategies are more successful in the long run, compared to SMEs which do not pursue any strategies. In the same vein, future research may also investigate whether there are single strategies or bundles of strategies that are more promising in dealing with potentially disruptive developments due to the ongoing digitization.

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Appendix

Table A1: Descriptive statistics of independent and control variables

Variable	Mean	Std. Dev.
Monitoring new technologies and business models	0.672	0.470
Conducting assessments and reviews concerning innovations and future trends	0.205	0.405
ICT very important for business model	0.187	0.390
ICT important for business model	0.119	0.325
Firm age	30.586	31.708
Export: yes	0.313	0.465
Sales: Same	0.384	0.487
Sales: Increased	0.489	0.501
Sales: Decreased	0.127	0.333
Sales: less than 1 Mio. €	0.366	0.483
Sales: 1 Mio. € to less than 2 Mio. €	0.213	0.410
Sales: 2 Mio. € to less than 10 Mio. €	0.287	0.453
Sales: 10 Mio. € to less than 50 Mio. €	0.134	0.342
Manufacturing	0.231	0.422
Distribution	0.142	0.349
Business services	0.250	0.434
Personal services	0.243	0.429
Other	0.134	0.342