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RESEARCH ARTICLE

I can do that alone…or not? How idea generators juggle between the pros and cons of teamwork

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***Research summary*:** The advantages of working with a team to develop an idea are well established, but surprisingly, little is known about why some idea generators ignore these advantages by developing their ideas alone. To answer this question, we study two important trade-offs. First, working with a team provides access to additional resources but also leads to increased coordination costs. Second, sharing the risks and costs of developing an idea necessitates sharing the potential rewards of a successful idea. We use unique data on idea generators and their submission of ideas to an innovation program in a large European company between 1996 and 2008 to show how the two different trade-offs affect the decision of idea generators to collaborate with a team.

***Managerial summary*:** Organizations usually form teams to develop and execute innovative ideas. When people have the choice, however, will they also form a team or will they develop ideas alone? By studying idea generators and their voluntary submissions of breakthrough ideas to an innovation program, we find that the success rate is much higher for team ideas. Although teamwork has important benefits, idea generators will often develop incremental ideas alone and only accept increased coordination costs for developing radical ideas—this is even more so when they have prior team experiences. Moreover, only when idea generators were successful before and—even more so—when they developed that idea alone, will they be more open to sharing the rewards and risks of developing another idea with a team.

KEYWORDS

corporate entrepreneurship, employee innovation, idea generation, radical innovation, teams

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1 | INTRODUCTION

By tapping into the creative potential of their employees, firms may create the mechanisms that encourage breakthrough innovation and strategic renewal (Ahuja & Lampert, 2001; Baumann & Stieglitz, 2014). Indeed, the voluntary contributions of new product and process ideas by employees are potentially important sources of competitive advantage (Birkinshaw, 1997; Burgelman, 1983, 1991). When employees develop new ideas, creating informal teams to work on the ideas is a powerful way to ensure their success. Despite drawbacks such as increased coordination costs and diminished motivation (Marks, Mathieu, & Zaccaro, 2001; Seers, 1989; Staats, Milkman, & Fox, 2012), working in informal teams allows idea generators to tap into the diverse expertise and knowledge of other people to develop the idea and address potential weaknesses (Harvey, 2014; Kurtzberg & Amabile, 2001; Singh & Fleming, 2010). Because new innovations often are met with resistance (Baer, 2010; Mueller, Melwani, & Goncalo, 2012), collaborating with other people also gives idea generators more persuasion and leverage to overcome initial resistance to adopting their new ideas (Lechner & Floyd, 2012). Although the advantages of working with a team to develop an idea are well established, we know surprisingly little about why some people ignore these advantages and develop their ideas alone. To answer this question, we focus on two important trade-offs: Working with a team provides access to additional resources, but also leads to increased coordination costs (Marks et al., 2001; Seers, 1989; Staats et al., 2012), and sharing the risks and costs of developing an idea necessitates sharing the potential rewards of a successful idea (Gomez-Mejia, Welbourne, & Wiseman, 2000).

For the trade-off between access to resources and increased coordination, we argue that the decision to work with a team is related to the radicalness of the nascent idea. Organizations usually form teams for the task to further develop and execute ideas—whether these ideas are radical or not (Marks et al., 2001; Mathieu, Maynard, Rapp, & Gilson, 2008; Mesmer-Magnus & DeChurch, 2009). We suggest that idea generators themselves are more likely to form a team when the idea is radical because the development of such an idea requires access to more resources, knowledge, and skills. For less radical ideas, however, idea generators are more likely to develop these ideas alone because the disadvantage of increased coordination cost outweighs the potential advantages of working with a team. We further propose that idea generators' earlier team experience is positively associated with the decision to develop radical ideas with a team. For the trade-off between sharing the risks and sharing the rewards with a team, we argue that, given the small chance of scoring a success, those idea generators who did develop a successful idea will subsequently be more likely to spread the risks of idea development by collaborating with other people. Prior idea success will also increase the likelihood that the idea generator is a more attractive partner for others. We argue, finally, that the quality signal of prior success is particularly powerful when the idea generator developed the earlier idea alone. The idea generator is likely to be sought out more by others which increases the probability that he or she will develop a next idea with a team.

Following idea generators over time as they generate, develop, and submit ideas to the innovation program, our study makes two contributions to research on teams and innovation. First, while working with teams is often seen as an important mechanism to spur innovation in organizations (Perry-Smith & Shalley, 2014; Sutton & Hargadon, 1997; Woodman, Sawyer, & Griffin, 1993), less research examines whether employees actually concur with this view, and given the choice, prefer working in teams to working alone. Focusing on the trade-offs that people make when deciding to develop an idea with a team or not therefore deepens our understanding of the drivers and constraints of collaborative idea development (Hargadon & Bechky, 2006). By studying the dynamics of idea development in an organization, we find that idea generators who generated a less radical

idea and who had not developed a successful idea before are less likely to work with a team. Developing an idea alone, however, is associated with lower chances for idea success. As a consequence, organizations have a lower stock of ideas, which in the long-run, will negatively affect their adaptability and innovativeness (Ahuja & Lampert, 2001; Birkinshaw, 1997; Burgelman, 1983, 1991). Second, by adopting a longitudinal perspective on idea generation and idea development, our study provides a better understanding of how sustained and successful idea development can be achieved (Deichmann & Van den Ende, 2014; Skilton & Dooley, 2010). Our study confirms that working with a team is positively associated with successful idea development (Ford, 1996; Kurtzberg & Amabile, 2001; Singh & Fleming, 2010; Tierney & Farmer, 2002), but we also show that the experiences which idea generators made during an earlier idea development significantly shape whether they are prepared to utilize the benefits of teamwork for a next idea development again.

We use unique data on idea generators and their submission of ideas to an innovation program in a large European company between 1996 and 2008 to study how the two different trade-offs are associated with the decision of idea generators to collaborate with a team.

2 | THEORY AND HYPOTHESES

To innovate and develop good ideas typically implies recombining existing ideas (Kaplan & Vakili, 2015). As teams have access to a diverse range of perspectives, knowledge, and experiences, they also have more possibilities for recombination than individuals and therefore are often thought to generate and develop better ideas than individuals (Ford, 1996; Kurtzberg & Amabile, 2001; Singh & Fleming, 2010; Tierney & Farmer, 2002). Using teams to work on new ideas, however, has both advantages and disadvantages. This emphasizes the importance of understanding why some idea generators work with a team to develop an idea, whereas others decide to develop their idea alone. We define team idea development as occurring when the idea generator collaborates with at least one other person on developing an idea.[1] The quality of the idea itself can be an important factor which may attract people to an idea (Hallen, 2008). The decision to develop an idea with a team rests therefore not only on the idea generator, but also on people who feel attracted and motivated to join working on an idea. It is important to note, however, that our theorizing concentrates on the trade-offs an idea generator is facing *before* the idea is further developed. At this point in time, the value and quality of ideas is still difficult to estimate for others (Litchfield, Gilson, & Gilson, 2015).

2.1 | The trade-off between access to resources and increased coordination

We expect that idea generators are more likely to be associated with using teams when they develop radical ideas than when they develop incremental ideas. A radical idea, as opposed to an incremental one, is an idea that departs substantially from prior ideas and practices, and therefore, typically requires access to new knowledge, skills, and competencies for successful development (Levinthal & March, 1993). Forming a team to develop an idea is an effective way for idea generators to gain timely access to resources such as new knowledge, skills, and competencies that are

[1]We do not distinguish between the terms *team* and *group*. Although the size of a team can influence its effectiveness or ineffectiveness (e.g., McFadyen & Cannella, 2004), we found no systematic differences in our results related to team size (where teams could range between having two and twelve members). For simplicity, we will refer to *team idea development* when we talk about a situation in which idea generators decided to work with a team to develop another idea and *prior team idea development* when they previously worked with a team to develop an earlier idea.

needed to successfully generate and implement ideas (Kamm & Nurick, 1993). Forbes, Borchert, Zellmer-Bruhn, and Sapienza (2006) showed that the decision to add people to entrepreneurial teams is driven, in addition to social attractiveness, by the need of the entrepreneurs to fill specific resource needs. As earlier research demonstrated, enhanced access to resources will allow teams to generate and develop more radical ideas than individuals (Singh & Fleming, 2010). In particular, the access to more diverse knowledge enables teams to recombine the knowledge in various and often new ways (Kaplan & Vakili, 2015). Given this, we expect that when idea generators initiated a radical idea, they are more likely to seek the diverse resources that a team provides in order to bring that idea to fruition. However, when they have generated a less radical idea, this might negatively be associated with team idea development. The development of less radical ideas, at least on the surface, is usually more predictable and appears to be less complex. The need to gain informal support by means of coalescing with a team is also less important for incremental ideas (Lechner & Floyd, 2012). Idea generators might therefore be more likely to develop those ideas alone and avoid grappling with the difficulties of coordinating, monitoring, and communicating with different team members (Marks et al., 2001; Seers, 1989; Staats et al., 2012). We therefore expect a positive association between idea generators who initiated a radical idea and the decision to work with a team to further develop that idea.

Hypothesis 1a (H1a): Radical ideas are positively associated with team idea development.

In addition, we suggest a stronger association between radical ideas and team idea development for idea generators who previously worked with a team already. In general, having experience in working with a team should help idea generators to overcome the challenges associated with teamwork and managing teams as they can link potential coordination challenges to existing experiences. However, prior experience working with teams might be even more useful when considering the development of radical ideas, and thus, might encourage idea generators to work with a team to develop such an idea. By having worked with a team before, for example, idea generators learned how to effectively engage with team members and how to handle stressful situations (Rentsch, Heffner, & Duffy, 1994). Both can be seen as important conditions for idea generators to access new knowledge from other team members and to successfully integrate this new knowledge to develop a radical idea (Kaplan & Vakili, 2015). Thus, we suggest that for idea generators who worked with a team to develop their last idea, there should be an even stronger association with working with a team again when their next idea is radical.

Hypothesis 1b (H1b): Prior team idea development positively moderates the positive association between radical ideas and team idea development.

2.2 | The trade-off between sharing the risks and sharing the rewards

Prior idea success is another important factor that can influence team idea development. Developing a successful idea, however, is more the exception than the rule for an idea generator (Deichmann & Van den Ende, 2014), which is why firms can facilitate successful idea generation and development by placing more innovation bets and by accessing a broader range of knowledge sources (Leiponen & Helfat, 2010). For idea generators, this means that they need to generate many ideas. When they are successful with one, they could then conclude that their "luck" of scoring another success is low. So if they nevertheless develop another idea, they might do so together with a team

so as to spread the risks and costs of this activity. At the same time, idea generators who already enjoyed the benefits of having developed a successful idea might also feel more secure and confident (Sitkin, 1992), and thus, might be more open to sharing the potential rewards of a new idea with other team members. Research on scientific collaborations finds a similar pattern in that academics who showed superior performance in the past prefer to work with a team rather than alone when writing a new paper (Jeong, Choi, & Kim, 2011; Vafeas, 2010).

Forming an informal team is not, however, a unilateral decision. The idea generator must convince other people to invest their time and resources. Having developed a successful idea makes an idea generator a more attractive partner, thus making it easier for him or her to recruit collaborators to develop the next idea. Specifically, prior idea success serves as a strong signal of quality for potential contributors who are deciding whether or not to partner with the idea generator (Hallen, 2008). Prior success suggests that an idea generator has the knowledge and skills necessary to successfully generate and develop ideas. Similarly, prior idea success makes the idea generator a more attractive partner because prior idea success likely increases the status and visibility of the idea generator within the organization. Status functions as a signal of quality suggesting that an idea generator who was successful in the past might continue to deliver high-quality work and be successful again (Jensen, Kim, & Kim, 2011). Regardless of the reasons for the success of the earlier idea, partnering with visible higher-status idea generators is positively associated with visibility and status of the team members themselves (Jensen, 2003; Podolny, 1994), and this should therefore relate to an even higher attractiveness of successful idea generators.

Hypothesis 2a (H2a): Prior idea success is positively associated with team idea development.

While prior idea success is generally associated with a higher likelihood of working with a team to develop another idea, we argue next that idea generators who experienced prior idea success without a team send an even stronger signal to those who may wish to collaborate with the idea generator (Hallen, 2008). This is because the earlier success can unequivocally be attributed to one idea generator instead of a whole team where it is more difficult to identify those who contributed most to the success of an earlier idea (Gomez-Mejia et al., 2000). In addition, because the idea generator already proved to be able to successfully master the development of ideas alone, he or she might also become more open to sharing potential rewards of a new idea development effort with collaborators (Baumann & Stieglitz, 2014). Having gone through the process of developing an idea alone, the idea generator more likely has experienced how difficult it is to successfully develop an idea and thus might be more receptive to teamwork in order to share the risks and costs of this effort.

Hypothesis 2b (H2b): Prior team idea development negatively moderates the positive association between prior idea success and team idea development.

3 | METHODS

Our empirical setting is the innovation program of a large multinational energy company called "Enco" in this study for the purpose of anonymity. Enco started its innovation program to spur its employees to develop early stage ideas that might one day radically transform the landscape of the energy industry. The program is open for participants from all levels and functions. Ideas could be

concepts for potential markets, new products and services, or fundamental changes in processes. Successful ideas developed via the innovation program include ideas for a new imaging technology that increased production efficiency and a new material that helped create a new market segment for Enco.

The program is structured as follows. After a short description of an idea has been submitted, two main gates must be passed before full funding is awarded. First, idea generators give a short pitch about their idea in front of two team members of the innovation program. If this first screening is passed successfully, the idea generators get some time, and if necessary, some research money to develop their idea further. Second, having done that, they then present the idea to a broader group of experts consisting of employees from the innovation program and other internal and external individuals with expertise in specific areas relevant to the idea. The expert panel assesses the potential, viability, and impact of the idea, and decides whether and how to go ahead with the idea, including how to fund the implementation. The composition of the panel should reduce potential idea selection biases (Reitzig & Sorenson, 2013). It should also be noted that the innovation program at Enco is an independent unit in the company evaluated on the basis of its ability to identify and execute ideas that lie outside the scope of the current business strategy. Accomplishing this goal is only possible by sponsoring high-quality ideas.

Throughout the study, we classify a successful idea as one where an idea is selected after the second panel, and an unsuccessful idea as one where an idea is not accepted after either the first or second panel. Passing the second screening panel meant that a serious amount of resources was then allocated to further the execution of an idea. Moreover, it is at this stage that an idea turns into a more formal project. Given that only 10% of all submitted ideas pass the second screening panel, it is common practice to label these ideas as "successes" within Enco. Idea generators also told us that clearing the second panel is important because one *"[…]can decide how to allocate the money and really make the idea happen in the business."*

We extracted all the information from the database in November 2008. This sample consists of a 12-year archival record of 2,352 ideas. Of these ideas, and after consulting with Enco, we excluded 306 ideas that were coded as being "in progress," which meant that people were still working on developing the idea in the phase before the first or second panel. We also excluded ideas that were initially conceived by people external to Enco and ideas that were generated in workshops because in workshops participants were asked to quickly generate specific solutions to pre-defined problems. This data cleaning procedure resulted in an overall sample of 1,792 ideas proposed by 908 idea generators. There is always one person who is the owner of the idea—the idea generator—even when there are other people who also contributed to the idea and our unit of analysis is therefore the idea generator.

Figure 1 provides an overview of the number of ideas that idea generators submitted.

As indicated in the figure, 598 idea generators developed one idea only, whereas fewer idea generators developed two or more ideas. In our main analysis, we drop the 598 idea generators with only one idea and focus on the 310 idea generators that had already developed one idea and now are deciding whether or not to work with a team to develop their second idea.

3.1 | Dependent and independent variables

Our main dependent variable, *team idea development*, is a binary variable coded one if an idea generator worked with a team to develop the next idea. In additional analyses, we also predict *idea success.* This, too, is a binary variable coded as one when an idea passes the second stage of the screening process. Our independent variables are also all binary variables. To operationalize *radical*

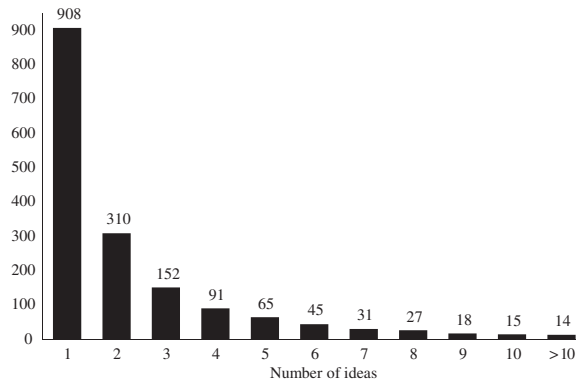

FIGURE 1 Number of ideas. Of the 908 idea generators who submitted at least one idea, 598 (66%) stopped after their first idea development while 310 (34%) submitted at least a second idea; of the 310 idea generators who submitted at least a second idea, 158 (51%) stopped after their second idea development while 152 (49%) submitted at least a third idea; of the 152 idea generators who submitted at least a third idea, 61 (40%) stopped after their third idea development while 91 (60%) submitted at least a fourth idea; and so on

ideas, we used a proxy stemming from the database that measures confidentiality of an idea. From our interviews with program management, we learned that ideas marked as confidential are of strategic value to the company and consequently tend to be ranked as more important by Enco. Specifically, ideas classified as confidential are considered the most radical because they typically deal with breakthrough technology. The importance of confidential ideas is reflected institutionally in the policy that users of the idea database have no access to detailed descriptions of ideas classified as confidential. *Prior idea success* means that a prior idea passed the second stage of the screening process and *prior team idea development* measures whether an idea generator worked with a team to develop the prior idea.

3.2 | Control variables

Our models include several control variables. First, employee activity and experience might influence team idea development because these could be alternative indicators of performance and talent that people take into account when deciding whether or not to contribute to an idea (Guimerà, Uzzi, Spiro, & Amaral, 2005). Moreover, the prior activity and experience of an idea generator allows for learning from experience (Levitt & March, 1988) which, in turn, can influence idea success. To capture and control for employee activity and experience, we counted all *prior idea involvements* of an idea generator. This measure includes both, the earlier ideas that an idea generator initiated and those involvements where he or she was listed as a contributor.

Second, we included a control variable to capture the similarity of an idea generator's ideas. Idea similarity may not only influence team formation (Schwab & Miner, 2008), but also lower the chances of success. The management of Enco's innovation program is looking for radical ideas; similarity could be a sign of incremental progress. To measure the *similarity to previous ideas*, we examined the titles given to the idea and we counted how many words overlapped with those used for previous idea submissions by the same idea generator.

Third, we control for different effects of time. Recently submitted ideas are believed to be more salient and easier to recall (Levitt & March, 1988), which could influence the composition of a team because other people are more aware of an idea generator (Schwab & Miner, 2008). To control for this effect, we noted the date when an idea was submitted and measured the number of months that

passed between a prior and a current idea submission. This procedure gave us a measure of *time elapsed since previous idea*: the time span between consecutive ideas. As a longer period of time would allow for more reflection and might enable learning to take place, we also included this control in models with idea success as the dependent variable. Additionally, we created three time windows (*1996–1999*, *2000–2003*, and *2004–2008*) representing different phases during which ideas were submitted to Enco's innovation program. The second binary variable was used as the reference because it appeared that in this time frame, fewer ideas were submitted. Interviews with managers of Enco indicated no particular reason or explanation for the lower number of idea submissions during this time frame.

We report summary statistics and bivariate correlations in Table 1.

3.3 | Analysis

We focus our statistical analysis on whether or not idea generators work with a team to develop the second idea. Concentrating our analysis on the second idea could result in sample selection bias, however, because not all the idea generators who submitted their first idea continued to submit a second idea (see Figure 1). To address sample selection bias, we used Heckman's (1979) two-step procedure with a probit specification, implemented in Stata 14.1 as the *heckprobit* routine. The selection models estimate who of the 908 idea generators developed a second idea using the number of *patents* held by an idea generator as the selection variable.[2] Additional analyses showed that while the number of patents is not significantly associated with the decision to work with a team (as well as idea success), it has a positive and significant effect in our selection equation. Idea generators who were involved in the development of more patents were, in other words, more likely to submit a second idea.

4 | RESULTS

Table 2 presents our statistical analyses of how idea radicalness and prior idea success are associated with the decision of the idea generator to work with a team to develop the second idea. Model 1 contains the control variables. Prior idea involvement has a positive and significant effect on team idea development. This finding suggests that, beyond characteristics which can be associated with a current or a prior idea, idea generators' experience in generating or contributing to ideas also matters for whether or not they work with a team to develop a new idea. Model 2 adds idea radicalness and shows that it is positively associated with working with a team ($\beta = 0.379$, $p = .034$). The probability for idea generators to develop the second idea with a team is 1.243 times higher when the idea is radical than when it is not. Hypothesis 1a is therefore supported. Model 3 shows that having developed a successful idea before also is positively associated with working with a team to develop the second idea ($\beta = 0.948$, $p < .001$). This finding supports Hypothesis 2a. Model 4 confirms the positive independent effects of idea radicalness and prior idea success. Model 5 shows, however, that when we consider the effect of prior team idea development as an additional control variable, that the effect of idea radicalness drops in significance.[3]

[2]The total number of *patents* was measured by using records from the European patent register. We recorded the number of patents held by the idea generator prior to developing the focal idea.

[3]As indicated before, the quality of an idea can also attract people to an idea (Hallen, 2008). Although idea success is determined *after* idea generators decide to develop an idea alone or with a team, for a robustness check, we added idea success as a proxy for idea quality into a model predicting team idea development. The results show that idea success indeed has a significant positive effect on team idea development, but that our findings hold irrespective of adding this variable as a control. Our findings also hold when we add whether or not an idea passed the first screening panel as a control variable instead of idea success.

TABLE 1 Descriptive statistics and correlations ($N = 310$)

		Mean	S.D.	Min.	Max.	1	2	3	4	5	6	7	8	9	10
1.	Team idea development	0.377	0.486	0	1										
2.	Prior team idea development	0.413	0.493	0	1	0.374									
3.	Idea success	0.103	0.305	0	1	0.239	0.146								
4.	Prior idea success	0.094	0.292	0	1	0.184	0.158	0.219							
5.	Idea radicalness	0.284	0.452	0	1	0.085	0.184	0.163	0.117						
6.	Prior idea involvement	1.594	1.527	1	11	0.208	0.047	0.118	0.086	0.083					
7.	Similarity to previous ideas	0.423	1.108	0	9	0.124	0.076	0.120	−0.003	0.018	0.010				
8.	Time elapsed since previous idea (ln)	1.722	1.364	0	4.575	0.092	0.113	0.187	0.159	0.103	0.227	−0.074			
9.	1996–1999	0.232	0.423	0	1	0.265	0.113	−0.036	−0.151	−0.312	0.021	0.059	−0.083		
10.	2000–2003	0.574	0.495	0	1	−0.083	−0.046	−0.094	0.030	0.325	−0.011	0.034	−0.097	−0.639	
11.	2004–2008	0.194	0.396	0	1	−0.179	−0.063	0.156	0.123	−0.073	−0.009	−0.106	0.209	−0.270	−0.569

TABLE 2 Heckman probit regression analysis of working with a team to develop a second idea

	Model 1		Model 2		Model 3		Model 4		Model 5	
Team idea development										
Prior team idea development									0.738	[0.000]
									(0.175)	
Prior idea success					0.948	[0.000]	0.927	[0.000]	0.768	[0.002]
					(0.265)		(0.259)		(0.250)	
Idea radicalness			0.379	[0.034]			0.349	[0.044]	0.156	[0.358]
			(0.179)				(0.173)		(0.170)	
Prior idea involvement	0.129	[0.044]	0.134	[0.026]	0.140	[0.021]	0.134	[0.024]	0.133	[0.025]
	(0.064)		(0.060)		(0.061)		(0.059)		(0.059)	
Similarity to previous ideas	0.115	[0.102]	0.124	[0.082]	0.119	[0.081]	0.121	[0.082]	0.119	[0.094]
	(0.070)		(0.071)		(0.068)		(0.069)		(0.071)	
Time elapsed since previous idea (ln)	0.058	[0.379]	0.065	[0.298]	0.045	[0.439]	0.043	[0.470]	0.019	[0.736]
	(0.066)		(0.062)		(0.058)		(0.059)		(0.057)	
1996–1999	0.534	[0.030]	0.752	[0.002]	0.674	[0.002]	0.835	[0.000]	0.686	[0.003]
	(0.246)		(0.245)		(0.213)		(0.231)		(0.232)	
2004–2008	−0.239	[0.363]	−0.224	[0.362]	−0.376	[0.132]	−0.322	[0.191]	−0.268	[0.263]
	(0.263)		(0.246)		(0.250)		(0.247)		(0.239)	
Constant	−0.032	[0.955]	−0.364	[0.488]	−0.240	[0.568]	−0.421	[0.326]	−0.494	[0.289]
	(0.560)		(0.524)		(0.420)		(0.428)		(0.466)	
Log likelihood	−728.991		−726.265		−720.989		−718.744		−704.500	
Likelihood ratio test			5.453	[0.020]	16.004	[0.000]	4.490	[0.034]	28.488	[0.000]
N	310		310		310		310		310	
Selection: submission of a second idea										
Patents (ln)	0.525	[0.000]	0.559	[0.000]	0.555	[0.000]	0.568	[0.000]	0.564	[0.000]
	(0.134)		(0.116)		(0.114)		(0.110)		(0.111)	
Idea success	0.040	[0.817]	0.010	[0.954]	−0.138	[0.360]	−0.127	[0.398]	−0.124	[0.411]
	(0.175)		(0.171)		(0.151)		(0.151)		(0.151)	
Idea radicalness	0.269	[0.010]	0.234	[0.025]	0.254	[0.015]	0.229	[0.027]	0.229	[0.025]

TABLE 2 (Continued)

	Model 1		Model 2		Model 3		Model 4		Model 5	
	(0.104)		(0.104)		(0.104)		(0.104)		(0.102)	
1996–1999	0.419	[0.000]	0.397	[0.000]	0.404	[0.000]	0.391	[0.000]	0.373	[0.000]
	(0.110)		(0.109)		(0.108)		(0.108)		(0.106)	
2004–2008	−0.410	[0.002]	−0.418	[0.001]	−0.413	[0.001]	−0.416	[0.001]	−0.429	[0.001]
	(0.129)		(0.129)		(0.129)		(0.129)		(0.128)	
Constant	−0.602	[0.000]	−0.585	[0.000]	−0.578	[0.000]	−0.570	[0.000]	−0.562	[0.000]
	(0.077)		(0.076)		(0.075)		(0.075)		(0.074)	
N	908		908		908		908		908	

Standard errors are in parentheses; *p*-values are between square brackets; two-tailed tests.

TABLE 3 Heckman probit regression analysis of success of second idea

	Model 6		Model 7	
Idea success				
Team idea development			0.866	[0.002]
			(0.279)	
Prior team idea development	0.380	[0.087]	0.166	[0.491]
	(0.223)		(0.241)	
Prior idea success	0.666	[0.020]	0.468	[0.123]
	(0.286)		(0.304)	
Idea radicalness	0.579	[0.020]	0.635	[0.016]
	(0.250)		(0.264)	
Prior idea involvement	0.060	[0.317]	0.026	[0.667]
	(0.060)		(0.060)	
Similarity to previous ideas	0.160	[0.032]	0.140	[0.061]
	(0.075)		(0.075)	
Time elapsed since previous idea (ln)	0.154	[0.104]	0.150	[0.123]
	(0.095)		(0.097)	
1996–1999	0.382	[0.225]	0.265	[0.421]
	(0.315)		(0.329)	
2004–2008	0.720	[0.009]	0.967	[0.002]
	(0.277)		(0.307)	
Constant	−2.284	[0.004]	−2.656	[0.001]
	(0.790)		(0.825)	
Log likelihood	−631.720		−626.087	
Likelihood ratio test			11.266	[0.001]
N	310		310	
Selection: submission of a second idea				
Patents (ln)	0.590	[0.000]	0.594	[0.000]
	(0.110)		(0.109)	
Idea success	−0.129	[0.395]	−0.128	[0.396]
	(0.151)		(0.151)	
Idea radicalness	0.206	[0.051]	0.205	[0.052]
	(0.106)		(0.106)	
1996–1999	0.357	[0.001]	0.356	[0.001]
	(0.109)		(0.109)	
2004–2008	−0.445	[0.001]	−0.442	[0.001]
	(0.132)		(0.132)	
Constant	−0.551	[0.000]	−0.551	[0.000]
	(0.076)		(0.076)	
N	908		908	

Standard errors are in parentheses; *p*-values are between square brackets; two-tailed tests.

In Table 3, we present our statistical analyses of how working with a team is associated with the success of the second idea. Model 6 contains the control variables only. Model 7 shows that the added variable, team idea development, is positively associated with the success of the second idea ($\beta = 0.866$, $p = .002$). The probability of developing a successful idea is 3.21 times higher when

idea generators work with a team rather than alone. An interesting additional finding in this respect is that when team idea development is added to Model 7, the effect of prior team idea development becomes insignificant, suggesting that team idea development mediates the effect of prior team idea development on idea success.

In the following analyses, we examined the hypothesized interaction effects by splitting the sample into idea generators who have worked with a team for the development of the first idea (Models 8–11) versus a sample where idea generators have not worked with a team for the development of the first idea (Models 12–15). The analyses presented in Table 4 mirror the steps we took for our main analyses. Model 9 shows that for idea generators with experience in prior team idea development, idea radicalness, while dropping in significance, is still positively associated with team idea development ($\beta = 0.502$, $p = .070$). This finding supports Hypothesis 1b and shows that the positive association between radical ideas and team idea development is enhanced when idea generators have experience working with a team. As Model 10 shows, the effect of prior idea success is not significant for idea generators with experience in prior team idea development ($\beta = 0.246$, $p = .449$). Turning to a sample where idea generators worked alone to develop their first idea, we find in Model 13 that idea radicalness is not significantly associated with the decision to develop the second idea with a team ($\beta = -0.002$, $p = .993$). Model 14 shows support for Hypothesis 2b as it demonstrates that for idea generators who developed their first idea alone and where successful in doing so, there is a positive association with their decision to develop the second idea with a team ($\beta = 1.754$, $p = .001$).

5 | DISCUSSION AND CONCLUSION

New product and process ideas are the lifeblood of growth and competitive advantage (Ahuja & Lampert, 2001; Baumann & Stieglitz, 2014; Birkinshaw, 1997; Burgelman, 1983, 1991). To facilitate the development of innovative ideas, research has often pointed at the benefits of teamwork (Perry-Smith & Shalley, 2014; Sutton & Hargadon, 1997; Woodman et al., 1993). Our results support this view as they show that working with a team is positively associated with the success chances of an idea. When given the choice, many idea generators nevertheless disregard the advantages of working with a team and develop instead their ideas alone. In this study, we focused on this puzzle and theorized that, when faced with the decision to form a team, there are two important trade-offs for idea generators: First, they need to weigh the advantage of having access to more resources through working with a team against the increased coordination costs. Consistent with our hypotheses, we found that there is a positive association between idea generators who need to develop a very radical idea and team idea development. Prior experience in working with a team further enhances this effect. The second trade-off is that idea generators need to decide whether sharing the risks and costs of developing an idea with the team outweighs the disadvantage of having to share the potential rewards of a successful idea. We found empirical support for the argument that prior idea success, especially when the idea was developed alone, is associated with subsequent team idea development. Based on these findings, we conclude that idea generators consider the pros and cons of teamwork very carefully. When the perceived costs of teamwork are high, idea generators are more likely to opt for developing ideas alone. This can be a costly mistake, however, because not working with a team is associated with a lower likelihood of developing a successful idea—independent of the type of idea being developed.

Our theory and findings extend research on teams and innovation in several ways. First, as discussed briefly in the introduction, our study deepens our understanding of the drivers and constraints

TABLE 4 Heckman probit regression analysis of working with a team to develop a second idea (for idea generators with and without experience in prior team idea development)

	Model 8		Model 9		Model 10		Model 11		Model 12		Model 13		Model 14		Model 15	
Team idea development																
Prior team idea development	Yes		Yes		Yes		Yes		No		No		No		No	
Prior idea success					0.246	[0.449]	0.200	[0.599]					1.754	[0.001]	1.881	[0.001]
					(0.326)		(0.379)						(0.506)		(0.544)	
Idea radicalness			0.502	[0.070]			0.496	[0.091]			−0.002	[0.993]			−0.270	[0.397]
			(0.277)				(0.294)				(0.244)				(0.318)	
Prior idea involvement	0.160	[0.113]	0.173	[0.075]	0.141	[0.230]	0.170	[0.093]	0.120	[0.099]	0.120	[0.104]	0.152	[0.055]	0.170	[0.045]
	(0.101)		(0.097)		(0.118)		(0.101)		(0.072)		(0.074)		(0.079)		(0.085)	
Similarity to previous ideas	0.178	[0.199]	0.177	[0.216]	0.159	[0.278]	0.181	[0.202]	0.137	[0.167]	0.137	[0.167]	0.115	[0.274]	0.115	[0.283]
	(0.139)		(0.143)		(0.146)		(0.142)		(0.099)		(0.099)		(0.105)		(0.107)	
Time elapsed since previous idea (ln)	−0.148	[0.105]	−0.151	[0.121]	−0.145	[0.120]	−0.158	[0.095]	0.219	[0.035]	0.220	[0.036]	0.196	[0.054]	0.199	[0.054]
	(0.091)		(0.097)		(0.093)		(0.094)		(0.104)		(0.104)		(0.102)		(0.103)	
1996–1999	0.429	[0.204]	0.732	[0.027]	0.424	[0.326]	0.749	[0.040]	0.551	[0.030]	0.551	[0.035]	0.726	[0.006]	0.670	[0.014]
	(0.337)		(0.330)		(0.431)		(0.364)		(0.254)		(0.262)		(0.265)		(0.272)	
2004–2008	−0.500	[0.208]	−0.360	[0.292]	−0.418	[0.424]	−0.354	[0.328]	−0.302	[0.324]	−0.302	[0.325]	−0.686	[0.081]	−0.713	[0.075]
	(0.397)		(0.342)		(0.523)		(0.363)		(0.306)		(0.307)		(0.393)		(0.401)	
Constant	0.354	[0.756]	−0.354	[0.718]	0.615	[0.614]	−0.118	[0.921]	−0.689	[0.210]	−0.689	[0.211]	−1.008	[0.043]	−1.015	[0.043]
	(1.142)		(0.982)		(1.219)		(1.184)		(0.550)		(0.551)		(0.498)		(0.501)	
Log likelihood	−297.186		−295.609		−296.144		−295.472		−401.316		−401.316		−393.212		−392.826	
Likelihood ratio test			3.155	[0.076]	2.085	[0.149]	1.344	[0.246]			0.000	[0.993]	16.208	[0.000]	0.772	[0.380]
N	128		128		128		128		182		182		182		182	
Selection: Submission of a second idea																
Patents (ln)	0.329	[0.073]	0.348	[0.033]	0.302	[0.184]	0.339	[0.049]	0.737	[0.000]	0.737	[0.000]	0.788	[0.000]	0.786	[0.000]
	(0.184)		(0.163)		(0.227)		(0.172)		(0.159)		(0.159)		(0.150)		(0.150)	
Idea success	−0.262	[0.192]	−0.283	[0.146]	−0.265	[0.166]	−0.272	[0.157]	0.371	[0.164]	0.371	[0.164]	0.064	[0.808]	0.057	[0.830]
	(0.201)		(0.195)		(0.191)		(0.192)		(0.266)		(0.266)		(0.266)		(0.266)	
Idea radicalness	0.380	[0.036]	0.375	[0.038]	0.380	[0.037]	0.375	[0.039]	0.129	[0.326]	0.129	[0.330]	0.114	[0.395]	0.124	[0.360]
	(0.181)		(0.181)		(0.182)		(0.182)		(0.131)		(0.133)		(0.134)		(0.135)	

TABLE 4 (Continued)

	Model 8		Model 9		Model 10		Model 11		Model 12		Model 13		Model 14		Model 15	
1996–1999	0.443	[0.017]	0.422	[0.023]	0.430	[0.014]	0.434	[0.017]	0.355	[0.020]	0.355	[0.020]	0.352	[0.022]	0.355	[0.021]
	(0.185)		(0.186)		(0.175)		(0.182)		(0.153)		(0.153)		(0.154)		(0.154)	
2004–2008	0.026	[0.927]	0.060	[0.823]	−0.011	[0.973]	0.039	[0.887]	−0.548	[0.000]	−0.548	[0.000]	−0.546	[0.000]	−0.548	[0.000]
	(0.282)		(0.269)		(0.321)		(0.277)		(0.151)		(0.151)		(0.152)		(0.153)	
Constant	−0.633	[0.000]	−0.624	[0.000]	−0.628	[0.000]	−0.628	[0.000]	−0.554	[0.000]	−0.554	[0.000]	−0.539	[0.000]	−0.541	[0.000]
	(0.156)		(0.157)		(0.161)		(0.155)		(0.086)		(0.086)		(0.087)		(0.087)	
N	344		344		344		344		564		564		564		564	

Standard errors are in parentheses; *p*-values are between square brackets; two-tailed tests.

of collaborative idea development (Hargadon & Bechky, 2006) by highlighting the trade-offs that people make when confronted with the decision to develop an idea with a team or not. Second, by following idea generators over time, our study sheds new light on the question of how sustained and successful idea development can be achieved (Deichmann & Van den Ende, 2014; Skilton & Dooley, 2010). We confirm that teamwork is a key enabler for successful idea development (Ford, 1996; Kurtzberg & Amabile, 2001; Singh & Fleming, 2010; Tierney & Farmer, 2002). Increasing the stock of ideas is important for companies for this increases their adaptability and innovativeness (Ahuja & Lampert, 2001; Baumann & Stieglitz, 2014; Birkinshaw, 1997; Burgelman, 1983, 1991). However, whether idea generators utilize the benefits of teamwork to develop another idea depends on their prior experiences, and among others, whether they worked with a team before. Third, our results provide fresh insights about the advantages and disadvantages of generating and developing ideas alone versus in a team (Singh & Fleming, 2010). Specifically, whereas in most prior research settings people could not choose whether they want to develop their ideas alone or in a team, we studied people who voluntarily generated ideas and who were free to choose with who they want to develop their ideas. Our findings suggest that there is a positive association between ideas developed in a self-formed team and idea success. Working with such a team is positively associated with idea success independent of whether the idea being developed is more or less radical. Despite the positive association between team idea development and the success of an idea, people are more likely to avoid working with teams when they associate teamwork with more disadvantages than advantages. This is especially the case when an idea is less radical and when the idea generator has no prior experience in successfully developing an earlier idea. Fourth, the findings of our study imply that idea generators may have a different perspective than their organization about the costs and benefits of working with a team. While teams have become the standard work form for organizations to accomplish complex tasks, increased communication and coordination demands of working with teams quickly can overshadow the potential benefits.

The limitations of our study open up several interesting avenues for future research. The proprietary data on idea generators is an important strength of our study, but also a constraint because Enco's strict policy on personal data prevented us from collecting demographic data for the people who generated and developed ideas. In addition, we were not directly able to assess the theorized mechanism. Contingent on the availability of such data, future research could address whether or not certain idea generators were more prone to working with a team than others and how this is driven by considerations related to different trade-offs. Another avenue for future research could be to examine team formation processes in more or less formalized innovation processes. The innovation program we studied is formalized in that it features a structured idea development process and is managed by an independent unit within Enco, which is measured by its ability to provide funding and time to people to develop breakthrough ideas. However, the program also has informal characteristics in that idea generation is voluntary (i.e., it is not part of anyone's job description to come up with ideas) and teams are self-formed (cf. Reitzig & Sorenson, 2013). When companies leverage complementary approaches to encourage innovation with even less or no formal structures, possibly more stark behavior concerning team formation processes could be observed from idea generators. For instance, one can imagine that the riskier conditions might facilitate more team formation, at least for early ideas.

To conclude, self-formed teams are important for the successful development of ideas and innovation but working with a team has pros and cons. Our study reveals under which conditions idea generators are more likely to disregard the advantages of teamwork and instead enter a lone idea development path, one which is much less likely to succeed.

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