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Should SMEs get out of the building? Examining the role of customer co-creation on radical organizational creativity*

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Facing the liability of smallness, SMEs face substantial challenges in internally developing solutions to spur the generation of new ideas that challenge existing practices. In this study, we point to co-creation with customers as an external solution to boost radical organizational creativity. Relying on a sample of SMEs in the Northern Netherlands, we examine the impact of co-creation on radical organizational creativity. Following insights from organizational learning theory, we also test the moderating effect of the nature of the organizational structure and the level of organizational creativity support. We find that customer co-creation has a positive impact on SME's radical creativity. Surprisingly, we find that organizational creativity support negatively moderates this relationship. Together these findings enrich our theoretical understanding of the drivers of radical organizational creativity. Moreover, they provide SME managers specific guidelines on how to generate radically new ideas.

1. Introduction

To survive in increasingly dynamic and competitive environments, firms need to challenge their dominant logics, routines, and practices (Ahuja and Lampert, 2001; Scott, 2012). The ability to generate new ideas that substantially deviate from existing practices has been labeled radical organizational creativity (Woodman et al.,

1993; Gilson and Madjar, 2011; Madjar et al., 2011). In the literature on corporate transformation, scholars (e.g., Becker and Gassmann, 2006; Shen et al., 2018) have identified a wide variety of internal solutions (i.e., corporate incubators, dedicated innovation teams, innovation outposts, innovation tournaments) that can help firms in improving their radical organizational creativity. However, these options are mainly tailored toward

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large established corporates. Facing the liability of smallness (Brüderl and Schüssler, 1990), SMEs tend to lack the necessary resources to engage in this kind of effort. This leads to the important question of how SMEs can foster radical organizational creativity.

In the paper, we point to co-creation with customers as a potential external alternative to foster radical organizational creativity at SMEs. We identify customers as valuable sources of non-redundant knowledge (e.g., von Hippel, 2005), which is an important source for generating radically new ideas. Moreover, we argue that, through actively involving users in development activities, such non-redundant knowledge can be accessed and assimilated more easily by the SMEs. We, therefore, hypothesize that co-creation positively influences radical organizational creativity at SMEs. Organizational learning literature (Cohen and Levinthal, 1990; Zahra and George, 2002; Estrada Vaquero et al., 2016), however, has stressed that, to fully realize the idea generating potential of external non-redundant knowledge, such knowledge also needs to be transformed and exploited within the firm. Moreover, this literature has pointed to the internal structure and culture of organizations as factors that influence such transformation and exploitation processes. Following this logic, we also explore how structural and cultural characteristics of the SME moderate the relationship between co-creation and radical organizational creativity. In particular, we hypothesize a moderating effect of the nature of the organizational structure (i.e., mechanistic versus organic) and the level of organizational support for creativity.

To test our hypotheses, we rely on a sample of 275 SMEs situated in the Northern Netherlands. Our results show a significant positive main effect of customer co-creation on radical organizational creativity. However, we do not find a moderation effect of organizational structure and, surprisingly, organizational support for creativity negatively moderates the relationship between customer co-creation and radical organizational creativity. Our results contribute to the organizational creativity literature in different ways. First, whereas existing organizational creativity literature (e.g., Sundgren et al., 2005; Cirella, 2016; Giustiniano et al., 2016) tends to focus on internal characteristics, we point to external factors as additional drivers of the ability to generate radically new ideas. Second, we develop new insights into the role of organizational support for creativity, suggesting that it has inherently different implications for internal and external knowledge sources.

2. Literature background and hypotheses

2.1. Defining radical organizational creativity

In both research and practice, creativity and innovation are often used interchangeably. However, there is an increasing consensus that creativity and innovation are two separate concepts, encompassing different activities. In his review paper, Castaner (2016), for instance, defines creativity as the generation of new ideas, whereas innovation refers to the application and commercialization of ideas. This implies that, 'whereas creativity refers to idea generation without regard for implementation, innovation always includes a concern with implementation' (Litchfield et al., 2015, p. 239). In this paper, we focus on creativity as the act of generating novel ideas. Although we see creativity as different from innovation, we also acknowledge that creativity is an important input for innovation. In particular, the higher the capability of organizations to generate ideas, the higher the probability of successfully applying and commercializing such ideas into specific products or processes.

Considering the degree of novelty of ideas, creativity scholars (i.e., Madjar et al., 2011, p. 731) have also started distinguishing between radical creativity – i.e., generation of ideas that differ substantially from an organization's existing practices and incremental creativity – i.e., generation of ideas that imply few changes in frameworks and offer only minor modifications. Whereas these scholars have started using this dichotomy on the individual level, exploring why some individuals generate more incremental and/or radical ideas than others (Gilson and Madjar, 2011; Madjar et al., 2011), we apply this distinction at the organizational level, focusing on radical organizational creativity, which we define as the organization's ability to generate ideas that differ substantially from an organization's existing practices.

Literature on corporate transformation (e.g., Birkinshaw and Hood, 2001; Becker and Gassmann, 2006; Terwiesch and Ulrich, 2009) has suggested several alternatives that can be used by companies to spur radical organizational creativity. Corporate incubators, innovation outposts, and innovation tournaments are well-acknowledged examples in this respect. However, a common characteristic of such initiatives is that they require substantial investment in terms of resources and time (Scott, 2012). Facing the liability of smallness, it is, therefore, challenging for SMEs to rely on this kind of initiative to boost the generation of radically new

ideas (Colombo et al., 2012). In this paper, we consider co-creation with customers as a potential alternative solution for SMEs to stimulate radical creativity. Below, we develop particular hypotheses on how customer co-creation influences radical organizational creativity.

2.2. *Customer co-creation and its impact on radical organizational creativity for SMEs*

The generation of new ideas has been described as a recombinatory process, where (teams of) individuals need to bring together different knowledge components to generate new ideas (Hargadon and Sutton, 1997). Exploring such knowledge recombination processes, scholars (e.g., Fleming, 2001; Arts and Veugelers, 2014) have demonstrated that the generation of ideas, which clearly deviate from the steady-state, requires the recombination of non-redundant knowledge. In other words, to generate radically new ideas, it is important to bring together knowledge components that come from different technological, market or geographical backgrounds. This implies that, when individuals or organizations aim to generate radically new ideas, they need to engage in distant search, spotting knowledge components that are different from their current stock of knowledge (Dong et al., 2017).

Customers have been identified as a valuable source of non-redundant knowledge (von Hippel, 2005). As customers experience the firms' product or service on a daily basis, they are valuable sources of potential pain points, which can question the organizations' implicit understanding of the functionality of existing products and services (Chatterji and Fabrizio, 2014; Heij et al., 2015). Customers can also be important sources of knowledge with respect to alternative technological and market trends (Gibbert et al., 2002). Finally, when customers simultaneously make use of different products from different competitors, they might serve as important knowledge brokers, providing unique information on the differences between the offerings of the focal firm and its competitors (Ofek and Sarvary, 2001).

In sum, customers are important sources of non-redundant knowledge, which can increase the variety of the organization's knowledge base (Foss et al., 2011; Jean et al., 2012; Heij et al., 2015). However, firms can only use this non-redundant customer input for knowledge recombination activities when this kind of knowledge is accessed and assimilated (Zahra and George,

2002). Customer co-creation, meaning the active involvement of customers in firms' development activities, has been identified as a valuable strategy to transfer knowledge from customers to the focal firm (von Hippel, 1986; Nooteboom, 1994; van der Vrande et al., 2009). Blank (2013, p. 67), for instance, stresses the importance of a customer development approach, where firms 'get out of the building' and actively engage in collaboration with customers to test fundamental assumptions of their business models. Actively collaborating with customers allows for rich interaction via different communication channels (Gustafsson et al., 2012). In this way, customers cannot only disclose codified knowledge, but also tacit knowledge, which often is the most important type of non-redundant knowledge (Szulanski, 1996). When firms build up a collaborative relationship with customers, this is also likely to foster a more trustful relationship, which increases the willingness of the customer to disclose sensitive information (Faems et al., 2007). Finally, as a customer and focal firm work together, they are likely to start building a shared language and develop common routines (Uzzi, 1997). In this way, the ability of the firm to assimilate the disclosed non-redundant knowledge is likely to increase.

Based on these arguments, we expect that when SMEs actively involve their customers in development activities, they are more likely to access and assimilate the non-redundant knowledge of the customer. In this way, the SME can diversify its knowledge pool, increasing the ability to generate radically new ideas. We, therefore, formulate the following hypothesis:

H1: *Customer co-creation positively influences radical organizational creativity of SMEs.*

2.3. *Moderating role of organizational structure and culture*

Organizational learning scholars (e.g., Lane and Lubatkin, 1998; Jansen et al., 2005) highlight that externally accessed knowledge can only lead to new ideas when such external knowledge components are internally recombined. To successfully use external knowledge, firms do not only need potential absorptive capacity – i.e., the ability to access and assimilate – external knowledge, but also realized absorptive capacity – i.e., the ability to internally transform and use such external knowledge (Zahra and George, 2002). In this literature, extensive attention has been paid to how the organizational structure and culture of organizations can influence their

ability to transform and use external knowledge (e.g., Harrington and Guimaraes, 2005; Bos et al., 2017). Following this logic, we expect that both structural and cultural elements of the SME can influence their ability to effectively recombine non-redundant knowledge that is accessed and assimilated via co-creation with customers.

Recombining non-redundant knowledge is described as an explorative learning process where organizational actors need to engage in experimentation and improvisation to transform and use such knowledge components (Arts and Veugelers, 2014; Dong et al., 2017). Organic organizational structures, i.e., structures that heavily rely on informal control mechanisms and flexibility of procedures and rules, have been identified as being conducive to such explorative learning processes (Burns and Stalker, 1961; Covin and Slevin, 1988; Sine et al., 2006). In such structures, it is easier to deal with unexpected results and larger variability, which are typical characteristics of explorative learning processes. Mechanistic structures, in contrast, are characterized by extensive formal control and a strong emphasis on following established procedures (Burns and Stalker, 1961). Although such mechanistic structures can stimulate exploitative learning processes, they tend to hamper exploration. In particular, formal control constrains experimentation and non-routine problem solving (O'Reilly and Tushman, 2004). Moreover, a strong emphasis on complying with rules and procedures makes it difficult to discuss and reconsider existing work practices, which is also important for explorative learning (Ahuja and Lampert, 2001). Scholars (e.g., O'Reilly and Tushman, 2004; Jansen et al., 2006) have therefore emphasized the benefits of more organic structures for exploration.

Based on these arguments, we expect that, when SMEs have a more mechanistic organizational structure, their ability to engage in explorative learning processes is restricted. As a result, their ability to recombine externally accessed non-redundant knowledge is likely to be relatively limited. This implies that the added value of customer co-creation for generating radically new ideas is likely to be lower when the level of mechanistic structural elements¹ increases within the SME.

H2: The level of mechanistic structural elements negatively moderates the positive relationship between customer co-creation and radical organizational creativity of SMEs.

Recombining non-redundant knowledge is an explorative process that is not only influenced by the nature of the organizational structure, but also by the organizational culture (Chirico and Nordqvist, 2010). In

this paper, we focus on organizational support for creativity, i.e., the extent to which employees perceive creative work is valued and cared for by the organization (Yu and Frenkel, 2013), as a particular manifestation of organizational culture. It is quite straightforward to expect that, when organizations highly value creative work, organizational members will be more motivated to generate ideas that challenge existing practices. However, next to this positive direct effect of support for creativity on radical organizational creativity, we also expect that it can moderate the relationship between customer co-creation and radical organizational creativity.

As mentioned before, transforming and using externally accessed non-redundant knowledge requires that organizational members engage in explorative learning processes (Zahra and George, 2002). Such processes, however, tend to be unpredictable and risky, meaning that failure is a likely outcome (March, 1991). Therefore, it is important that the organization provides sufficient support for this kind of activities. Farmer et al. (2003), for instance, observed that organizational members with high creative role identities only engaged in creative work when sufficient organizational support for such activities was present. In a similar vein, we expect that the willingness of individuals to engage in the necessary but risky explorative learning processes to transform external knowledge from co-creation with customers into radically new ideas depends on the level of organizational support for creativity. We, therefore, hypothesize:

H3: Organizational support for creativity positively moderates the positive relationship between customer co-creation and radical organizational creativity of SMEs.

3. Methodology

3.1. Data and sample

In order to test our hypotheses, we rely on the first wave of the Northern Netherlands Innovation Monitor (NNIM). The NNIM is an annual survey that tries to map the innovation activities and outcomes of SMEs, which are situated in this particular region. Firms are sampled from the database of the Alliance of the Northern Netherlands, an institution that is responsible for processing and allocating different subsidies in the Northern Netherlands. The first wave of the NNIM was conducted in 2016. For this wave, this database contained usable information on 2701 SMEs. In order to minimize selection problems, 294 additional Northern Dutch

SMEs were approached via e-mail (i.e., contact information was identified in the ORBIS database). In total, 432 SMEs answered the questionnaire. Out of 432 SMEs, 9 SMEs declared having more than 250 employees, actually violating our formal definition of SME. We, therefore, removed these 9 firms. Moreover, 148 firms had missing values or consisted of only one employee. We also deleted these firms from the database, leaving 275 SMEs in our final sample.

The respondents operate in various Dutch industries: consultancy and specialized business services (46%), manufacturing (14%), wholesale (8%), information and communication (6%), construction (5%), transport (3%), and other industries (e.g., health, food, financial services, water management) (18%). The questionnaire was filled in by people having different functions in these SMEs such as director/owner (76%), manager (13%), and others (e.g., project leader, engineer) (11%).

In order to check for non-response bias, we compared responses from the Alliance of the Northern Netherlands with responses from the ORBIS database. We found no significant differences with respect to the level of customer co-creation and the level of radical organizational creativity ($P > 0.38$). However, the firms from the ORBIS database were somewhat larger in size. We also did a more traditional test following the extrapolation method of Armstrong and Overton (1977), comparing early (half split completed questionnaires) with late responses on the level of customer co-creation, firm size and the level of radical organizational creativity. We did not find any significant differences ($P > 0.19$). We, therefore, conclude that it is unlikely that we suffer from non-response bias.

Relying on self-reported data triggers the risk of biased responses. For instance, respondents might have a tendency to overestimate their radical organizational creativity. We conducted two particular efforts to minimize this risk. On the one hand, we promised that each respondent would receive a customized benchmark report, where the scores of the company would be compared with their peers,² motivating them to provide accurate information. On the other hand, we refrained from using the data for particular creativity and innovation awards or rankings to avoid that respondents would have an incentive to inflate their responses.

3.2. Measures

3.2.1. Dependent variable

The three-item, 5-point Likert-type scale (i.e., *1-Strongly disagree* to *5-Strongly agree*) of radical

organizational creativity was based on the employee creativity scale of Madjar et al. (2011). Whereas Madjar et al. (2011) used this scale at the individual level, we transformed each item to the organizational level (see Table 1).³

3.2.2. Independent variable

Customer co-creation was measured by a 4-point, Likert-type scale (i.e., *1-Not at all*, *2-Limited*, *3-Moderate* to *4-Extensive*)⁴ measuring the extent to which the organization was involved in co-creation or the active involvement of end-users in the development of new products and services in the period 2013–2015.

3.2.3. Moderators

As Table 1 shows, mechanistic organizational structure was measured by a three-item, 5-point Likert-type scale based on Covin and Slevin (1988). The items were reversely coded such that value 1 becomes '*low formal control*' (i.e., organic structure) and value 5 becomes '*high formal control*' (i.e., mechanistic structure). We measured organizational support for creativity using a six-item, 5-point Likert-type scale based on Farmer et al. (2003).

3.2.4. Control variables

We controlled for age of the organization, total full-time employment in 2015, percentage employees with higher education, collaboration in R&D with external partners in the period 2013–2015 (yes/no), participation in multi-disciplinary innovation networks in the period 2013–2015 (4-point, Likert-type scale, i.e., *1-Not at all* to *4-Extensive*), participation in living lab projects in the period 2013–2015 (4-point, Likert-type scale, i.e., *1-Not at all* to *4-Extensive*), the use of patents (yes/no) and the use of confidentiality as protection mechanisms (yes/no) for innovations introduced in the period 2013–2015, and the percentage of sales spent on internal R&D.

3.3. Confirmatory factor analysis

Prior to testing our hypotheses, we conducted a confirmatory factor analysis on the constructs with Likert-type scales consisting of more than one item (Hair et al., 2006). Wordings of the items, standardized factor loadings, *T*-values, average variances extracted (AVEs), and composite reliabilities are presented in Table 1.

Results in Table 1 indicate a good fit of the measurement model: $\chi^2 = 85.69$, $df = 51$; RMSEA = 0.050; GFI = 0.95; CFI = 0.99; NFI = 0.98 (Hair et al., 2006). AVEs range between 0.61 and 0.67 which is well beyond the threshold of 0.50 (Fornell and Larcker, 1981). Moreover, all loadings on the respective

Table 1. Standardized factor loadings, T-values, Average Variance Extracted (AVE), and Composite reliabilities (CR)

Construct item	Standardized factor loadings	T-value	AVE	CR
Radical Organizational Creativity			0.63	0.83
RAC1: Staff members in this organization are a source of creative ideas	0.80	14.80		
RAC2: Staff members in this organization show creativity in their work	0.90	17.37		
RAC3: Staff members in this organization propose radical new ways of working	0.65	11.48		
Mechanistic Organizational Structure			0.67	0.86
MOS1*: In my organization, there is (1) strict formal control making use of advanced monitor and information systems (5) loose informal control using informal relations and cooperation	0.76	14.09		
MOS2*: In my organization (1) people keep close control on the fulfillment of formal procedures (5) there is a strong tendency to deviate from formal procedures when necessary	0.86	16.59		
MOS3*: In my organization, there is (1) strong emphasis on keeping sound management principles even when circumstances change (5) strong emphasis on adaptation of sound management principles when circumstances require to do so	0.82	15.58		
Organizational Support for Creativity			0.61	0.90
OC1: In my organization, there is a lot of support for creative work	0.81	15.96		
OC2: My organization stimulates the generation of new ideas and concepts	0.85	17.17		
OC3: In my organization creative work is valued	0.86	17.36		
OC4: In my organization staff members are encouraged to be creative	0.84	16.84		
OC5: My organization expects staff members to consider problems from different angles	0.72	13.56		
OC6: In my organization creative staff members are rewarded	0.61	10.81		

$\chi^2 = 85.69$, $df = 51$; RMSEA = 0.050; GFI = 0.95; CFI = 0.99; NFI = 0.98.

*Reversely coded.

constructs are highly significant ($P < 0.001$), while the standardized loadings of the items were all above 0.50, demonstrating the convergent validity of our scales (Fornell and Larcker, 1981). We also conclude that our scales possess discriminant validity as we found no inter-factor correlations having a confidence interval that contains the value of one ($P < 0.01$) (Bagozzi et al., 1991).

3.4. Common method bias

As the same informants assessed the independent and dependent variables we cannot fully rule out common method bias. We conducted several tests to investigate the extent of this potential bias. First, we carried out the Harman's single factor test. By comparing a three-factor model including radical organizational creativity, mechanistic organizational structure and organizational support for creativity with a one-factor model in a confirmatory factor analysis, we found that the single factor model performed significantly worse ($\Delta\chi^2 = 482.82$, $\Delta df = 2$, $P < 0.001$). Second, we calculated the method of correlation between independent and dependent

variables on the basis of the original equation of Podsakoff et al. (2003).

$$R_{x,y} = (\text{true } R_{ti,tj} \sqrt{t_x} \sqrt{t_y}) + (\text{true } R_{mk,ml} \sqrt{m_x} \sqrt{m_y})$$

where $R_{x,y}$ is the observed correlation between variables x and y , true $R_{ti,tj}$ is the true correlation between trait i and trait j , t_x and t_y are the percent of trait variances of measures x and y , true $R_{mk,ml}$ is the true correlation between method k and method l and m_x and m_y are the percent of method variances of method k and l . In order to determine $R_{x,y}$ we used the Pearson correlations between variables x and y . To estimate $\sqrt{t_x}$, $\sqrt{t_y}$, $\sqrt{m_x}$ and $\sqrt{m_y}$ we used confirmatory factor analysis results with models of two traits and one method (Bagozzi et al., 1991). In the Podsakoff et al. (2003) equation there are two variables unknown, true $R_{ti,tj}$ and true $R_{mk,ml}$ of which the significance of $R_{mk,ml}$ is important for common method bias. To determine the two unknown variables we needed two equations with these unknown variables. Therefore, we split up our database in two partial databases by either only taking the even id numbers, or only taking the odd id numbers. In this way, we

could calculate the true $R_{mk,ml}$ for the relationship between co-creation, mechanistic organizational structure and organizational support for creativity, and radical organizational creativity. The method correlations varied between 0.02 and 0.10 and all were insignificant ($P > 0.23$). Based on this, we conclude that it is unlikely that our results are significantly influenced by common method bias.

4. Results

Table 2 displays the descriptive statistics, the correlations and the Cronbach alphas of our variables. Cronbach alphas range from 0.82 to 0.90 suggesting good reliabilities.

We used hierarchical OLS regression to test our hypotheses (see Table 3). In our model, we first included the control variables. Subsequently, we added the main effect of customer co-creation. Finally, we included the moderators – i.e., mechanistic organizational structure and organizational support for creativity – in our model. For the moderator analyses, we mean-centered the variables that were involved in the interactions (Kenny and Judd, 1984; Aiken and West, 1991). All Variance Inflation values remained below 3.39, which is well below the cut-off value of 10.

Model 1 presents the effects of the control variables; % of full-time employees with higher education, confidentiality as a protection mechanism for innovation and % of sales spent on internal R&D were positively associated with radical organizational creativity ($B = 0.004$, 0.197 and 0.005 , $P < 0.05$, respectively).

Model 2 presents the main effect of customer co-creation. Customer co-creation has a significant positive impact on radical organizational creativity ($B = 0.173$, $P < 0.01$). Thus, *H1 can be confirmed*. Model 3 shows that the interaction between customer co-creation and mechanistic organizational structure is insignificant with respect to radical organizational creativity (*H2 is not supported*). At the same time, we see a significant direct negative impact of mechanistic organizational structure on radical organizational creativity ($B = -0.151$, $P < 0.01$).

Surprisingly, Model 4 shows a significant negative interaction between customer co-creation and organizational support for creativity with respect to radical organizational creativity ($B = -0.170$, $P < 0.01$) (*H3 is not supported*). In Model 4, we also see a strong positive relationship between organizational support for creativity and radical organizational creativity ($B = 0.509$, $P < 0.001$).

Finally, Model 5 shows an insignificant interaction between customer co-creation and mechanistic organizational structure with respect to radical organizational creativity and a significant negative interaction between customer co-creation and organizational support for creativity with respect to radical organizational creativity ($B = -0.157$, $P < 0.05$). In Model 5, we again see a strong positive relationship between organizational support for creativity and radical organizational creativity ($B = 0.495$, $P < 0.001$).

5. Discussion

5.1. Theoretical implications

Prior research on organizational creativity has mainly looked at how internal characteristics such as the level of internal information sharing (Sundgren et al., 2005; Giustiniano et al., 2016), leadership styles (Hussain et al., 2017), and technological support (Cirella, 2016) influence the ability of firms to generate new ideas. We contribute to this literature stream by shifting focus to external strategies to boost radical organizational creativity. Our results show a positive main effect of customer co-creation on radical organizational creativity. This finding suggests that customer co-creation can be a valuable external strategy to get access to non-redundant knowledge.

It needs to be acknowledged that some scholars have also pointed to the limitations of customers as a source of non-redundant knowledge. Christensen and Bower (1996), for instance, point to potential limitations of customer feedback in the face of disruptive change. Although the particular case of disruptive change was outside the scope of our research, we conducted an additional test, considering a potential inverted U-shaped relationship between customer co-creation and radical organizational creativity. In this test, we did not find evidence for such non-linear relationship. At the same time, we acknowledge the relevance and importance to further explore the impact of customer co-creation on different types of idea generation, including more disruptive types of ideas.

Our findings also have important implications for our understanding of the connection between organizational creativity support and organization creativity outcomes. Prior research (Farmer et al., 2003; Yu and Frenkel, 2013) has highlighted the importance of organizational creativity support to mobilize internal knowledge sources to generate new ideas. In line with this prior research, we also found a positive

Table 2. Descriptive statistics, correlations, and Cronbach alphas

Variable	<i>M</i>	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Radical organizational creativity	3.54	0.74	0.82												
2. Age of the organization	26.37	28.01	-0.19**	n.a.											
3. Total full-time employment 2015	24.02	35.40	-0.03	0.37**	n.a.										
4. % full-time employees with higher education	47.24	35.48	0.31**	-0.38**	-0.26**	n.a.									
5. Collaboration in R&D with external partners	45% (yes)	–	0.18**	-0.07	0.08	0.28**	n.a.								
6. Multidisciplinary innovation networks	1.62	1.03	0.22**	-0.14*	0.07	0.31**	0.66**	n.a.							
7. Living lab	1.19	0.54	0.18**	-0.12*	-0.02	0.29**	0.37**	0.59**	n.a.						
8. Protection methods – patents	13% (yes)	–	0.16**	-0.10	0.03	0.18**	0.19**	0.21**	0.00	n.a.					
9. Protection methods – confidentiality	44% (yes)	–	0.24**	-0.13*	0.08	0.21**	0.42**	0.31**	0.19**	0.33**	n.a.				
10. % Internal revenue R&D activities	14.56	22.69	0.32**	-0.28**	-0.16**	0.54**	0.37**	0.38**	0.39**	0.26**	-0.28**	n.a.			
11. Co-creation	1.80	1.16	0.27**	-0.08	0.04	0.30**	0.76**	0.70**	0.44**	-0.09	-0.41**	0.32**	n.a.		
12. Mechanistic organizational structure	2.22	0.98	-0.30**	0.20**	0.17**	-0.17**	-0.20**	-0.17**	-0.15*	0.04	0.16**	-0.31**	-0.20**	0.86	
13. Organizational support for creativity	3.92	0.63	0.56**	-0.14*	0.02	0.23**	0.21**	0.30**	0.17**	0.17**	-0.30**	0.37**	0.30**	-0.48**	0.90

Note that the Cronbach alphas are in italics on the diagonal.

* $P < 0.05$, ** $P < 0.01$.

Table 3. Unstandardized estimates of hierarchical regression with dependent variable radical organizational creativity

	Model 1	Model 2	Model 3	Model 4
Age of the Organization	−0.002	−0.002	−0.002	−0.002
Total Full-time Employment in 2015	0.001	0.001	0.002	0.001
% Full-time Employees with Higher Education	0.004*	0.003*	0.004*	0.003*
Collaboration in R&D with external partners	−0.073	−0.268*	−0.296*	−0.143
Multidisciplinary Innovation Networks	0.044	−0.022	−0.026	−0.058
Living Lab	0.033	0.020	0.045	0.095
Protection Methods – Patents	0.068	0.136	0.208	0.145
Protection Methods – Confidentiality	0.197*	0.144	0.102	0.000
% of sales spent on R&D	0.005*	0.005*	0.003	0.000
Co-creation		0.173**	0.179**	0.148*
Mechanistic organizational structure			−0.151**	
Co-creation * Mechanistic organizational structure			0.073	
Organizational support for creativity				0.509***
Co-creation * Organizational support for creativity				−0.170***
F	5.657***	5.991***	6.809***	13.615***
R ²	0.161	0.185	0.238	0.384
ΔR ²	–	0.024**	0.077***	0.223***
Adj. R ²	0.133	0.154	0.203	0.356

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

direct effect of organizational support for creativity on radical organizational creativity.

We also expected that organizational support for creativity would positively moderate the relationship between external knowledge sources (i.e., co-creation) and radical organizational creativity. However, we actually found a negative moderating effect, implying that the positive effect of customer co-creation on radical organizational creativity becomes smaller as organizational support for creativity increases. A potential explanation for this unexpected result can be found in the work of Yu and Frenkel (2013). Exploring the mechanisms that drive the positive relationship between organizational support for creativity and organizational creativity, they find that work unit identification is the strongest mechanism, driving this relationship. It seems logical to expect that strong identification with the organization will stimulate organizational members to mobilize their internal resources for the generation of radically new ideas. However, indications are present in the literature that such strong identification might actually hamper the mobilization of external knowledge resources. Several scholars (Katz and Allen, 1982; Kane, 2010; Antons et al., 2017), for instance, pointed to the potential problem of the Not Invented Here syndrome, suggesting that strong identification with the internal team is likely to restrict absorption of external information flows. This alternative logic might explain why we did observe a

negative moderating effect of organizational support for creativity instead of a positive moderating effect. Most importantly, these findings indicate that organizational support for creativity can have inherently different implications for generating radically new ideas, depending on the actual source of knowledge (i.e., internal versus external).

5.2. Practical implications

From a *practical perspective*, our findings provide interesting insights for executives and managers of SMEs. Our findings indicate that customer knowledge is an important source for radical idea generation within the organization. Customer knowledge is likely to be non-redundant, representing a valuable starting point for generating ideas that challenge existing practices. Accessing and assimilating such knowledge requires active collaboration with customers. This can be realized by generating business-related (online) knowledge-sharing communities (Hashim and Tan, 2015) or by encouraging the formation of communities of practice (Brown and Duguid, 2001). Our research also indicates that this alternative external approach toward stimulating radical creativity mainly makes sense when SMEs do not have a strong creativity climate. In particular, co-creation can help to boost radical organizational creativity when internal support for creativity is rather low.

5.3. Limitations and other future research directions

Our research has some limitations, which might provide interesting avenues for future research. The first limitation of our research refers to the generalizability. We focused on SMEs situated in the region of Northern Netherlands and this raises concerns whether our findings are generalizable to other regions and countries. Our empirical focus on SMEs also leaves the question open whether our findings are generalizable to the setting of large established firms. From a theoretical perspective, it seems feasible to expect that also large established firms can benefit from customer co-creation in terms of accessing and assimilating non-redundant knowledge. Future research is necessary, though, to see under which conditions this latter type of firm would be able to fully benefit from customer co-creation in terms of radical organizational creativity.

In contrast to our expectation, we did not observe a significant interaction effect of organizational structures. A first potential explanation might be that we exclusively looked at organizational structures in terms of the absence/presence of formal elements. It would, therefore, be interesting to also consider more informal mechanisms (Das and Teng, 1998; Zahra and George, 2002). A second potential explanation could be that we analyzed the broader organizational structure of the firm, while ignoring the extent to which firms implemented particular knowledge management practices. Prior research (Lane and Lubatkin, 1998; Estrada Vaquero et al., 2016), however, has provided the first evidence that particular knowledge management systems and practices can have a substantial impact on the ability to take advantage of externally accessed knowledge. A more fine-grained analysis of particular knowledge management structures, therefore, is an important avenue for future research.

Another limitation of our research refers to how we operationalized co-creation with customers. Whereas we relied on a single item to measure customer co-creation, we see several opportunities to develop richer measures of co-creation. First, it would be interesting to get a more detailed understanding of when customers are involved in innovation processes and how the timing of involvement influences the ability of the firm to use customers as sources of non-redundant knowledge. Another fruitful approach would be to make a more fine-grained distinction between different types of customers. von Hippel (2005), for instance, pointed to lead users as a particular type of customer that is a valuable source of non-redundant knowledge.

These improvements in terms of operationalization could be helpful to better understand when co-creation with customers can help to boost radical creativity. Finally, whereas our operationalization focuses on the extent of customer involvement, it does not allow considering the quality of involvement. Other scholars (e.g., Merz et al., 2018; Clauss et al., 2019) have started developing extensive survey scales that allow getting a more fine-grained understanding of the willingness and ability of customers to engage in co-creation activities. Yi and Gong (2013), for instance, developed a 19-item scale that allows capturing both customer citizenship behavior (i.e., feedback, advocacy, helping, and tolerance) and customer participation behavior (i.e., information seeking, information sharing, responsible behavior, and personal interaction).

Finally, we encourage future research to delve deeper into the actual process of customer co-creation and its implications for knowledge transfer and creativity. More qualitative research designs, gathering micro-level observations on the actual process of customer co-creation could help generating richer insights into (i) when customers are willing to share non-redundant knowledge, (ii) which type of interaction is necessary to transmit such non-redundant knowledge from the customer to the SME, and (iii) under which conditions the SME is able to fully absorb such knowledge.

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Notes

- 1 Following Covin and Slevin (1988), we conceptualize and operationalize organizational structure as a continuum ranging from high level of mechanistic elements to high level of organic elements. This implies that an increase in the number of mechanistic elements corresponds with a decrease in the number of organic elements.
- 2 In these benchmark reports, we provided respondents their individual score as well as the average scores of the size, age, and industry group to which they belonged.
- 3 Following Madjar et al. (2011), respondents also had to answer three items that referred to incremental organizational creativity. In particular, respondents were asked whether staff members (i) use previously existing ideas or work in an appropriate new way, (ii) are very good at adapting already existing ideas or ads, and (iii) easily modify previously existing work processes to suit current needs.

- 4 As the purpose was to measure the extent to which respondents relied on customer co-creation, it did not make sense to add a neutral middle category, which is the typical case in 5-point or 7-point Likert scales.

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