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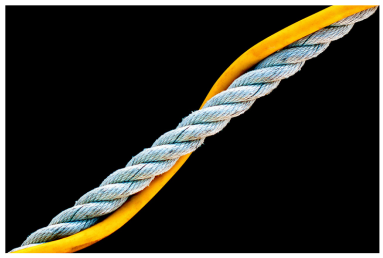

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Collaboration

Welcome to the December issue of the *Technology Innovation Management Review*. We welcome your comments on the articles in this issue as well as suggestions for future article topics and issue themes.

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Chris McPhee

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Overview

The *Technology Innovation Management Review* (TIM Review) provides insights about the issues and emerging trends relevant to launching and growing technology businesses. The TIM Review focuses on the theories, strategies, and tools that help small and large technology companies succeed.

Our readers are looking for practical ideas they can apply within their own organizations. The TIM Review brings together diverse viewpoints – from academics, entrepreneurs, companies of all sizes, the public sector, the community sector, and others – to bridge the gap between theory and practice. In particular, we focus on the topics of technology and global entrepreneurship in small and large companies.

We welcome input from readers into upcoming themes. Please visit timreview.ca to suggest themes and nominate authors and guest editors.

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Contribute to the TIM Review in the following ways:

- Read and comment on articles.
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- Sponsor or advertise in the TIM Review.
- Tell a friend or colleague about the TIM Review.

Please contact the Editor if you have any questions or comments: timreview.ca/contact

About TIM

The TIM Review has international contributors and readers, and it is published in association with the Technology Innovation Management program (TIM; timprogram.ca), an international graduate program at Carleton University in Ottawa, Canada.

Editorial: Collaboration

Chris McPhee, Editor-in-Chief

Welcome to the December 2017 issue of the *Technology Innovation Management Review*. This month's editorial theme is **Collaboration**, and the authors provide insights on the benefits of diverse entrepreneurial teams, the importance of educational collaboration in university–industry relationships, how startups and SMEs can collaborate through open innovation, and how coworking spaces can promote collaborative capability.

In the first article, **Franziska Brodack** and **Anna Sinell** from the Fraunhofer Center for Responsible Research and Innovation in Berlin, Germany, discuss the benefits of team diversity on entrepreneurial commitment in academic-spinoffs. Building on literature on interdisciplinarity, academic entrepreneurship, and entrepreneurial intention, they analyzed the development of nine interdisciplinary spin-off teams comprising expertise from science, industry, and design. Through their findings, they identify several benefits of interdisciplinarity and put forward a number of propositions about its positive effect on entrepreneurial commitment.

Next, **Leena Kunttu** from the University of Vaasa in Finland examines the role of educational involvement in innovative university–industry collaboration. Although the value of linking university research with industrial innovation is widely recognized, little attention has been given specifically to the value of involving industry in educational activities such as student projects, thesis projects, jointly organized courses, and tailored degree courses. Through a qualitative analysis of nine cases of university–industry research collaboration, the author demonstrates the mutual benefits of educational involvement.

Then, **Fabio Mercandetti**, **Christine Larbig**, **Vincenzo Tuozzo**, and **Thomas Steiner** from the Lucerne University of Applied Sciences and Arts Information Technology in Switzerland highlight the potential for startups to collaborate with small and medium-sized enterprises (SMEs) through open innovation. More commonly, startups collaborate with large companies, but the authors' findings suggest that building bridges between startups and SMEs can reduce the challenges both players face in identifying potential partners and can lead to effective collaboration and innovation solutions.

Finally, **Marcelo Castilho** and **Carlos Quandt** from Business School of Pontificia Universidade Católica do Paraná in Curitiba, Brazil, explore the development of collaborative capability in coworking spaces. Based on their study of 14 coworking spaces in six Asian countries, they identify two types of coworking spaces – those tailored towards "convenience sharing" and those supporting "community building" – and argue that they each foster collaborative capability in different ways. They also contribute to a four-dimensional theoretical model for coworking spaces to help coworking founders and community managers make strategic decisions in relation to developing collaborative capability.

The articles in this issue were selected and developed from papers presented at the ISPIM Innovation Conference in Vienna, Austria, from June 18–21, 2017. ISPIM (ispim-innovation.com) – the International Society for Professional Innovation Management – is a network of researchers, industrialists, consultants, and public bodies who share an interest in innovation management.

Next year's ISPIM Innovation Conference will be held in Stockholm, Sweden, from June 17–20, 2018. Submissions from academic, research, consulting, industry, intermediary, and policy organizations are encouraged. The submission deadline is January 26, 2018 (tinyurl.com/y9u5lbqy).

Before turning the page on 2017, we return to the December tradition of looking back on the articles that have proven the most popular in the past year. Table 1 ranks the most popular articles published in the 12 issues between October 2016 and September 2017 based on traffic to timreview.ca (timreview.ca) over this period. This method strongly disadvantages more recently published articles, so the table also includes five trending articles that would appear in the main list if only recent traffic were considered. If you missed any of these articles when they first came out, we encourage you to add them to your reading list. Our full archive of articles is available on our website at: timreview.ca/issue-archive

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Table 1. Most popular TIM Review articles published from October 2016 to September 2017*

Rank	Article	Author(s)	Issue
1	**Integrating Open Innovation Platforms in Public Sector Decision Making: Empirical Results from Smart City Research** (timreview.ca/article/1040)	Ojasalo & Tähtinen	December 2016 *Smart Cities and Regions*
2	**Action Research as a Framework to Evaluate the Operations of a Living Lab** (timreview.ca/article/1056)	Logghe & Schuurman	February 2017 *Innovation in Living Labs*
3	**Innovation in the Public Sector: Exploring the Characteristics and Potential of Living Labs and Innovation Labs** (timreview.ca/article/1045)	Schuurman & Tõnurist	January 2017 *Innovation in Living Labs*
4	**The Concept of the Entrepreneurial University Applied to Universities of Technology in Austria: Already Reality or a Vision of the Future?** (timreview.ca/article/1026)	Sperrer et al.	October 2016 *Insights*
5	**Digital Technology Entrepreneurship: A Definition and Research Agenda** (timreview.ca/article/1076)	Giones & Brem	May 2017 *Lean and Global*
6	**The Design-Driven Living Lab: A New Approach to Exploring Solutions to Complex Societal Challenges** (timreview.ca/article/1049)	Brankaert & den Ouden	January 2017 *Innovation in Living Labs*
7	**Hybrid Entrepreneurship: How and Why Entrepreneurs Combine Employment with Self-Employment** (timreview.ca/article/1063)	Solesvik	March 2017 *Insights*
8	**Managing Innovation Ecosystems to Create and Capture Value in ICT Industries** (timreview.ca/article/1024)	Pellikka & Ali-Vehmas	October 2016 *Insights*
9	**Orchestrating Innovation Ecosystems: A Qualitative Analysis of Ecosystem Positioning Strategies** (timreview.ca/article/1061)	Valkokari et al.	March 2017 *Insights*
10	**The Smart City Ecosystem as an Innovation Model: Lessons from Montreal** (timreview.ca/article/1032)	Khomsi et al.	November 2016 *Innovation in Tourism*
11	**Q&A. How Can You Teach Innovation and Entrepreneurship?** (timreview.ca/article/1027)	Trifilova et al.	October 2016 *Insights*
12	**Collaborative Innovation with External Actors: An Empirical Study on Open Innovation Platforms in Smart Cities** (timreview.ca/article/1041)	Ojasalo & Kauppinen	December 2016 *Smart Cities and Regions*
13	**Empowering Local Tourism Providers to Innovate through a Living Lab Process: Does Scale Matter?** (timreview.ca/article/1031)	Guimont & Lapointe	November 2016 *Innovation in Tourism*
14	**Categorization of Innovation Tools in Living Labs** (timreview.ca/article/1046)	Leminen & Westerlund	January 2017 *Innovation in Living Labs*
15	**Initiating a New Research Phase in the Field of International Entrepreneurship: An Interview with Professor Nicole Coviello** (timreview.ca/article/1077)	Coviello & Tanev	May 2017 *Lean and Global*
↑	**The Sharing Economy and the Future of Personal Mobility: New Models Based on Car Sharing** (timreview.ca/article/1097)	Novikova	August 2017 *Insights*
↑	**Improving Internal Communication Management in SMEs: Two Case Studies in Service Design** (timreview.ca/article/1081)	Eskelinen et al.	June 2017 *Insights*
↑	**The Defining Characteristics of Urban Living Labs** (timreview.ca/article/1088)	Steen & van Bueren	July 2017 *10th Anniversary Issue*
↑	**Comparing the Entrepreneurial Ecosystems for Technology Startups in Bangalore and Hyderabad, India** (timreview.ca/article/1090)	Subrahmanya	July 2017 *10th Anniversary Issue*
↑	**Is There a Lean Future for Global Startups?** (timreview.ca/article/1072)	Tanev	May 2017 *Lean and Global*

*The rankings are based on website traffic to timreview.ca from October 1, 2016 to September 30, 2017. The list also includes 5 recently published articles (denoted by ↑) that would appear in the main list if only traffic from June 1, 2016 to November 30, 2017 were considered.

Editorial: Collaboration

Chris McPhee

For future issues, we are accepting general submissions of articles on technology entrepreneurship, innovation management, and other topics relevant to launching and growing technology companies and solving practical problems in emerging domains. Please contact us (timreview.ca/contact) with potential article topics and submissions.

Chris McPhee
Editor-in-Chief

About the Editor

Chris McPhee is Editor-in-Chief of the *Technology Innovation Management Review*. He holds an MASc degree in Technology Innovation Management from Carleton University in Ottawa, Canada, and BScH and MSc degrees in Biology from Queen's University in Kingston, Canada. Chris has nearly 20 years of management, design, and content-development experience in Canada and Scotland, primarily in the science, health, and education sectors. As an advisor and editor, he helps entrepreneurs, executives, and researchers develop and express their ideas.

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Keywords: collaboration, cooperation, entrepreneurship, startups, entrepreneurial commitment, interdisciplinarity, education, university, industry, SMEs, coworking, collaborative capability

Promoting Entrepreneurial Commitment: The Benefits of Interdisciplinarity

Franziska Brodack and Anna Sinell

> *"Individual commitment to a group effort – that is what makes a team work, a company work, a society work, a civilization work."*
>
> Vince Lombardi (1913–1970)
> American Football Player and Head Coach

This article is the first to examine the relationship between interdisciplinarity and entrepreneurial commitment in academic spin-offs. Building on literature on interdisciplinarity, academic entrepreneurship, and entrepreneurial intention, we analyzed the development of nine interdisciplinary spin-off teams comprising expertise from science, industry, and design. Our findings suggest that interdisciplinary teams engage with their ideas, maintain productive interaction, and successfully implement these ideas. Subjects in this study thoroughly developed their project proposals and implementation strategies by examining them from multiple angles. They believed not only in the value of these projects, but in their own ability to see them through. They found one another's contributions highly inspirational and experienced a strong sense of responsibility and motivation. Communication within the teams was well managed, and tasks were clearly defined and distributed. Based on our findings, we put forward a number of propositions about the positive effects of interdisciplinarity on entrepreneurial commitment and conclude with implications for future research and practice.

Introduction

In innovation-driven economies, the transfer of scientific findings to industry has great economic and political significance. Academic entrepreneurship is one particularly potent form of such transfer (Grimaldi et al., 2011; Siegel & Wright, 2015). Recognizing its benefits, European decision makers in academia, industry, and government increasingly regard academic entrepreneurship as the third "academic mission" and continue to introduce wide-ranging support initiatives. Nonetheless, transfer performance in Europe still lags behind that of universities in the United States (Audretsch & Göktepe-Hultén, 2015).

Academics might experience particular difficulty in overcoming the challenges of entrepreneurship because they often regard industry as a completely alien environment and because they lack business-related resources and skills (Franklin et al., 2001; Rasmussen & Wright, 2015; Siegel & Wright, 2015; Sinell et al., 2015). Even when they do successfully initiate spin-offs, they rarely invite non-scientific specialists to join (Ensley & Hmieleski, 2005; Franklin et al., 2001; Knockaert et al., 2011). At the same time, teams composed of members with different areas of expertise and networks might more successfully transform scientific findings into marketable products and services (Knockaert et al., 2011).

To bridge the gap between mere entrepreneurial intention and actual entrepreneurial activities, the concept of entrepreneurial commitment plays a significant role (Fayolle et al., 2011; Malewicki, 2005). Studies found a positive impact of entrepreneurial commitment on start-up performance (Tasnim & Singh, 2016; De Clercq et al., 2009), new venture formation (Fayolle, 2007), and new product development (Schmidt & Calantone, 2002). Nevertheless, so far, little research has been done on the factors that promote entrepreneurial commitment (Fayolle et al., 2011).

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Theoretical Framework

Following Auer and Walter (2009), we define academic spin-offs as independent business entities that are founded by or with the help of employees of publicly funded research organizations in order to commercialize scientific findings and technological products.

In comparison to mere entrepreneurial intention (Crant, 1996; Fayolle et al., 2011), entrepreneurial commitment more frequently results in entrepreneurial activities (Erikson, 2002; Vohora et al., 2004). Entrepreneurial commitment is known to be crucial "for a potential venture to be taken forward from a vision that the researcher has created in his mind, to the formation of a running business" (Parente & Feola, 2013). Entrepreneurial commitment starts with a considerable investment of time, energy, and resources, including financial, intellectual, relational, and emotional resources (Fayolle et al., 2011; Parente & Feola, 2013).

In the context of organizational behaviour, commitment is indicated by attachment to, identification with, and involvement in the organization's projects (affective), willingness to expend significant effort (normative), and a strong desire to belong in the long term (continuance) (Meyer & Herscovitch, 2001; Mowday et al., 1979). Tasnim and Singh (2016) extended the work of Meyer and Herscovitch (2001) in the context of entrepreneurial activities. Accordingly, entrepreneurial commitment is shaped by seven separate constructs that influence the three components of commitment: i) *affective commitment* is influenced by the entrepreneur's passion, values, and personality; ii) *normative commitment* is shaped by the entrepreneurs internalized norms, responsibility and righteousness; and iii) *continuous commitment* is affected by the entrepreneur's investments in the project and lack of alternatives (Tasnim et al., 2016). A study with over 400 startups revealed a positive effect of affective commitment and normative commitment on the development of entrepreneurial commitment, indicating that the entrepreneur's strong emotional attachment to their venture and desire for it to succeed will lead to a higher level of entrepreneurial commitment. Likewise, the entrepreneur's perceived obligation resulting from the internalization of norms, the receipt of benefits that induces a need to reciprocate or stimulates the acceptance of responsibilities, positively affects the development of entrepreneurial commitment (Tasnim & Singh, 2016; Tasnim et al., 2014).

Further indicators for the factors that promote entrepreneurial commitment can be found in the literature of entrepreneurial intention. Because entrepreneurial commitment can be considered to supplement entrepreneurial intention (Erikson, 2002), relevant existing models of the latter can be expanded to examine the former (Parente & Feola, 2013). Almost all such models include the perceived (internal and external) desirability of a potential startup and its perceived feasibility (Ajzen, 1991; Bird, 1998; Krueger et al., 2000; Shapero & Sokol, 1982).

Literature on individual entrepreneurs shows that entrepreneurs who are curious to explore the new, are innovative, are proactive, and are able to take risks are more likely to engage in entrepreneurial activities (Langkamp et al., 2012; Kollmann et al., 2007). Regarding the factors that promote founding teams to engage in the venturing process, little research has been done so far. A study by Boeker (1997) investigating managerial teams found that heterogeneous teams are more likely to manifest entrepreneurial and innovative behaviours and enter new product markets than homogeneous teams. Meanwhile, studies in innovation research have shown the different ways in which interdisciplinary teams can benefit the innovation process and outperform more homogenous teams (Harrison & Klein, 2007; Nickerson & Zenger, 2004; Page, 2007). A greater variety of knowledge bases, methods, and mindsets, resulting from diversity in educational and professional backgrounds, typically lead to more informed and considered decisions (Pelled et al., 1999) and might be particularly useful early in the innovation process to master the challenges of technology development, marketing, product definition, and business and financial analysis (Cooper 1979; Montoya-Weiss, 1994). Teams that include both academics and professionals with diverse backgrounds have been shown to successfully navigate startups through the initial, and often the most challenging, development stages (Knockaert et al., 2011; Rasmussen & Wright, 2015; Visintin & Pittino, 2014). Therefore, we argue that an interdisciplinary team composition, due to the greater variety of competencies, perspectives, and knowledge, can support the perceived desirability and perceived feasibility of aspiring entrepreneurs, thus promoting entrepreneurial commitment.

Fayolle and colleagues (2011) argue that greater operational knowledge of commitment phenomenon should improve the quality of startup support. Research on entrepreneurship has thus far devoted little attention to such factors, particularly team composition. To address

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this gap, we examined the relationship between interdisciplinarity and performance by focusing on the following research question: *Does interdisciplinarity in academic spin-offs promote entrepreneurial commitment, and if so, how?*

Method

We examined a six-month spin-off incubator hosted by a leading, publicly funded European research institute and ultimately involving a total of 32 potential founders. They were 17 men (53%) and 15 women (47%) and were on average 29.28 years old (SD = 4.81). Eight were students. Twenty-four were employed or self-employed. The incubator resulted in nine teams, each with its own project proposal, involving a total of 26 individuals: ten designers, nine scientists, and seven business managers. Three different coaches and a number of experts from different fields provided ongoing advice and training. An external jury evaluated the results.

The case study approach (Eisenhardt, 1989; Eisenhardt & Graebner, 2007) was employed because its inductive nature is particularly suited to qualitative data analysis in addressing previously unexamined questions (Yin, 2009). Each team provided one case as shown in Table 1.

The data was gathered from 60 semi-structured interviews, each lasting between 20 and 60 minutes. Twenty-two participants were interviewed midway through: 16 upon completing and 14 upon leaving the incubator. Participants were typically interviewed first midway through and then upon completing or leaving the incubator. Coaches and members of the jury were interviewed only at the end.

Table 1. The nine interdisciplinary cases examined in this study

Case	Technology	Product or Service	Number of Founders	Industry Experience
ASO1	Medical device	Product	2	Yes
ASO2	Damping panel	Product	4	No
ASO3	Psychological gaming	Service	4	Yes
ASO4	Patient management service	Service	5	Yes
ASO5	Data mapping	Service	3	No
ASO6	Smart hardware vendor	Service	1	Yes
ASO7	Medical device	Product	3	No
ASO8	Healthcare app	Service	2	No
ASO9	Healthcare device	Product	2	No

Interview transcripts were qualitatively analyzed with the help of Mayring's method (Mayring, 2010). Other data such as field notes, one-pagers, business plans, and pitch decks were added to the transcripts and provided valuable context-specific information (Ritchie et al., 2013).

In the next section, based on our findings, we put forward a number of propositions about the positive effects of interdisciplinarity on entrepreneurial commitment.

Findings and Propositions

Engagement with ideas

Every successful startup begins with a good idea. The more founders believe in their project, the greater their commitment (Cooper et al., 1988). Our findings suggest that, by embracing a wider variety of perspectives, members of interdisciplinary teams are likely to experience high levels of motivation and dedication to their ideas, which leads to stronger affective commitment and higher perceived desirability of the venture project.

In addition to personality traits, social networks, and scientific expertise, an understanding of markets, consumer needs, and customer service strategies can help uncover business opportunities (Ardichvili et al., 2003). Potential founders in this study experienced the opportunity to discover different, previously unfamiliar mindsets and methods as inspirational, motivating, and beneficial to idea development. They utilized their combined knowledge to examine multiple aspects of both their proposed projects and implementation strategies by accounting for three different perspectives – product, market, and consumer.

Six of the nine teams admitted new members with additional expertise immediately after the incubator process had begun, which encouraged these teams to streamline or even substantially alter their original ideas: "Right away […], what I definitely found very useful and exciting was looking at the idea more closely and asking ourselves: so, is it really that good, or do we need to keep working on it?" (ASO1 member) In particular, the approaches introduced by the designers in these teams helped all members better understand the customer perspective.

Founders regarded their project proposals as shared visions produced by team effort and expressed a strong belief in their value: "Toward the end, it got to be really exciting, working on this idea that could really fill a

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niche and then even be up and running someday. Suddenly, you are totally into it, with all your passion." (ASO1 member) Members of the teams that exhibited lower entrepreneurial commitment by leaving the project (ASO6, ASO7, and ASO8) explained their decision by the lack of necessary skills, leading to a loss of confidence in their project: "But the reason not to pitch to the jury was, in the first place, that the idea just wasn't ready. And it was a huge factor that the technological knowhow, for the hardware that we'd pictured, it just wasn't there, didn't exist. And that would've been key somehow." (ASO8 member)

Based on these findings, we propose the following:

> **Proposition 1:** Interdisciplinarity increases identification and engagement with ideas, thus promoting entrepreneurial commitment.

Implementation

The more aspiring entrepreneurs believe in their ability to navigate the challenges of founding, the greater their commitment (Goethner et al., 2012). Our findings suggest that, through their combined knowledge, interdisciplinary teams are particularly likely to master such challenges and obtain higher levels of perceived feasibility of the venturing project: "Because the responsibilities were assigned this way, […] nothing was unmanageable… because yes, because we had it covered." (ASO4 member)

Various teams exemplified how particular combinations of skills might be necessary for innovations to not only be proposed, but advanced. In ASO3, a psychologist's idea for a psychotherapeutic online game could not take form until a game developer created a demo and a project manager formulated a business plan. Those teams that left the incubator needed to do so exactly because they did not "have it covered." As one interviewee stated, "For this really crucial [managerial] task […], we would need someone. Otherwise it just won't work. It's just not my area of expertise, absolutely not." (ASO6 member)

Based on these findings, we propose the following:

> **Proposition 2:** Interdisciplinarity increases the likelihood of ideas being implemented, thus promoting entrepreneurial commitment.

Teamwork

Teamwork is the engine of entrepreneurship. Functional interaction increases entrepreneurial commitment (Glew, 2012), while high levels of disagreement cause startups to fail (CBinsights, 2014; Kummer et al., 2016). Our findings suggest that members of interdisciplinary teams are likely to maintain productive teamwork through i) good communication strategies and ii) clear distribution of tasks.

While explaining ideas to their teammates, potential founders in this study deliberately used basic terms, accessible regardless of background. Some teams (ASO2, ASO3, ASO7, and ASO9) originally experienced communication barriers due to the use of professional jargon and took this as an opportunity not only to reach mutual understanding, but to further streamline communication: "Everyone brings their own field with them and that's great. But we always try to turn it down a notch – to say it again, but more simply, really, less complex, to get everyone on the same page. It's important that no-one feels excluded at the end." (ASO9 member)

Members of ASO1, ASO2, and ASO8 discovered that simple charts and sketches can sometimes best convey complex specifics and engage others in the subject at hand: "So that whole fungus development process, no mysteries to me there, because of my biology background. But for the others it was [hard] sometimes. So it took forever. But when we drew this cutesy little picture, then it finally clicked. So this visualization was actually an important communication tool for us." (ASO2 member)

Because of differences in background, participants felt that, in order to convey their own perspectives clearly, they first needed to better understand those of their teammates: "When I talk about findings in psychology, I immediately explain why: why it could actually be important for the finances or design. We try to speak each other's languages, I'd say. […] We look at it from one another's point of view." (ASO3 member)

Because founders had their particular areas of expertise, tasks within the teams were clearly defined. This clear task distribution not only continued to promote constructive communication, but led to high levels of appreciation for one another's backgrounds and contributions: "And each and everyone feels valued because they have their own areas of responsibility in which they get to make decisions. And that's good, that's the way it should be, I believe." (ASO4 member)

In addition, high levels of self-confidence and a strong sense of responsibility could be observed: "An interdisciplinary team makes you more aware of your own com-

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petence. When I just hang out with biologists, they are all experts in their mini-fields, and I am an expert in my mini-field. And that makes me feel so small sometimes because the others also know a lot. But here […], [here] I am officially 'the expert'. And that boosts my confidence." (ASO2 member)

The experienced appreciation by other teammates and perceived responsibility for their respective field of expertise lead to higher levels of normative commitment. Based on these findings, we propose the following:

> **Proposition 3a:** Interdisciplinarity leads to good communication strategies, thus promoting entrepreneurial commitment.
>
> **Proposition 3b:** Interdisciplinarity leads to clear task distribution and a strong sense of responsibility, thus promoting entrepreneurial commitment.

Conclusions

Thus far, little research has been done on entrepreneurial commitment within academic spin-offs and the factors that promote it (Fayolle et al., 2011). The goal of this study was to examine the effects of interdisciplinarity on entrepreneurial commitment and derive first propositions on the relationship between the two constructs.

Our findings suggest that teams that exhibit a greater variety of knowledge bases, methods, and mindsets – which we consider interdisciplinary – are likely to engage with their ideas, maintain productive interaction, and successfully implement these ideas. Potential spin-off founders in this study thoroughly developed both their project proposals and implementation strategies by examining them from multiple angles. They believed in the value of their projects and their own ability to master the challenges of entrepreneurship, thus expressing high levels of perceived desirability and feasibility (Ajzen, 1991). They experienced high levels of appreciation for one another's contributions and a strong sense of responsibility and motivation leading to high levels of normative commitment (Tasnim et al. 2016). Given that every team member had their own field of expertise, tasks were clearly defined and distributed within teams. Team members quickly overcame the barriers of professional jargon and developed effective communication strategies.

Academic spin-offs particularly benefit from interdisciplinarity because the scientific perspectives, knowledge, and methods of single academics are challenged within the team. Therefore, ideas can be further developed and streamlined. When academics are open to such discussions, promising business opportunities with high levels of engagement can arise. Due to the combination of theoretical and practical knowledge within the teams, interdisciplinary academic spin-offs are more likely to transform ideas from a mere theoretical to a more application-oriented level. Especially against the background that academic spin-offs often lack business and market-related knowledge, interdisciplinarity leads to higher levels of perceived feasibility. The ability to clearly communicate a startup idea is crucial for a new venture. In interdisciplinary teams, academics are forced to simplify scientific language in order to better communicate. This is also very beneficial when communicating the business idea to external stakeholders.

All of the above suggests that interdisciplinary teams might be particularly likely both to make a commitment to their spinoffs and to uncover good commercialization opportunities. Research institutions that wish to encourage academic entrepreneurship should therefore consider inviting non-scientific specialists to participate and integrating expertise from different research fields early on in the research process.

Furthermore, our findings confirm the importance of team composition for venture capitalist's investment decisions (Gorman & Sahlman, 1989; Muzyka et al., 1996; Silva, 2004). Literature shows that venture capitalists prefer to invest in startups with high-quality teams (Silva, 2004) comprising entrepreneurs with industry-related competences and heterogeneous educational backgrounds (Franke et al., 2008). Confirming the importance of interdisciplinary startup teams, our study indicates that, particularly in early stages of the venturing process, interdisciplinary teams are more likely to develop high levels of entrepreneurial commitment and are therefore more likely to establish and maintain a successful startup company. We therefore suggest that venture capitalists should consider a certain degree of heterogeneity within the composition of startup teams in order to foster team members commitment and avoid potential drop-outs.

Our study is not without limitations. Further research needs to establish whether the positive effects identified above can be observed not only during the early stages of spin-off development, as was the case in this study, but throughout their existence. Although all subjects had the opportunity to use the resources of the

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host research institute, such as facilities, materials, and networks, only one was actually employed there. Future studies might focus on more "typical" spin-offs where academic members come from the same organization, or they might compare interdisciplinary and more homogenous groups.

Acknowledgements

This article was developed from a paper presented at the ISPIM Innovation Conference in Vienna, Austria, June 18–21, 2017. ISPIM (ispim-innovation.com) – the International Society for Professional Innovation Management – is a network of researchers, industrialists, consultants, and public bodies who share an interest in innovation management.

About the Authors

Franziska Brodack is Research Fellow at the Fraunhofer Center for Responsible Research and Innovation in Berlin, Germany. Her current projects focus on academic spin-off creation and the utilization of inter- and transdisciplinary teams for technology and knowledge transfer. Franziska holds a Master's degree in Business Administration from the Brandenburg University of Technology in Germany.

Anna Sinell is a PhD Candidate at the Technical University of Berlin, Germany, and a Research Fellow at the Fraunhofer Center for Responsible Research and Innovation. Her research focus is the transfer of knowledge and technology between different actors in innovation ecosystems. She is currently finishing her PhD thesis on strategies to foster academic entrepreneurship at research institutions.

References

Audretsch, D. B., & Göktepe-Hultén, D. 2015. University Patenting in Europe. In A. N. Link, D. S. Siegel, & M. Wright (Eds.), *The Chicago Handbook of University Technology Transfer and Academic Entrepreneurship:* 188–217. Chicago, IL: University of Chicago Press.

Ajzen, I. 1991. The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes,* 50(2): 179–211. http://doi.org/10.1016/0749-5978(91)90020-T

Ardichvili, A., Cardozo, R., & Ray, S. 2003. A Theory of Entrepreneurial Opportunity Identification and Development. *Journal of Business Venturing,* 18(1): 105–123. http://doi.org/10.1016/S0883-9026(01)00068-4

Auer, M., & Walter, A. (Eds.). 2009. *Academic Entrepreneurship: Unternehmertum in der Forschung* (1st ed.). Wiesbaden, Germany: Gabler Verlag.

Bird, B. 1988. Implementing Entrepreneurial ideas: The Case for Intention. *Academy of Management Review,* 13(3): 442–453. http://doi.org/10.5465/AMR.1988.4306970

Boeker, W. 1997. Strategic Change: The Influence of Managerial Characteristics and Organizational Growth. *Academy of Management Journal,* 40(1): 152–170.

CBinsights. 2014. *The Top 20 Reasons Startups Fail.* New York: CB Insights. https://www.cbinsights.com/research-reports/The-20-Reasons-Startups-Fail.pdf

Cooper, A. C., Woo, C. Y., & Dunkelberg, W. C. 1988. Entrepreneurs' Perceived Chances for Success. *Journal of Business Venturing,* 3(2): 97–108. https://doi.org/10.1016/0883-9026(88)90020-1

Cooper, R. G. 1979. The Dimensions of Industrial New Product Success and Failure. *Journal of Marketing,* 43(3): 93–103. http://doi.org/10.2307/1250151

Crant, J. M. 1996. The Proactive Personality Scale as a Predictor of Entrepreneurial Intentions. *Journal of Small Business Management,* 34(3): 42–49.

De Clercq, D., Menzies, T. V., Diochon, M., & Gasse, Y. 2009. Explaining Nascent Entrepreneurs' Goal Commitment: An Exploratory Study. *Journal of Small Business & Entrepreneurship,* 22(2): 123–139.

Eisenhardt, K. M. 1989. Building Theories from Case Study Research. *Academy of Management Review,* 14(4): 532–550. http://doi.org/10.5465/AMR.1989.4308385

Eisenhardt, K. M., & Graebner, M. E. 2007. Theory Building from Cases: Opportunities and Challenges. *Academy of Management Journal,* 50(1): 25–32. http://doi.org/10.5465/AMJ.2007.24160888

Ensley, M. D., & Hmieleski, K. M. 2005. A Comparative Study of New Venture Top Management Team Composition, Dynamics and Performance between University Based and Independent High-Technology New Ventures. *Research Policy,* 34(7): 1091–1105. http://doi.org/10.1016/j.respol.2005.05.008

Erikson, T. 2002. Entrepreneurial Capital: The Emerging Venture's Most Important Asset and Competitive Advantage. *Journal of Business Venturing,* 17(3): 275–290. http://doi.org/10.1016/S0883-9026(00)00062-8

Promoting Entrepreneurial Commitment: The Benefits of Interdisciplinarity

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Fayolle, A. 2007. *Entrepreneurship and New Value Creation: The Dynamic of the Entrepreneurial Process.* Cambridge, UK: Cambridge University Press.

Fayolle, A., Basso, O., & Tornikoski, E. T. 2011. Entrepreneurial Commitment and New Venture Creation: A Conceptual Exploration. In K. Hindle & K. Klyver (Eds.), *Handbook of Research on New Venture Creation:* 160–182. Cheltenham, UK: Edward Elgar.

Franke, N., Gruber, M., Harhoff, D., & Henkel, J. 2008. Venture Capitalists' Evaluations of Start-Up Teams: Trade-Offs, Knock-Out Criteria, and the Impact of VC Experience. *Entrepreneurship Theory and Practice,* 32(3): 459–483. http://doi.org/10.1111/j.1540-6520.2008.00236.x

Franklin, S. J., Wright, M., & Lockett, A. 2001. Academic and Surrogate Entrepreneurs in University Spin-Out Companies. *The Journal of Technology Transfer,* 26(1): 127–141. http://doi.org/10.1023/A:1007896514609

Glew, D. J. 2012. Effects of Interdependence and Social Interaction-Based Person-Team Fit. *Administrative Sciences,* 2(4): 26–46. http://doi.org/10.3390/admsci2010026

Goethner, M., Obschonka, M., Silbereisen, R. K., & Cantner, U. 2012. Scientists' Transition to Academic Entrepreneurship: Economic and Psychological Determinants. *Journal of Economic Psychology,* 33(3): 628–641. http://doi.org/10.1016/j.joep.2011.12.002

Gorman, M., & Sahlman, W. A. 1989. What Do Venture Capitalists Do? *Journal of Business Venturing,* 4(4): 231–248. https://doi.org/10.1016/0883-9026(89)90014-1

Grimaldi, R., Kenney, M., Siegel, D. S., & Wright, M. 2011. 30 Years After Bayh–Dole: Reassessing Academic Entrepreneurship. *Research Policy,* 40(8): 1045–1057. http://doi.org/10.1016/j.respol.2011.04.005

Harrison, D. A., & Klein, K. J. 2007. What's the Difference? Diversity Constructs as Separation, Variety, or Disparity in Organizations. *Academy of Management Review,* 32(4): 1199–1228. http://doi.org/10.5465/AMR.2007.26586096

Knockaert, M., Ucbasaran, D., Wright, M., & Clarysse, B. 2011. The Relationship between Knowledge Transfer, Top Management Team Composition, and Performance: The Case of Science-Based Entrepreneurial Firms. *Entrepreneurship Theory and Practice,* 35(4): 777–803. http://doi.org/10.1111/j.1540-6520.2010.00405.x

Kollmann, T., Christofor, J., & Kuckertz, A. 2007. Explaining Individual Entrepreneurial Orientation: Conceptualisation of a Cross-Cultural Research Framework. *International Journal of Entrepreneurship and Small Business,* 4(3): 325–340. https://doi.org/10.1504/IJESB.2007.013255

Krueger, N. F., Reilly, M. D., & Carsrud, A. L. 2000. Competing Models of Entrepreneurial Intentions. *Journal of Business Venturing,* 15(5-6): 411–432. http://doi.org/10.1016/S0883-9026(98)00033-0

Kummer, J., Funke, T., Amrheim, A.-G., & Müller, M. 2016. *Gründungen scheitern nicht am Team, sondern im Team: Studie zu Herausforderungen für Startup-Teams.* Berlin: Federal Ministry of Economics and Technology (Germany). https://www.rkw-kompetenzzentrum.de/gruendung/studie/gruendungen-scheitern-nicht-am-team-sondern-im-team/

Langkamp Bolton, D., & Lane, M. D. 2012. Individual Entrepreneurial Orientation: Development of a Measurement Instrument. *Education + Training,* 54(2/3): 219–233. https://doi.org/10.1108/00400911211210314

Link, A. N., Siegel, D. S., & Wright, M. 2015. *The Chicago Handbook of University Technology Transfer and Academic Entrepreneurship.* Chicago, IL: The University of Chicago Press.

Malewicki, D. S. 2005. Member Involvement in Entrepreneur Network Organizations: The Role of Commitment and Trust. *Journal of Developmental Entrepreneurship,* 10(02): 141–166. http://doi.org/10.1142/S1084946705000112

Mayring, P. 2010. *Qualitative Inhaltsanalyse: Grundlagen und Techniken.* Weinheim, Germany: Beltz.

Meyer, J. P., & Herscovitch, L. 2001. Commitment in the Workplace: Toward a General Model. *Human Resource Management Review,* 11(3): 299–326. http://doi.org/10.1016/S1053-4822(00)00053-X

Montoya-Weiss, M. 1994. Determinants of New Product Performance: A Review and Meta-Analysis. *Journal of Product Innovation Management,* 11(5): 397–417. http://doi.org/10.1016/0737-6782(94)90029-9

Mowday, R. T., Steers, R. M., & Porter, L. W. 1979. The Measurement of Organizational Commitment. *Journal of Vocational Behavior,* 14(2): 224–247. http://doi.org/10.1016/0001-8791(79)90072-1

Muzyka, D., Birley, S., & Leleux, B. 1996. Trade-Offs in the Investment Decisions of European Venture Capitalists. *Journal of Business Venturing,* 11(4): 273–287. https://doi.org/10.1016/0883-9026(95)00126-3

Nickerson, J. A., & Zenger, T. R. 2004. A Knowledge-Based Theory of the Firm? The Problem-Solving Perspective. *Organization Science,* 15(6): 617–632. https://doi.org/10.1287/orsc.1040.0093

Page, S. E. 2007. *The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies.* Princeton, NJ: Princeton University Press.

Parente, R., & Feola, R. 2013. Entrepreneurial Intent and Entrepreneurial Commitment of Young Researchers. *International Journal of Technology Management & Sustainable Development,* 12(2): 155–166. http://doi.org/10.1386/tmsd.12.2.155_1

Pelled, L. H., Eisenhardt, K. M., & Xin, K. R. 1999. Exploring the Black Box: An Analysis of Work Group Diversity, Conflict, and Performance. *Administrative Science Quarterly,* 44(1): 1–28. http://doi.org/10.2307/2667029

Rasmussen, E., & Wright, M. 2015. How Can Universities Facilitate Academic Spin-Offs? An Entrepreneurial Competency Perspective. *The Journal of Technology Transfer,* 40(5): 782–799. http://doi.org/10.1007/s10961-014-9386-3

Ritchie, J., Lewis, J., Nicholls, C. M., & Ormston, R. 2013. *Qualitative Research Practice: A Guide for Social Science Students and Researchers* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Schmidt, J. B., & Calantone, R. J. 2002. Escalation of Commitment during New Product Development. *Journal of the Academy of Marketing Science,* 30(2): 103–118. https://doi.org/10.1177/03079459994362

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Shapero, A., & Sokol, L. 1982. The Social Dimensions of Entrepreneurship. In C. Kent, D. L. Sexton, & K. H. Vesper (Eds.), *Encyclopedia of Entrepreneurship:* 72–90. Englewood Cliffs, NJ: Prentice Hall.

Siegel, D. S., & Wright, M. 2015. Academic Entrepreneurship: Time for a Rethink? *British Journal of Management,* 26(4): 582–595. http://doi.org/10.1111/1467-8551.12116

Silva, J. 2004. Venture Capitalists' Decision-Making in Small Equity Markets: A Case Study Using Participant Observation. *Venture Capital,* 6(2-3): 125–145. http://doi.org/10.1080/13691060410001675974

Sinell, A., Heidingsfelder, M., & Schraudner, M. 2015. Entrepreneurship and Academic Employment – More Alike than You'd Think. *Journal of Technology Management & Innovation,* 10(3): 1–10. http://dx.doi.org/10.4067/S0718-27242015000300001

Tasnim, R., & Singh, H. 2016. "What, Exactly, is Entrepreneurial Commitment?": Modeling the Commitment of Successful Entrepreneurs. *Journal of Applied Management and Entrepreneurship,* 21(3): 6–35. https://doi.org/10.9774/GLEAF.3709.2016.ju.00003

Tasnim, R., Yahya, S., & Zainuddin, M. N. 2014. "I'm Loving It!" What Makes the Successful Entrepreneur Affectively Committed to Entrepreneurial Performance? *Journal of Applied Management and Entrepreneurship,* 19(2): 27–52. http://doi.org/10.9774/GLEAF.3709.2014.ap.00004

Visintin, F., & Pittino, D. 2014. Founding Team Composition and Early Performance of University—Based Spin-Off Companies. *Technovation,* 34(1): 31–43. http://doi.org/10.1016/j.technovation.2013.09.004

Vohora, A., Wright, M., & Lockett, A. 2004. Critical Junctures in the Development of University High-Tech Spinout Companies. *Research Policy,* 33(1): 147–175. http://doi.org/10.1016/S0048-7333(03)00107-0

Yin, R. K. 2009. *Case Study Research: Design and Methods* (4th ed.). Thousand Oaks, CA: Sage Publications.

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> *"Even if the relationship between us and our university partner has been primarily a research collaboration serving our R&D, the educational dimension of this collaboration has also been very important in developing us new skills and competences in new fields. Thus, by involving with educational activities, we have enabled efficient knowledge transfer from the academic world to our own R&D."*
>
> Technology Manager
> Case company D

The positive link between university research and industrial innovation has been widely recognized among academics and industrial practitioners. A remarkable volume of previous research emphasizes the importance of the transfer of academic knowledge into the industrial domain. In this sense, it is surprising that the role of university education is an almost neglected topic in the research concerning university–industry collaboration, despite education and the creation of knowledge being a primary goal of universities and providing great potential in terms of improving competences. This study presents a case study that analyzes educational involvement in nine long-term university–industry relationships. In all the cases, the research collaboration between industrial firm and university research group is directly associated with close educational involvement. The aim of the case analysis is to understand mechanisms and practices of educational collaboration that facilitate relational learning and innovation development in university–industry relationships. The forms of educational involvement studied in this article include student projects, thesis projects, jointly organized courses, and tailored degree courses. The findings of the study reveal a number of educational collaboration practices that may facilitate relational learning, creation of new knowledge, as well as innovation development in university–industry relationships.

Introduction

Previous research has shown that innovative research collaboration between universities and industrial firms may effectively facilitate shared knowledge creation, learning, and joint innovation and, therefore, it acts as a stimulator of economic growth (Laursen & Salter, 2004; Weckowska, 2015). University–industry relationships typically involve collaborative research, contract research, educational collaboration, personnel mobility, or contracting (D'Este & Patel, 2007; Perkmann et al., 2013). Whereas the importance of the transfer of academic knowledge into the industrial domain has been highlighted in previous research (e.g., Ankrah & Al-Tabbaa, 2015; Perkmann et al., 2013), educational collaboration taking place as a part of university–industry research collaborations is an almost neglected topic. This is surprising, because education and the creation of knowledge is a primary goal of universities, and involvement in academic educational activities is a source of great potential in terms of improving the competences of firms seeking new skills and competences (Santoro & Chakrabarti, 1999) or wishing to develop their own internal capabilities. Indeed, previous studies on university–industry relationships mention education, training, and student projects as potential academic opportunities for industrial actors participating in university–industry relationships, for facilitators of a deepening academic engagement between the parties (Arvanitis et al., 2008; Bruneel et al., 2010; Perkmann et

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al., 2013), and for contributors to the creation of joint knowledge (Weckowska, 2015). However, prior understanding of *how* educational activities contribute the creation of joint knowledge and learning in university–industry relationships is very limited.

Educational collaboration can be defined as interactions between academic institutions and non-academic organizations involving academic educational activities. Thus, educational collaboration in university–industry relationships may consist of joint educational activities, training, or different kinds of student projects (Arvanitis et al., 2008; Bruneel et al., 2010; Maietta, 2015; Perkmann et al., 2013), all taking place in the relationships between academia and industry. To understand the facilitating practices of educational collaboration in university–industry relationships, this article uses the theory of relational joint learning (Kuwada, 1998; Selnes & Sallis, 2003) as a theoretical framework. The relational learning approach has so far received relatively little research interest in the context of university–industry relationships (Weckowska, 2015), despite scholars showing that the learning process that takes place in collaborative relationships is an essential enabler of joint innovation involving knowledge creation, transfer, interpretation, and utilization (Bäck & Kohtamäki, 2016; Selnes & Sallis, 2003). Moreover, the innovativeness of firms participating in university–industry relationships has been shown to be dependent on how successful they are at acquiring and developing knowledge through learning in these collaborative relationships (Bruneel et al., 2010; Laursen & Salter, 2004). This study intends to answer the following research question: *How can educational collaboration facilitate relational learning and knowledge creation in university–industry relationships?* To address this question, this article presents nine case examples of successful educational involvement in long-term university–industry research collaboration.

Relational Learning in University–Industry Relationships

The learning process taking place in relationships between industry and universities has been recognized as an essential facilitator of the transfer and integration of new, external knowledge in firms. This relational learning process also helps partners to jointly build new internal capabilities for innovation and to identify ways of joint knowledge development and utilization towards commercial ends (Weckowska, 2015). In this study, the relational learning approach is applied to the collaboration taking place in university–industry relationships. Selnes and Sallis (2003) define relational learning as a joint activity between two parties, in which they share information, which is then jointly interpreted and integrated into a shared relationship domain-specific memory. Thus, the relational learning process consist of three interconnected phases in which the research partners "1) share knowledge, 2) jointly make sense of it, and 3) integrate that knowledge into relational memory" (Selnes & Sallis, 2003). In the first phase, *knowledge sharing,* the partners share and transfer information and knowledge in formal and informal manners within their relationship. In the context of university–industry relationships, the process of knowledge transfer from academia to industry has been studied by several teams of researchers (e.g., Ankrah et al., 2013; D'Este & Patel, 2007; Siegel et al., 2004). Typical forms of knowledge transfer include jointly organized research projects, training and education, consulting engagements, or thesis supervision. The transfer of technological knowledge is an important part of the relational learning process, because innovative collaboration involves close sharing of experience-based specialized knowledge that is often tacit in nature. In the second phase, *joint sensemaking,* the partners work together to achieve a mutual understanding, create new knowledge, and solve practical problems in their common development work (Selnes & Sallis, 2003). Thus, the joint sensemaking combines the resources, competences. and previous knowledge of the partners to jointly develop new knowledge that is typically relationship specific and thus difficult to utilize outside the partnership. The third phase, *knowledge integration,* refers to the integration of the jointly developed knowledge, capabilities, and skills into a part of the relational memory owned by the partners. In university–industry collaboration, the partners often integrate the outcomes of their joint development processes as commercialized innovations, prototypes, or academic outcomes (Perkmann et al., 2013).

Case Study on Educational Involvement in University–Industry Relationships

To explore the involvement of industrial firm in university education as a part of their innovation collaboration with universities, this study presents a comparative, qualitative multiple case study of nine long-term university–industry relationships in Finland (Table 1). The cases were selected purposively following the concept of information-rich cases (Patton, 1990). Thus, all nine cases represented a close and long-term collaboration between a university research group (typically led by a professor or assistant professor) and an industrial firm's R&D function. All the cases also included educational collaboration that has directly contributed to the rela-

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Table 1. Case study descriptions for the studied relationships between universities and industrial partners

	Industrial Area	Relationship Age	Joint R&D Project Area	Forms of Educational Collaboration	Industry Participants	University Participants
Case A	Electronic and electrical systems	4 years	Process development for R&D function	Student projects	R&D Director	Leader of the research group
Case B	Mobile devices	5 years	Software and algorithm development	Student projects, Thesis projects, Jointly organized courses	Research Manager	Leader of the research group
Case C	Software products	4 years	Software and algorithm development	Student projects, Thesis projects	Project Manager	Leader of the research group
Case D	Software for mobile devices	5 years	Algorithm development	Tailored degree courses, Thesis projects, Jointly organized courses	Technology Manager	Leader of the research group
Case E	Hardware platforms and embedded software	5 years	Software development	Student projects, Thesis projects	R&D Manager	Leader of the research group
Case F	Power electronics products	13 years	Hardware and related embedded software development	Tailored degree courses, Thesis projects	Senior Director, Global Innovation	Leader of the research group
Case G	Telecoms	3 years	Service product development	Student projects, Thesis projects	Development Director	Leader of the research group
Case H	Engines and power plants	5 years	Service product development	Student projects, Thesis projects	Business Development Director	Leader of the research group
Case I	Heating systems	6 years	Service product development	Student projects	R&D Director	Leader of the research group

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tional learning outcomes and innovation capabilities developed in the relationships. In most of the university–industry relationships studied, the collaboration had started as a research collaboration and the educational aspects evolved gradually over the years of collaboration. The data was collected on each case by means of recorded and transcribed interviews and the analysis of secondary materials, such as websites, company reports, and teaching materials. Each of the case interviews involved an interviewee on both sides of each case relationship, and all the interviewees were the key contributors to the relationship who also had directly participated in the educational aspects throughout the collaboration. To maintain confidentiality of the interview data, the interviewees are identified only by position (university=UNIV; industry=IND). The structure of the interviews were divided into three parts following the three phases of relational learning: 1) knowledge sharing, 2) joint sensemaking, and 3) knowledge integration. The interview data revealed that the educational collaboration in the selected university–industry relationships included the following four forms of educational collaboration:

1. *Student projects for groups of undergraduate students.* The projects were usually organized by universities as a part of their curriculum. The topics of the projects were initiated by the research project on university–industry relationships, and they were jointly supervised by industrial and university staff.

2. *Thesis projects.* Thesis projects were typically related to Master's or PhD theses. In this case, relevant thesis topics were also usually initiated by the research project, and they were co-supervised by university professors and industrial managers.

3. *Tailored degree courses.* The courses were organized by the university in cases where the industrial partner needed certain types of unique skills; that partner would then often provide employment opportunities for students who had passed these courses. The industrial partner's own R&D staff also frequently taught and studied on these courses.

4. *Jointly organized courses.* These courses were organized jointly by the university and the industrial partner around the central topics related to the project on university–industry relationships. The teaching was organized jointly by university researchers and industrial R&D staff. The audience for the course was typically undergraduate or postgraduate students from the university, as well as industrial R&D staff.

Results

This section presents an analysis of the interview data collected from each case in terms of knowledge sharing, joint sensemaking, and knowledge integration. At the end of this section, Table 2 summarizes the key findings.

Knowledge sharing

Transferring knowledge is one the primary drivers of innovation in inter-organizational collaboration (Tsai, 2001) in which both partners have to share their own previous knowledge and information that can often be tacit or experimental in nature. However, information sharing between partners requires an open and trusted atmosphere, particularly given that the information owned by the industrial actor in the relationship has both economic value and potential competitive advantage (Santoro & Saparito, 2003). Therefore, the knowledge sharing and transfer in university–industry relationships requires engagement and commitment to the collaboration from both parties (Ankrah et al., 2013). The interview data showed that efficient knowledge transfer in the educational collaboration was based on long-term and close collaboration and person-level relationships between industrial actors and universities:

> *"Our research collaboration started some years ago, and it has been gradually extended as good results have been achieved, and people from both sides have become more familiar to each other. We started to participate to the educational activities quite recently, since we felt that it could support our research collaboration."* (IND G)

> *"I feel that long-term personal relationships between the industrial partner's R&D staff and our researchers represent one of the most critical facilitators of close collaboration and open communication in this relationship."* (UNIV D)

The interview data also revealed that perhaps the most important form of educational knowledge transfer in the cases studied is different kinds of thesis projects:

> *"In our joint research projects, thesis projects were carried out from the beginning, but other forms of educational collaboration started after the collaboration had been ongoing for quite some time."* (IND B)

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> *"I try to find competent students to who will base their theses (at both Master's and PhD levels) within the industrial projects around practical themes that really benefit our industrial partner. This way, the students become integrated into the industrial way of working, and many of them have also continued to work as employees of the industrial partner after graduation."* (UNIV F)

The interview data also revealed that thesis projects can only be successful when the student writing the thesis is able to obtain relevant and good-quality supervision from both sides of the relationship. Here, again, the role of a trustful and close collaboration between universities and industry is emphasized (Santoro & Saparito, 2003):

> *"Joint supervision also involves a great deal of direct interaction between us and the industrial partner, which can also generate new ideas and valuable knowledge transfer outside of the thesis project."* (UNIV D)

> *"Many times, a thesis project has paved the way to a wider joint research project between us and our industrial partner."* (IND E)

> *"Based on my experience, even a competent Master's student with a relevant background needs supervision from both university professors and the industrial partner to reach a successful outcome in their thesis project."* (IND F)

The interview data in cases B and D also emphasizes the meaning of jointly organized courses in knowledge transfer between parties. The idea behind this kind of joint education is to involve both university staff and industrial R&D specialists both as lecturers and participants in the course, and in this manner provide both parties education on a new and important topic. Based on the interviews, these kinds of courses seem to be an effective way of gaining knowledge and skills in a new research area on both sides of the relationship:

> *"We have jointly organized courses with academia on central topics of our R&D. The idea is to invite lecturers from both our organization and from our university partner to give lectures on the topic, which we then discuss together. The audience of the courses includes our R&D staff and university researchers and students. Personally, I feel that this kind of joint working is a really effective way of gaining knowledge on the area in question, and it definitely benefits both parties."* (IND B)

> *"Feedback from students and researchers regarding these courses has been outstanding."* (UNIV B)

> *"The joint courses provide us as researchers, and also our students, with an excellent opportunity to apply our knowledge in a practical industrial context, to learn practical viewpoints and also to initiate new research directions together with industry."* (UNIV D)

The interview data in cases B and D also shows that the joint educational activities have improved the knowledge transfer, interaction, and communication between the partners also outside the course activities. This is because the courses usually involve new people in the collaboration from both sides and help them to connect. This, in turn, often facilitates the development of new ideas and initiatives for further research directions:

> *"Several kinds of excellent ideas have been born during the discussions at these courses."* (IND D)

Joint sensemaking

The development of new knowledge, ideas, and innovations in the collaborative relationship takes place in the process of joint sensemaking (Selnes & Sallis 2003). In this process, the academic and industrial partners jointly work on development tasks in order to solve technical problems and other tasks related to their mutual development projects (Bäck & Kohtamäki, 2016). In this effort, the partners can bring their own skills, knowledge, and earlier experience to the collaborative process and jointly create new, experimental knowledge. In the context of educational involvement, different kinds of student projects represent a central form of joint sensemaking between universities and industry. The purpose of the student projects is to involve university students in building a project around subjects provided by industry so that they can utilize their studies and apply the studied content in practice. The interview data confirms that this kind of practical learning procedure can facilitate learning within the relationship and the joint development of innovations (Brown & Duguid, 1991):

> *"I have been teaching and supervising the student groups undertaking these practical projects for several years. In my opinion, students are very motivated to work on these projects. The students are particularly eager to collect information and use their knowledge to solve problems provided by the industrial partner, especially when it also involves this work."* (UNIV A)

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> *"The results of the development work in the student work were so beneficial to our own development work that we decided to continue this kind of collaboration with our university partner from year to year."* (IND I)

Thus, the interview data emphasized the importance of student projects as a valuable research resource in the joint research projects. The industrial actors especially appreciated the student groups' ability and eagerness to provide the firms with new views, ideas, and insights on the novel areas that were not so familiar to the firms' internal development staff:

> *"For us, student projects provide new and fresh insights, views, and ideas to support our own development work. They also increase our knowledge in the areas dealt with by the project work topics."* (IND H)

Another area that arose in the interviews was the student groups' ability to collect and analyze valuable field data on, for example, customer experience, trends, and behaviour:

> *"It was a surprise to us how much valuable customer information and how many development ideas the student groups can collect in these projects. During their joint discussions with us, we can develop these ideas together in a way that really contributes to our internal R&D."* (IND E)

> *"The student groups have provided us with a lot of very useful information that would have been difficult to collect by ourselves."* (IND H)

However, the majority of the interviewees also recognized that the student project work can only be successful when is properly guided and supervised by both industrial and academic parties:

> *"The university student groups are really a good and valuable resource, especially if both we and the university research staff have enough time to supervise them in the right direction."* (IND B)

> *"We have achieved good results from student projects, especially with tasks where the projects are designed around a practical problem that somehow fits into the competence profiles and background of the students. Naturally, we have to put in extra effort to guide this work, but in any case it is a great learning experience for all of us."* (UNIV A)

Another educational aspect of the collaboration includes dedicated degree courses for university students. The motivation behind these courses is usually a practical need for certain specific and unique skills that the industrial partner is lacking. The partner university then organizes this kind of education for its students, who were typically near to graduation:

> *"We have tried to answer to our industrial partner's educational needs by providing our students with courses containing dedicated content. It was also quite common for the industrial partner's internal R&D staff to attend these courses, either as audience members or as lecturers or supervisors."* (UNIV F)

> *"Opportunities to participate and give input to the degree courses provided by the university have been important to our R&D. This way, we have been able to recruit graduates with a certain important competences."* (IND D)

In some cases, the industrial partner has also provided teaching materials or tools to support university education in the selected field:

> *"We have provided our internal software development and testing environment targeted for experimenting with different kinds of new ideas for the use of universities, so that students can test their own ideas as part of their courses in this field."* (IND B)

> *"The materials provided by the industrial partner, as well as the experiences from our joint projects, are very valuable practical teaching materials."* (UNIV D)

This collaboration on dedicated degree courses is also important in terms of knowledge transfer, because many of the students who passed these courses ended up becoming employees of the companies:

> *"During these years of university collaboration, we have employed a number of students in this field after their graduation."* (IND F)

> *"A significant number of our previous students, on both Master's and Doctoral levels, now work as members of the industrial partner's R&D staff."* (UNIV F)

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Knowledge integration

The third part of the relational learning process (Selnes & Sallis, 2003) is related to the knowledge integration and implementation. The knowledge integration in university–industry relationships may involve the industrial commercialization of jointly developed innovations or technological solutions, such as commercialized product, process or service innovations, prototypes or other practical outcomes of the joint development work (Perkmann et al., 2013). In the case interviews, the interviewees were asked about the practical outcomes of the educational collaboration:

> *"The students should be able to present and document their project outcomes in a way that our internal developers can utilize them."* (IND E)

> *"I know that many university professors appreciate academic outcomes such as publications more than practical ones, but I feel that the industrial collaboration project is only successful when the results can really be utilized in industry."* (UNIV A)

Thesis projects and student group projects are typical examples of educational outcomes that have practical value for industry. However, the interview data shows that the results can be utilized only when they are presented in a practical manner:

> *"From our point of view, the outcomes of the student projects should not be scientific reports, but instead well-documented and implemented demonstrations of the developed methods that are both easy to understand and to further develop within our organization."* (IND A)

> *"A well-made Master's thesis project has been the starting point for many successful internal R&D projects."* (IND F)

> *"Even if a Master's or doctoral thesis is the primary result of academic work, we encourage students contributing to the industrial projects to write their documentation in such a way that it also meets the industrial partner's needs."* (UNIV F)

One effective way to integrate the results of educational involvement is to also employ the students in the industrial implementation process. Thus, in all of the university–industry relationships studied in this article, the industrial partners have employed the students who contributed to their projects after their graduation:

> *"Many project or thesis workers have continued to work on their topic as part of our R&D organization."* (IND B)

> *"Several of our previous students who contributed to the industrial partner's research projects in some way have been employed by the company."* (UNIV C)

> *"Experience has shown that one of the most effective ways of integrating research-based knowledge to our industrial goals is to recruit the person who has studied the topic within a university research group."* (IND D)

Thus, boundary spanning activities in the relationship between scientists and industry (Siegel et al., 2004) represent an important way of integrating the knowledge obtained in educational collaboration within university–industry relationships.

Conclusion

This study presented a qualitative analysis of nine cases of educational involvement in university–industry research collaboration. The main goal of the study was to analyze the mechanisms and practices that are related to the educational aspects of this collaboration. The empirical analysis presented in the article indicates that this collaboration provides a number of factors that may facilitate relational learning, collaborative practices, and the creation of new knowledge in university–industry relationships, as summarized in Table 2. First, when industrial firms are given the opportunity to employ university students in their research projects in parallel with university research staff, many kinds of practical benefits can be achieved. For instance, almost all of the industrial managers interviewed mentioned university student projects as a valuable channel for new ideas, insights to customer experience and behaviour, as well as being an efficient way of recruiting competent R&D staff to companies. Particularly, the recruitment of graduates with specific competences obtained in the university research projects has proved to be a very efficient way of transferring academic knowledge to industry. Second, jointly organized educational activities, such as training courses targeted to both university students and company internals, are an efficient method of gaining internal skills for the company and absorbing new information from the academic world. In a similar manner, these activities provide universities with access to real-world industrial R&D work and

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Table 2. A summary of the main findings of this study on university–industry relationships

	Knowledge Sharing	Joint Sensemaking	Knowledge Integration
Student Projects	• An effective method for transferring practical knowledge from research or the field	• Establish interaction between the students and industrial partner • Joint efforts to solve practical industrial problems • Provide new insights and fresh ideas "from the outside world"	• Provide practical results • Involvement in industrial implementation
Thesis Projects	• An important way of transferring practical academic knowledge • Joint supervision of theses facilitates university–industry collaboration and interaction	• Open new development areas • Deepen university–industry collaboration • Provide industrial partner with easy opportunities to collaboration with research groups	• Clear documentation facilitates industrial utilization • Employing the graduate is an easy way of integrating the knowledge into industry
Tailored Degree Courses	• Are able to facilitate gaining new academic competences and resources that can be accessed by industry	• Joint working and discussions in the courses facilitate joint knowledge creation and deepen research-based collaboration	• Integrating the new competences through recruitments
Jointly Organized Courses	• Represent an effective way of gaining knowledge and competences in a new research area (on both sides of the collaboration)	• Joint working and discussions in the courses facilitate joint knowledge creation and deepen research-based collaboration	• Implementing the most promising ideas developed in the coursework

the challenges that come with it. Third, the interview data revealed that all educational activities involving industrial partners facilitate research-based information transfer from academia to industry, and they help industrial partners to efficiently utilize this information. This transfer is particularly important when the industrial partner needs to improve its skills in new, knowledge-intensive areas. Fourth, educational collaboration deepens research-based collaboration between academia and industry, which helps both sides to develop similar attitudes and arrive at a mutual understanding regarding the research process and collaborative practices.

The findings of the study are also of managerial interest given that most high-technology companies utilize collaborative university partnerships for their innovation and product development work, and thus face the challenge of utilizing the results achieved in this collaboration. This study presents a variety of collaborative practices that include educational involvement and that have a positive impact on these research collaborations, especially in terms of relational learning, knowledge creation, and commitment to the collaboration.

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About the Author

Leena Kunttu is an innovation researcher at the University of Vaasa in Finland. She received her PhD degree in Information Technology from the Tampere University of Technology, Finland, in 2006. From 2007 to 2012, she served as Senior Manager in an area of innovation at the Nokia Corporation. During her career in Nokia, she led a number of collaborative projects between the company and external research institutes, such as universities. She also led and participated in projects that collected and analyzed field data from end users and customers to provide inputs for R&D. Since 2015, Dr. Kunttu has served as a researcher in the area of innovation at the University of Vaasa, while also carrying out PhD studies in industrial innovation. Her current research interests include university–industry collaboration, educational involvement, and the commercialization of university technologies.

References

Ankrah, S., & Al-Tabbaa, O. 2015. Universities–Industry Collaboration: A Systematic Review. *Scandinavian Journal of Management,* 31(3): 387–408. http://doi.org/10.1016/j.scaman.2015.02.003

Ankrah, S. N., Burgess, T. F., Grimshaw, P., & Shaw, N. E. 2013. Asking Both University and Industry Actors about Their Engagement in Knowledge Transfer: What Single-Group Studies of Motives Omit. *Technovation,* 33(2–3): 50–65. http://doi.org/10.1016/j.technovation.2012.11.001

Arvanitis, S., Kubli, U., & Woerter, M. 2008. University–Industry Knowledge and Technology Transfer in Switzerland: What University Scientists Think about Co-Operation with Private Enterprises. *Research Policy,* 37(10): 1865–1883. http://doi.org/10.1016/j.respol.2008.07.005

Bäck, I., & Kohtamäki, M. 2016. Joint Learning in Innovative R&D Collaboration. *Industry and Innovation,* 23(1): 62–86. http://doi.org/10.1080/13662716.2015.1123613

Brown, J. S., & Duguid, P. 1991. Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation. *Organization Science,* 2(1): 40–58. https://doi.org/10.1287/orsc.2.1.40

Bruneel, J., D'Este, P., & Salter, A. 2010. Investigating the Factors that Diminish the Barriers to University–Industry Collaboration. *Research Policy,* 39(7): 858–868. http://doi.org/10.1016/j.respol.2010.03.006

D'Este, P., & Patel, P. 2007. University–Industry Linkages in the UK: What Are the Factors Underlying the Variety of Interactions with Industry? *Research Policy,* 36(9): 1295–1313. http://doi.org/10.1016/j.respol.2007.05.002

Kuwada, K. 1998. Strategic Learning: The Continuous Side of Discontinuous Strategic Change. *Organization Science,* 9(6): 719–736. https://doi.org/10.1287/orsc.9.6.719

Laursen, K., & Salter, A. 2004. Searching High and Low: What Types of Firms Use Universities as a Source of Innovation? *Research Policy,* 33(8): 1201–1215. http://doi.org/10.1016/j.respol.2004.07.004

Maietta, O. W. 2015. Determinants of University–Firm R&D Collaboration and Its Impact on Innovation: A Perspective from a Low-Tech Industry. *Research Policy,* 44: 1341–1359. http://doi.org/10.1016/j.respol.2015.03.006

Patton, M. Q. 1990. *Qualitative Evaluation and Research Methods.* London: Sage Publications.

Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D'Este, P., Fini, R., Geuna, R., Hughes, A., Krabel, S., Kitson, M., Llerena, P., Lissoni, F., Salter, A., & Sobrero, M. 2013. Academic Engagement and Commercialisation: A Review of the Literature on University–Industry Relations. *Research Policy,* 42(2): 423–442. http://doi.org/10.1016/j.respol.2012.09.007

Santoro, M. D., & Chakrabarti, A. K. 1999. Building Industry–University Research Centers: Some Strategic Considerations. *International Journal of Management Reviews,* 1(3): 225–244. http://doi.org/10.1111/1468-2370.00014

Santoro, M. D., & Saparito, P. 2003. The Firm's Trust in Its University Partner as a Key Mediator in Advancing Knowledge and New Technologies. *IEEE Transactions on Engineering Management,* 50(3): 362–373. https://doi.org/10.1109/TEM.2003.817287

Selnes, F., & Sallis, J. 2003. Promoting Relationship Learning. *Journal of Marketing,* 67(3): 80–95. https://doi.org/10.1509/jmkg.67.3.80.18656

Siegel, D. S., Waldman, D. A., Atwater, L. E., & Link, A. N. 2004. Toward a Model of the Effective Transfer of Scientific Knowledge from Academicians to Practitioners: Qualitative Evidence from the Commercialization of University Technologies. *Journal of Engineering and Technology Management,* 21(1-2): 115–142. http://doi.org/10.1016/j.jengtecman.2003.12.006

Tsai, W. 2001. Knowledge Transfer in Intraorganizational Networks: Effects of Network Position and Absorptive Capacity on Business Unit Innovation and Performance. *Academy of Management Journal,* 44(5): 996–1004. http://doi.org/10.2307/3069443

Weckowska, D. M. 2015. Learning in University Technology Transfer Offices: Transactions-Focused and Relations-Focused Approaches to Commercialization of Academic Research. *Technovation,* 41–42: 62–74. http://doi.org/10.1016/j.technovation.2014.11.003

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Innovation by Collaboration between Startups and SMEs in Switzerland

Fabio Mercandetti, Christine Larbig,
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> *"We cannot solve our problems with the same thinking we used when we created them."*
>
> Albert Einstein (1879–1955)
> Theoretical physicist and Nobel laureate (1921)

Open innovation is key to the success of many companies. It is based on the intelligent use of all possible resources, including collaborations with parties outside the firm. Although it is well known that large companies foster and use startups as experiments in their innovation process, little is known about similar activities with small and medium-sized enterprises (SMEs). The aim of this article is to report the results of research done in Switzerland on startups and SMEs. It reveals that most startups know that they must co-operate with other companies from the very beginning of their existence, and that both sides have difficulties in performing a systematic search for possible partners. Hence, to encourage the collaborative development of innovative solutions, we propose building bridges between startups and SMEs, making the identification of possible users of new technologies (SMEs) more accessible to startups, as well as making startups more identifiable by SMEs.

Introduction

Even though Albert Einstein was best known for his work in physics, many of his principles and practice of teaching are transferable to business. When he said that, "we cannot solve our problems with the same thinking we used when we created them", he was basically describing the ability to solve problems by "thinking outside the box", which is a competence that sets many startups apart from larger companies. Indeed, startups are seen as a potentially rich source of novel ideas by other companies seeking to bring innovations to market.

In Switzerland, large companies such as Swisscom or SBB offer startups platforms for developing innovative ideas (e.g., the Pirate Hub in Zurich; tinyurl.com/y96acyu3). Such companies consider it an affordable approach to scan the business environment and then identify and consequently exploit innovative ideas outside their established businesses. Often, they systematically seek startups and support them not only financially, but also by providing them with infrastructure, advice, and know-how. At the same time, startups seek support from large companies because the potential boosting effect appears to be substantial.

However, this article has a more narrow focus on systematic, contractually defined collaborative innovation activity between startups and small and medium-sized enterprises (SMEs). SMEs form the vast majority of commercial enterprises in Switzerland, where 99.7% of companies have fewer than 250 full-time employees (Swiss Confederation, 2014). Although much of the focus is on collaboration between startups and large companies, due to their economic weight, SMEs could support and collaborate with considerably more startups than large companies do. SMEs could then enhance their own innovation process with limited investments.

Despite the economic significance of SMEs, we are only aware of relevant studies by Lichtenthaler (2011) and Vanhaverbeke and colleagues (van de Vrande et al., 2009; Vanhaverbeke et al., 2012), who researched the practice of open innovation in SMEs and their collaborations with startups. Likewise, in Switzerland, cases of

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best practices of SMEs that innovate thanks to collaborations with startups are scarce. Given that the number of newly founded companies per year in Switzerland is substantial when compared to the country's size and exceeded 42,000 in 2014 alone (Swiss Confederation, 2014), it cannot be said that the substrate for such partnerships is missing. There must be other reasons that explain the low number of open innovation initiatives between Swiss startups and SMEs.

This research addresses how collaborations between startups and SMEs can be encouraged, and it presents measures to foster such collaborations. We review the theory and literature of open innovation and place it at the level of startups and SMEs. In addition, we focus on collaboration and the literature addressing SMEs' involvement of startups in their innovation process. Our research was conducted in the context of an industry project (Steiner, 2015) and a bachelor thesis (Tuozzo, 2016) at the Lucerne University of Applied Sciences and Arts (HSLU) in Switzerland.

Theoretical Background

This section provides a background to the study by including definitions of terms and concepts related to open innovation and collaboration among companies, and by referencing literature about how large companies and SMEs approach startups.

Open innovation and collaboration

Open innovation allows the incorporation of solutions and innovation in the form of ideas, products, or technologies that could not be generated by the organization on its own. Chesbrough and Crowther (2006) state that "firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology". The do-it-yourself approach in technology and research and development (R&D) is inadequate to compete within today's business environment: finding partners and collaborations is essential for organizations (Pénin et al., 2011). Consequently, collaboration with partners along the value chain does not only offer new competitive options, it also forces a firm to define what type of knowledge it needs to source from external partners and what internal knowledge might be licensed out or sold (Vanhaverbeke & Roijakkerspp, 2013).

The concept of open innovation comprises the exploitative and the explorative approaches to collaboration (Holmes & Smart, 2009):

- The exploitative approach is "the use and development of things already known" (Levinthal & March, 1993). That is, the approach involves a firm reinforcing its existing relationships to use and develop its current knowledge base. Given that firms can rely on prior experience and trust, the predictability, reliability, and efficiency of collaboration are enhanced (Lavie & Rosenkopf, 2006). Associated terms are: refinement, choice, production, efficiency, selection, implementation, and execution (March, 1991). Repetition-based improvement, experiential learning, and specialization are associated with exploitation (Lavie & Rosenkopf, 2006).

- The explorative approach in forming collaborations with new partners involves sharing and developing new knowledge outside the firm's own domain (Lavie and Rosenkopf, 2006). It is experimentation with new alternatives; in March's terms, it is "search, variation, risk taking, experimentation, play, flexibility, discovery, innovation". Although firms cannot rely on direct experience when collaborating with a new partner, searching for partners beyond a firm's immediate network offers new opportunities, but uncertainty and risks are definitively higher (Lavie & Rosenkopf, 2006).

Although Lavie and Rosenkopf (2006) state that a balance between the explorative and the exploitative approaches can be achieved, Holmes and Smart (2009) found that firms with a broad or an undefined engagement scope adopted an explorative approach to search for new innovation opportunities. Firms with a narrow engagement scope and with a predefined remit adopted the exploitative approach, using the skills and resources of their partners.

Innovation and startups

Startups are often pictured as freshly founded companies with creative youngsters in a garage developing mobile phone apps or high-tech gadgets. However, Ries (2011) notes that the size of the company and its industry sector do not belong to the definition of a startup: instead, innovation is at the heart of every startup. Thus, a refined definition of a startup is "a temporary organisation in search of a scalable, repeatable, profitable business model" (Blank & Bob, 2012).

Established firms – from small to large – operate in mature markets with known business models (Blank & Bob, 2012). They offer a product that is successful in the market and focus on optimization and efficient execution of operations. Startups instead are still seeking a

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business model and operate in a search mode, turning unknowns into knowns. Prior to market entry, startups are unaware of whether or not their ideas will work. It is about trial and error in situations of extreme uncertainty, seeking a feasible value proposition and a repeatable and scalable business model (Brikman, 2016). Complex processes, demanding influential customers, or the liability of fixed capital and human costs are foreign to startups. Due to startups' proximity to sources of technological knowledge, they are capable of experimenting with different approaches, enabling them to respond with agility to shifting needs (World Economic Forum, 2015). Hence, startups reach the market and produce profits considerably quicker than the innovation initiatives of established firms (Mocker et al., 2015).

Large firms collaborating with startups

A significant amount of the open innovation literature addresses technology-intensive firms and large corporations. They are aware of the concept of open innovation and consequently collaborate with other partners. Industry leaders such as Apple, BMW, Google, Netflix, and Procter & Gamble include innovation in their business strategies and embed innovation within their organizations. They proved that innovation is essential for organizations striving to maintain and develop a valuable competitive advantage (Ebert, et al., 2008). In this respect, John Chambers, former President of Cisco Systems stated, "open innovation offers the best platform for leveraging organisational science, knowledge, and experiential learning to foster rapid creative development, implementation, and new business leadership" (Creamer & Amaria, 2012).

Large firms offer startups business experience and economies of scale, open their working networks to them – including loyal customers and established suppliers – under the umbrella of a recognized image. Hence, startups can test their products for market fit in that environment and acquire additional expertise about the market and customer needs. This collaboration between "large firms and startups" is a special kind of open innovation, which according to research, has a positive effect on the performance of both startups and established firms (Mocker et al., 2015).

The innovation opportunity for SMEs collaborating with startups

Literature about open innovation addressing collaboration between startups and SMEs is scarce. Nevertheless, SMEs contribute considerably to employment opportunities in all countries, irrespective of the countries' income levels or location. According to the International Labour Office (2015), a sample of 18 countries by the Organisation for Economic Co-operation and Development (OECD) revealed that SMEs account for 63% of total employment. Indeed, in the Swiss economy, SMEs employ 68% of all employees (Swiss Confederation, 2014).

It becomes evident that, nowadays, no company can conduct all R&D activities in-house (Vanhaverbeke et al., 2012). For SMEs, the innovation process is impaired by limited financial means and competencies, by limited opportunities in recruiting specialists, by insufficient understanding of the newest technologies, and simply by the lack of time. Thus, SMEs need to collaborate with partners in order to remain innovative (Vanhaverbeke et al., 2012). Large companies demonstrate that collaborations with startups enable them to deepen their knowledge and to quickly grasp new opportunities. Therefore, collaboration with startups and young entrepreneurs can likewise contribute to strategic renewal and successful innovation at SMEs (Ketchen et al., 2007).

Research Method

In a first step, a quantitative approach was undertaken to measure the nature of open innovation initiatives among startups collaborating with SMEs. In total, 138 startup companies were sent a questionnaire to collect both qualitative and quantitative information, such as the timing of collaborations, successes and failures, as well as the rationale for each collaboration. Geographically, 111 companies were in the German-speaking part of Switzerland, whereas 27 in the French-speaking part, approximately reflecting the size of the respective regions. In total, 28 startups answered, which corresponds to 20% of the sample. This approach allowed objective reporting of reality, showing results with simple descriptive statistics (Davies, 2007). Qualitative information from the survey was useful to better understand the data provided and as a description of the resulting charts. It also led to the identification and selection of startups for a subsequent series of interviews, some of which are presented here as case studies.

In a second step, 20 interviews were conducted. The qualitative research method allowed the reconstruction of events by requiring the interviewee to give reasons, experiences, and explanations (Rubin & Rubin, 2005). The sample was divided into two subsample groups. The first subsample consisted of 15 startups working in the financial, food, furniture, graphics, microbiology, software, textile, and tourism sectors. For the second

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subsample, five SMEs working in the beverage, fashion, furniture, marketing, and software sectors were interviewed.

The adopted method of research for the interviews was semi-structured, allowing more space for the interviewees to answer on their own terms. However, the main questions were the same for both respective interview groups. Thus, the obtained answers from startups and SMEs allowed a comparison within and between both subsamples. For instance, startups and SMEs were asked about their cooperation efforts, their preferences in selecting a partner (for startups if it was preferably a large company or an SME), how they reached an appropriate partner, how they would rate their experience, and what were the results.

The analysis consisted of preparing the transcripts and coding the interviews by matching what the interviewees said with the relevant themes and concepts. Subsequently, a comparison of the themes and categories across the interviews was made to answer the research question in a way that allows the drawing of broader theoretical conclusions (Rubin & Rubin, 2005).

Findings: Openness of Startups towards Collaboration

Among the survey respondents, 60% were already cooperating with another company and another 20% intended to do so soon. This finding reveals how important collaboration is for startups.

Many startups entered co-operation agreements at a rather early stage of their company lifecycle: 55% did so within the first two years (Figure 1). Startups realized that being alone in the business arena is challenging for a newcomer with limited resources and experience. The reasons mentioned in favour of collaboration were: expected support in infrastructure, product development, production, or distribution (21%); a better image in the market (18%); know-how transfer on how to run a business (18%); and cost reduction opportunities (14%). The reasons mentioned against collaboration were: fear of losing freedom (36%); difficult co-operation and communication (29%); lack of trust (14%); and fear of potential conflicts (14%).

Finding an adequate partner was not always easy for the startups. Among those who found a partner, there was variation in their experiences, as depicted in Figure 2. However, finding an adequate partner did not usually occur through systematic searches. Most frequently, the partner was found within the startup's own network (73%), followed by business fairs (13%), advertisements in business papers (7%), and systematic search projects (7%). Unfortunately, startups and young entrepreneurs do not commonly possess strong networks.

The "top league" companies of the respective industry sector were targeted as partners in 85% of the cases. Nevertheless, startups were even open to collaboration with other startups in their quest for synergies. Working with a similarly minded company may accelerate the innovation efforts, thanks to high motivation, entrepreneurial

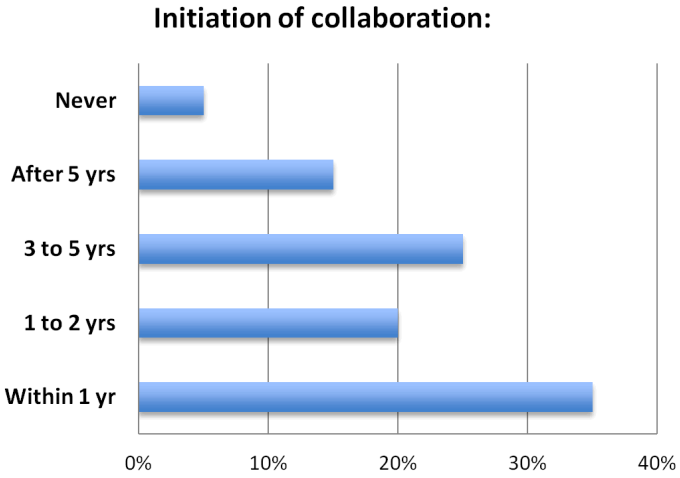

Figure 1. Survey results: when startups first started collaborating with other companies

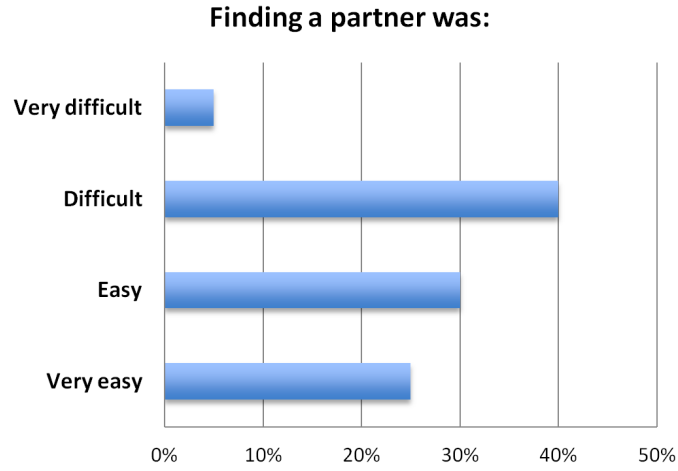

Figure 2. Survey results: how difficult it was for startups to find a partner company to collaborate with

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climate, and speed. However, startups did not immediately seek partners among SMEs. First, startups were not aware of them and second, startups feared that a small partner might not be stable enough over time.

Once they did find a partner, the majority of the startups surveyed reported positive experiences (see Figure 3) and could mention more than one positive aspect.

Findings: Collaborations between Startups and SMEs

When asked to provide a definition of the term "startup", the SME interviewees provided different understandings and associations, indicating different views of what a startup really is. Also, startups perceived resistance to collaboration from SMEs. In addition, SMEs emphasized the efforts required to collaborate, mentioning the fear of losing time and money as reasons for their reduced openness to risk. They mentioned their top target was the prevention of any negative impact on their business performance. Startups appeared venturesome in the area of collaboration, which is not in accordance with the security-focused mentality of the SMEs. Conversely, as demonstrated in the following successful cases of collaboration between startups and SMEs (Cases 1, 2, and 3), there were similarities in the rationale for seeking adequate innovation partners who are willing to collaborate in a successful and fruitful manner.

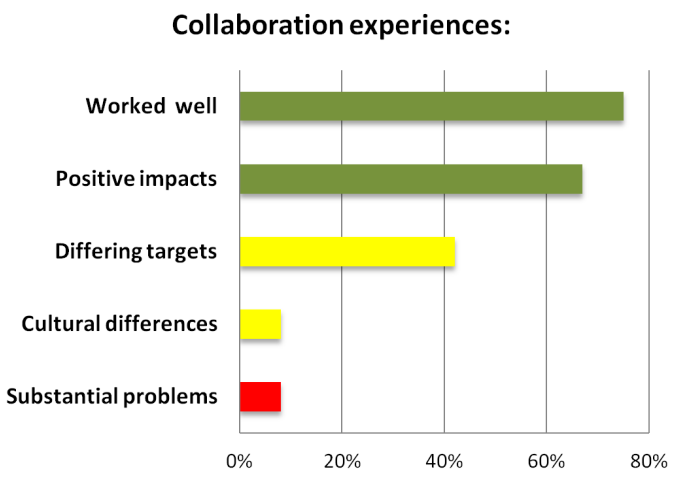

Figure 3. Survey results: how startups perceived the benefits and challenges of collaborating with another company

Rationale for collaboration

For both SMEs and startups, customer needs constituted the starting point. Finding a solution, solving problems quicker, achieving improved results, and meeting the customers' requests in time were at the forefront. The interviewees had a clear idea of how to meet such requests and were aware of their core capabilities, the complementary resources, and their missing knowledge. Thus, collaborations were considered as a good solution to satisfy such customers' requests and obtain synergies – such as know-how exchange and cost savings. Yet, although SMEs looked to collaborate only when a specific customer request pushed them beyond their own competence area, startups mentioned that collaborations constitute an integral part of their strategy. Consequently, startups more frequently sought partners without a specific customer request and early in their company life. The result was that cooperation agreements between startups and larger companies were more likely to happen than between startups and SMEs.

Finding a partner

In accordance with the findings above, both startups and SMEs initially used the recommendations from their existing network to find partners to collaborate with, followed by fairs and events – only rarely did they launch an organized search. This was due to lack of time and resources, but also arose from a conservative approach and desire to minimize risks. The key difference

Case 1. Rationale for collaboration

A successful spinoff of a university research project invented a bacterial detection process, useful in the biology and food industry, that was considerably quicker than previous ones. As a newcomer in business, it looked for partners within its own thankfully wide network of research institutes and related players. Specifically, it was seeking know-how and cost-reduction opportunities.

Hence, from the beginning, it initiated several agreements in different areas, such as with SMEs specialized in equipment, transportation of hazardous materials, and microbiology research. The owner did this systematically and tactically, approaching each collaboration like a project. At given milestones, he checked progress and, if a collaboration was not bringing results, it was attentively scrutinized and then possibly stopped.

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between the network of startups and the network of SMEs was structural. Although SMEs relied on long-standing business relationships, startups searched within their circle of friends and acquaintances. Indeed, if a large company might withstand failures, for startups or SMEs with little available resources, selecting the wrong partner could have dramatic consequences. This is why they stayed on familiar ground. However, opportunities for innovation were probably missed by only using their own networks, unless luck played a part.

Respective expectations about a successful collaboration

An essential aspect mentioned by all interviewees was the concept of give and take. Reciprocity and creating a win-win situation had significant importance. Openness, transparency, and flexibility were additional aspects expected by startups and SMEs in building long-term collaborations. Along with these aspects, business-related expectations were also relevant: firms expected to enlarge their customer base, improve profits, and increase their brand awareness when entering into collaborations. Startups considered team spirit and fairness to be key values in initiating collaborations.

Case 2. Finding a partner

Following completion of their Bachelor degrees, two recent graduates founded a startup with the aim to design and sell a high-performance, high-quality tool for the outdoor sports market. A business incubator gave them office space, where they started with conceptual and detailed design engineering, based on their computer-aided design (CAD) experience and on rapid prototyping using 3D printers. They initiated their first collaboration with an SME that performed mechanical work and assembly for third parties, and this SME was located in their same building. Thus, the partnership was not the result of a search, it was just luck and compatibility. This partner started producing parts for the startup while they produced technical drawings for the SME, resulting in more business for both. They found a second partner, a producer of industrial 3D plastic parts, at a business fair. This collaboration increased the number of orders as well as the exchange of know-how.

Both collaborations took place at the very beginning of the startup's lifecycle; were set for the long-term; were built on trust, seeking synergy, and the transfer of know-how; and were successful.

Decisions were almost always made based on soft factors such as perceived compatibility, a reliance on personal intuition, and a perception of "the right chemistry" between partners.

It is important to emphasize that, although SMEs demonstrated a willingness to open up to external innovation, their internal time-consuming procedures and the differences in expectations often impeded successful collaborations with startups. Hierarchical structures and the difficulty of finding people responsible for taking decisions were inadequate when working with fast-moving entrepreneurs. One startup mentioned a case where 17 signatures were required within a firm in order to obtain approval, which unduly delayed the process. Also, the expectations were transmitted with insufficient clarity and transparency to the person responsible within the SME organization. Moreover, an absence of structure in the SMEs was stressed as an issue by startups and by SMEs. The interviewees referred to this as an impediment to initiating collaborations in the right place at the right time.

In contrast to the approach taken by large companies, where collaborations with startups are sought to exploit innovative ideas outside their own core competencies, both startups and SMEs stated a customer need to be the initial motive for seeking partners. Startups and SMEs can combine their know-how, core capabilities, and complementary resources. Because both possess

Case 3. Respective expectations about a successful collaboration

A startup developed a process to produce fruit drinks that would retain the high quality of the fruits, which resulted in a much tastier drink. It partnered from the beginning with a completely unrelated SME – a well-known manufacturer of household appliances. This relationship offered immediate visibility in the market with a very limited marketing investment. Growth followed, and it was a win-win situation for both companies.

A negative experience came from another producer of drinks that was interested in a portfolio expansion: the proposed contract was too complicated and conditions were unfavourable. For this reason, the startup owner decided not to sign collaboration contracts anymore and would base any further collaboration purely on trust.

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customer proximity and great flexibility in meeting specific customer's needs, they may have an advantageous competitive position in the market. Hence, it is important to create joint opportunities where startups can scale their business model and SMEs can simultaneously ensure their goal of growing and remaining a valuable market player.

Furthermore, trust, reciprocity, loyalty, and commitment are the crucial conditions to achieve successful collaborations for both startups and SMEs: personal intuition is, by and large, decisive when selecting a partner to collaborate with.

The approach of startups is more tactical than strategic. The preferred partner is the company that seems to better suit the customer's needs and is more inclined to help. This is more often a larger company than an SME, because these appear to be generally less attentive to the innovation potential offered by startups.

Thus, the process of searching for the right partners is still currently sub-optimal. Many more collaborations could be initiated if only the SMEs knew of the existence of appropriate startups and vice versa.

Conclusion

In conclusion, based on our analyses, we propose the following actions. All companies, including SMEs, must keep their technology portfolio up-to-date to sustain their business success in the long run. Particularly because of the "Internet of Things" revolution, companies will have to watch and evaluate technologies that they never considered before, or have very little knowledge of. In addition, they will have to implement new technologies faster than in the past – and continuously.

Monitoring technological trends, however, requires time, expert resources and money. Some companies even pay for external parties and technology monitoring tools. It is obvious that such practices are a big effort, often too big for SMEs, considering their limited human and financial resources. The quantity of information to analyse will be vast, but in spite of the help of the Internet, reaching the "right" information will be a challenge.

On the other hand, startups develop their offerings in new technological domains but have little idea of the application fields or of the industry sectors where their innovations could add value and close the innovation gap. They often do not know which markets and collaboration opportunities they should pursue, and move only within their own network. Sometimes, lists of players and technologies offered are prepared, and universities or industry associations organize meetings between established firms and startups. However, participants are few, and they seldom obtain enough information for effective matchmaking.

Therefore, considering the difficulty that both SMEs and startups encounter in first becoming aware of each other, then meeting, and eventually initiating collaboration, two schools at the Lucerne University of Applied Sciences and Arts in Switzerland – the Institute for Innovation and Technology (tinyurl.com/yaynnzp3) and the Lucerne School of Information Technology (tinyurl.com/y8wf4327) – are about to launch a project with the aim to build bridges between SMEs and startups (Hohmann, 2016). The objective is enabling collaborative innovation based on a shared platform that will support an active matching of interested SMEs and startups. Both will submit standardized documents covering their technology profiles, patents, product portfolios, and expectations, which will facilitate the matchmaking process. The input and the maintenance of such documentation over time is designed to be simple and cost-effective. Particular attention will be given to the protection of confidential information. An IT developer will provide artificial intelligence software that will scan all submitted documents to find common ground upon which to propose meaningful matches to members of the platform and initiate discussions about potential collaborations.

This or similar initiatives may be helpful in bringing down the walls between startups and SMEs and foster innovation by cooperation. But we strongly invite the top managers of SMEs to move out of their "comfort zones": we argue that traditional ways of thinking will not help their companies to solve their innovation problems as effectively as intelligent cooperation with startups.

Limitations and future research

Although our research has revealed important insights on the perception of collaborations among startups and SMEs, it has some limitations. First, the response rate to the survey was reasonable but not as high as expected, and the number of interviews conducted was limited. Both of these factors limit the extent to which the findings can be generalized. However, these limitations must be considered in light of the overall purpose of the study, which was to raise interest in the topic and give some guidance on where further research and actions could be based.

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Attention should definitely be devoted to the SME arena, to shed light on how open innovation initiatives can be stimulated in successful, knowledgeable companies with limited resources and risk-averse attitudes. Moreover, it could be of interest to compare the findings of this study (focused only on the Swiss landscape) with the situation in other countries in the European Union. Finally, we encourage local authorities and organizations to organize workshops and events for SMEs where they can meet startups and eventually initiate collaborations. Such networking may be nothing new, but it is still an area that needs attention given the difficulties startups and SMEs have in simply becoming aware of each other and learning more about their potentially complementary needs and competences.

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Fabio Mercandetti is a Professor at the Lucerne School of Engineering and Architecture in Switzerland. He holds an MSc in Chemical Engineering from the Technical University (Politecnico) of Turin, Italy, he has held different management positions up to the Executive Committee in global companies, where he led the Operations and/or the Corporate development function. He teaches in Engineering Bachelor and Masters programmes. His applied research focuses on both operational excellence and lean manufacturing, to help companies, particularly SMEs, to improve and increase their business. This includes finding and rightly approaching co-operation opportunities.

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Vincenzo Tuozzo is graduate of the Lucerne University of Applied Sciences and Arts (HSLU) in Switzerland, where he obtained a BA degree in International Management and Economics. He has been active in the area of innovation management and collaboration. With the support of Fabio Mercandetti, Professor of Operations Management at HSLU, and Prof. Dr. Christine Larbig, Professor of Social Innovation at HSLU, he has been researching the theory of open innovation and its practice between startups and SMEs in Switzerland. The focus of their current research lies in recognizing co-operation opportunities and prescribing measures on how to promote such collaborations with the aim of enhancing the innovation processes of startups and SMEs.

Thomas Steiner is a business product developer who, in 2016, completed his Bachelor`s degree studies in Business Engineering Innovation at the Lucerne University of Applied Sciences and Arts (HSLU) in Switzerland. Within an industrial project at the HSLU, supported by Fabio Mercandetti, Professor of Operations Management at the HSLU, he researched the possibilities and needs for collaboration between startups and SMEs in Switzerland. His current professional activities at an SME focus on issues such as innovation management, lean product development, and business modelling.

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References

Blank, S., & Bob, D. 2012. *The Startup Owner's Manual.* Pescadero, CA: K&S Ranch, Inc.

Brikman, Y. 2016. Hello, Startup: A Programmer's Guide to Building Products, Technologies, and Teams. North Sebastopol, CA: O'Reilly Media, Inc.

Chesbrough, H., & Crowther, A. K. 2006. Beyond High Tech: Early Adopters of Open Innovation in Other Industries. *R&D Management,* 36(3): 229–236. http://doi.org/10.1111/j.1467-9310.2006.00428.x

Creamer, W. P., & Amaria, P. 2012. The Effect of Business Transformation and Innovation Economics on Sustainable Corporate Competitive Advantage. *Research in Business and Economics Journal,* 6: 1– 34.

Davies, M. B. 2007. *Doing a Successful Research Project: Using Qualitative or Quantitative Methods.* New York, NY: Palgrave Macmillan.

Ebert, J., Chandra, S., & Liedtke, A. 2008. *Innovation Management, Strategies for Success and Leadership.* Chicago, IL: At Kearney.

Hohmann, C. 2016. *Projektskizze: Technologieorientiertes Matching von KMUs und Start-Ups.* Lucerne, Switzerland: Lucerne University of Applied Sciences and Arts.

Holmes, S., & Smart, P. 2009. Exploring Open Innovation Practice in Firm-Nonprofit Engagements: A Corporate Social Responsibility Perspective. *R&D Management,* 39(4): 394–409. http://doi.org/10.1111/j.1467-9310.2009.00569.x

Ketchen, D. J., Jr., Ireland, R. D., & Snow, C. C. 2007. Strategic Entrepreneurship, Collaborative Innovation, and Wealth Creation. *Strategic Entrepreneurship Journal,* 1(3-4): 371–385. http://doi.org/10.1002/sej.20

Lavie, D., & Rosenkopf, L. 2006. Balancing Exploration and Exploitation in Alliance Formation. *Academy of Management Journal,* 49(4): 797–818. http://doi.org/10.5465/AMJ.2006.22083085

Levinthal, D. A., & March, J. G. 1993. The Myopia of Learning. *Strategic Management Journal,* 14(52): 95–112. http://doi.org/10.1002/smj.4250141009

Lichtenthaler, U. 2011. Open Innovation: Past Research, Current Debates, and Future Directions. *Academy of Management Perspectives,* 25(1): 75–93.

March, J. G. 1991. Exploration and Exploitation in Organizational Learning. *Organization Science,* 2(1): 71–87. https://doi.org/10.1287/orsc.2.1.71

Mocker, V., Bielli, S., & Haley, C. 2015. *Winning Together: A Guide to Successful Corporate-Startup Collaborations.* London: Startup Europe Partnership.

OECD. 2005. *Handbook on Economic Globalisation Indicators.* Paris: OECD Publishing.

Pénin, J., Hussler, C., & Burger-Helmchen, T. 2011. New Shapes and New Stakes, a Portrait of Open Innovation as a Promising Phenomenon. *Journal of Innovation Economics & Management,* 7(1): 11–29. http://doi.org/10.3917/jie.007.0011

Ries, E. 2011. *The Lean Startup.* New York: Random House, Inc.

Rubin, H. J., & Rubin, I. S. 2005. *Qualitative Interviewing: The Art of Hearing Data.* London: Sage.

Steiner, T. 2015. *Kooperationen bei Startup-Firmen: Was und Wie?* Industry Project. Lucerne, Switzerland: Lucerne University of Applied Sciences and Arts.

Swiss Confederation. 2014. KMU in Zahlen: Firmen und Beschäftigte. *Swiss Confederation.* Accessed April 24, 2017: https://www.kmu.admin.ch/kmu/de/home/kmu-politik/kmu-politik-zahlen-und-fakten/kmu-in-zahlen/firmen-und-beschaeftigte.html

Tuozzo, V. 2016. *Open Innovation: Collaborations of Startup Firms.* Bachelor Thesis. Lucerne University of Applied Sciences and Arts.

van der Vrande, V., de Jong, J. P. J., Vanhaverbeke, W., & de Rochemont, M. 2009. Open Innovation in SMEs: Trends, Motives and Management Challenges. *Technovation,* 29(6): 423–437. https://doi.org/10.1016/j.technovation.2008.10.001

Vanhaverbeke, W., Vermeersch, I., & de Zutter, S. 2012. *Open Innovation in SMEs: How Can Small Companies and Start-Ups Benefit from Open Innovation Strategies?* Leuven, Belgium: Flanders DC.

Vanhaverbeke, W., & Roijakkerspp, N. 2013. *Enriching Open Innovation Theory and Practice by Strengthening the Relationship with Strategic Thinking.* Berlin: Springer Verlag.

World Economic Forum. 2015. *Collaborative Innovation Transforming Business, Driving Growth.* Geneva: World Economic Forum.

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Collaborative Capability in Coworking Spaces: Convenience Sharing or Community Building?

Marcelo F. Castilho and Carlos O. Quandt

> *"It is not about a business transaction, it is about social support... needing and being needed."*
>
> Andrew Jones
> Coworker, Singapore Impact Hub

This study explores the development of collaborative capability in coworking spaces. It is based on the perception of collaboration among 31 coworking founders, community managers, and coworkers of those spaces. In-depth interviews around the meaning of collaboration and its challenges were conducted in 14 coworking spaces located in six Asian countries. A set of factors was identified and a model was proposed based on a set of four dimensions: enabling knowledge sharing, enhancing a creative field, enhancing an individual action for the collective, and supporting a collective action to an effective execution. The "Convenience Sharing" and "Community Building" coworking types based on Capdevila (2014) suggest different conditions under which collaborative capability develops. Convenience Sharing coworking spaces tend to foster collaborative capability through knowledge sharing and effective execution, whereas Community Building coworking spaces tend to foster collaborative capability by enhancing a creative field and individual action for the collective. Overall, this study contributes to a theoretical model for coworking spaces to help coworking founders and community managers make strategic decisions. The findings suggest that collaborative capability in coworking spaces depends on the interlacing of a set of factors along four dimensions that relate in varying degrees of intensity to a two-fold coworking space typology.

Introduction

Coworking spaces are gaining strength worldwide as a collaborative phenomenon in a network economy in which competitiveness is based on knowledge and continuous innovation. The emergence and rapid expansion of those spaces (Ross & Ressia, 2015) stem from interconnected factors, such as technological changes, new generation lifestyles, the increased complexity of globalized business, and the increasing isolation of people. Together, these factors sharply restrict opportunities for collaboration and networking, and they reduce the ability to build trust and relationships with others, leading to the emergence of values related to a shared economy culture (Spinuzzi, 2012).

Coworking spaces have multiple popular definitions, and they could be viewed basically as shared offices that offer mostly operational efficiency (Stumpf, 2013). In that sense, coworking as an activity is a promise of sharing, where a space means a physical structure able to promote personal benefits among its participants (Moriset, 2013). But it may also present the opportunity to build an innovation ecosystem of mutual benefits (Spinuzzi, 2012). Thus, in a broader sense, coworking spaces offer the promise of a collaboration capability that generates benefits in terms of firm competitiveness. For the purposes of this study, a coworking space is not defined simply as a service or platform for those who want to share resources (Gandini, 2016), but as an organization that hosts and promotes a collaborative capability, defined as the ability to build and manage relationships, linked to a broader social complex phenomenon (Blomqvist & Levy, 2006).

The theoretical study of capabilities is in an early phase – there is no consensus on their key concepts or how they should be operationalized (Blomqvist & Levy, 2006), and the same applies to collaboration as a capability (Allred et al., 2011). Thus, this research might con-

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tribute to this effort through the identification of specific collaboration factors that characterize this capability in coworking spaces. Hence, this article aims to explore the development of collaborative capability in coworking spaces, as a conceptual framework that might help investors, coworking founders, and community managers with their strategic decisions in order to achieve more sustainable firm competitiveness.

This research is exploratory. It uses semi-structured interviews with key stakeholders and is based on a multidimensional intra-organizational collaboration model proposed by Quandt and Castilho (2017). The study represents an additional effort to understand collaborative capabilities in the context of firm competitiveness intertwined with other capabilities – innovative, absorptive, and adaptive – that support sustainable innovativeness.

The structure of the article is as follows. First, a literature review summarizes how coworking spaces relate to collaboration as a capability. Then, based on a previous study on the relationship of collaboration and innovativeness at the intra-organizational level (Quandt & Castilho, 2017), a set of collaboration factors are presented as a reference point for the current study. Next, a content analysis of the interviews yields a broader set of proposed collaboration factors, which then is used to develop a concept formed by four collaboration dimensions. A "Convenience Sharing" and "Community Building" model based on Capdevila (2014) suggests different conditions where collaborative capability develops from those four dimensions. In the concluding remarks, the limitations of the results are discussed and further research topics are suggested.

Coworking Spaces

Collaboration in coworking spaces may be subject to different interpretations. It may be seen either as a byproduct of the space, or as the very reason why such a place exists. However, a coworking space cannot be defined as just a place where diverse actors such as entrepreneurs, freelancers, and offsite workers interact. Different and often conflicting needs may yield a socially complex context where a community is formed and can be transformed by this socialization (Van den Broek, 2013).

Coworking refers to a specific way of organizing people around work that, by its own nature, facilitates collaboration, characterized by the co-location of economic actors, leading in some cases to the emergence of a highly-collaborative community (Capdevila, 2014). In that sense, a coworking space nurtures business ecosystems, given the potential for knowledge sharing and learning practices in a particular space that results in opportunities for innovation in business, services, and products.

Some view coworking as more than a convenient way of sharing resource – they see it as a way to escape the isolation of working alone and feel it provides a convivial space to break the loneliness (Moriset, 2013). For others, coworking is a "state of mind" (Kwiatkowski & Buczynski, 2011). Finally, others even view coworking spaces as "serendipity accelerators" (Moriset, 2013).

The reasons to join a coworking space are mainly to access the space itself, the direct contact, the events, and the sense of the community or "home" that all of this provides (Stumpf, 2013). Ross and Ressia (2015) expand those reasons by considering four aspects that make a coworking space appealing:

1. Flexible, precarious working conditions associated with a broader macro-social economic reality.

2. The attractiveness of flexible alternatives to either working from home or a corporate office.

3. Opportunity for social interaction that brings also the benefit of a better separation of working and home activities.

4. Opportunity to participate in collaborative projects and put related skills into practice.

Coworking spaces are certainly places where a propensity for social interaction can be enhanced, as can a willingness to share resources. However, what actually differentiates a coworking space from other spaces for work and learning is its complex social concept (Waters-Lynch & Potts, 2017), which can be described in terms of motivation to work together in a "good neighbours" and "good partners" proposition (Spinuzzi, 2012). Good neighbours work alone, focusing on their own tasks, politely alongside others; good partners actively foster the trust required that can lead to formal work collaborations.

The good neighbours and good partners proposition suggests there are different levels of collaboration in coworking spaces. Capdevila (2014) proposes a collaboration typology for coworking spaces that considers cost, resources, and relational approaches. The cost-driven level is about the rental of specific physical

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spaces, where building a community is non-existent and sharing knowledge is a secondary goal. The resource level is about a common physical space that attracts people or organizations that look for a mix of personal convenience and socialization advantages. In the relational level, the focus is on the synergistic effect of collaboration from a community shaped by a diverse social network of people with both strong and weak ties that choose to share resources serendipitously while in close proximity with each other. It often starts with a community, not a space, and it may take some time to build.

A relevant aspect of collaboration in coworking spaces is to understand the behavioural motivation behind the individuals' desire to share their resources and networks with each other (Kenline, 2012). In this sense, a coworking space is the reflection of a community well-being dependent on a common mental ground for emerging relationships (Stumpf, 2013). As a socially-constructed phenomenon, collaboration in coworking spaces is a product of cultural and social practices, as well as an expression of a shared mental space of values and beliefs.

A better comprehension of collaboration capabilities in the context of coworking spaces might boost, for instance, a diverse social network with some specific socialization advantages or through some community building strategies that sustain higher levels of motivation to work together. This highlights the importance of new sources of firm competitiveness through the identification of factors and dimensions related to collaboration in coworking spaces.

Collaboration as a Capability

Collaboration capabilities in the context of coworking spaces bring the opportunity to build and manage relationships based on mutual trust, communication, and commitment. Thus, such capabilities are linked to a broader social complex phenomenon and generate some specific socialization advantages for coworking founders, community managers, and coworkers of those spaces.

Collaboration is also a capability that allows organizations to adapt quickly to a changing economic environment and rely on "ingredients" of social interaction that have a strong impact on the innovative result. Among those ingredients are processes of shared creation based on shared understanding that none had previously possessed or could obtain on their own (Dalkir, 2011) and mutuality (Gray, 1989), which is highly dependent on formal commitment (Gray & Wood, 1989).

In a study aimed to identify the different factors that influence collaboration in an intra-organizational context (Quandt & Castilho, 2017), collaboration as a capability was translated into intertwined factors that influence collaboration and affect the ability of an organization to innovate. The proposed ten collaboration factors represented a specific form of collaboration in which the presence of barriers to knowledge sharing and mutual aid are minimized.

Collaboration capability could be described through the same intertwined factors as proposed by Quandt and Castilho (2017): as an integral component of other capabilities – adaptive, absorptive and innovative (Wang & Ahmed, 2004). In a coworking space, collaboration capability might evolve from collective action that supports innovation and firm performance to a generic meta-capability in uncertain and complex environments, which impacts the innovative results of an organization through the exploitation of combined and complementary capabilities.

Methodology

The proposed approach is exploratory; the aim is to propose a typology for coworking spaces that might help coworking founders and community managers make strategic decisions. It is based on the perceptions and experiences of collaboration among coworking founders, community managers, and coworkers of those spaces. It involved a combination of semi-structured interviews, secondary data related to the coworking spaces under study and their leaders, as well as direct observation and insights during the field research. Semi-structured interviews were conducted during a research trip in six Asian countries between November 2015 and January 2016 (Table 1). The choice of places was determined by convenience and accessibility, not due to any expectation that coworking spaces in Asia are typical or unique in some way, although this may be an area worthy of future research. Rather, it was assumed that coworking spaces mirror some common factor such as technological changes; new generation lifestyles; the increased complexity of globalized business that impact any space wherever the country it is located. The interviews included 31 individuals (P1 – P31) who were mainly founders of coworking spaces, community managers, and coworkers of those spaces. The interview questions focused on four perspectives:

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Table 1. Coworking spaces visited by country and number of interviews

Country	Number of Coworking Spaces Visited	Number of Interviews (Founders/Managers/ Coworkers)
Thailand	8	14 (8/2/4)
Malaysia	1	2 (1/1/0)
Singapore	1	6 (1/1/4)
Indonesia	1	3 (0/2/1)
Vietnam	2	3 (3/0/0)
Japan	2	3 (1/2/0)
Total	**15**	**31 (14/8/9)**

the meaning of collaboration, challenges of collaboration, successful experiences with collaboration, and less successful experiences with collaboration. The selection of coworking spaces followed the opportunity to be in contact with a broader, diverse sample of a coworking ecosystem in each country. The preliminary selection of websites was based on the combination of at least one of three criteria: i) the ones that had the most relevance in terms of size or economic impact; ii) the ones that pioneered the activity in their region; and iii) the ones that could represent a diverse social network through a specific field or professional activity, such as a focus on creative industries.

All the interview data were transcribed and exported to Atlas TI software for the methodological procedures of content analysis, based on a method of collection, description and analysis (Figure 1) proposed by Friese (2010). This process involves:

1. Scanning the data, recognizing relevant points and giving them a badge or identity.

2. Digging into the data, associating, categorizing, and ranking it in order to describe it with the utmost accuracy.

3. Reflecting on the data, creating new meanings, and leading to new ways of understanding a reality.

The initial set of factors influencing collaboration was reviewed and refined in light of the encoding process of the interviews, according to the phases contained in the descriptive level (Figure 1).

Analysis and Discussion

The analysis is structured in four main phases:

1. *Code creation:* utilizes a ten-code system proposed by Quandt and Castilho (2017) in the context of the relationship between collaboration and innovativeness in a case study of an innovative organization to support the codification of the preliminary interviews and eventually the creation of new codes.

2. *Code consolidation:* provides a refined coding system for the remaining interviews through the consolidation of a new set of codes along the set of ten original factors.

3. *Code freezing:* a more refined code system brings about a merger of the codes in four families.

4. *Conceptualization:* a new system of collaboration factors is proposed.

Phases 1 and 2: Code creation and consolidation (encoding the interviews)
A ten-code system proposed by Quandt and Castilho (2017) (Table 2) supported the codification of the interviews. As content analysis involves recognizing relevant points that bring new meaning to the data, additional codes were created in order to better explain specific aspects of collaboration capability in coworking spaces. This first phase was followed by a code-consolidation phase in which a new set of codes provided a refined coding system for the remaining interviews, forming an expanded code system (Table 3) together with the codes proposed previously by Quandt and Castilho (2017).

Phases 3 and 4: Code freezing and conceptualization (a system of collaboration factors)
A third step and fourth phase aimed at the creation of new meanings through the formulation of a concept that merged the codes along four dimensions. The creation of a set of four different dimensions followed an interpretive inductive–deductive analysis supported by a progressive refinement of the theoretical model of the factors influencing collaboration at a more conceptual abstract approach (Friese, 2010). From a combination

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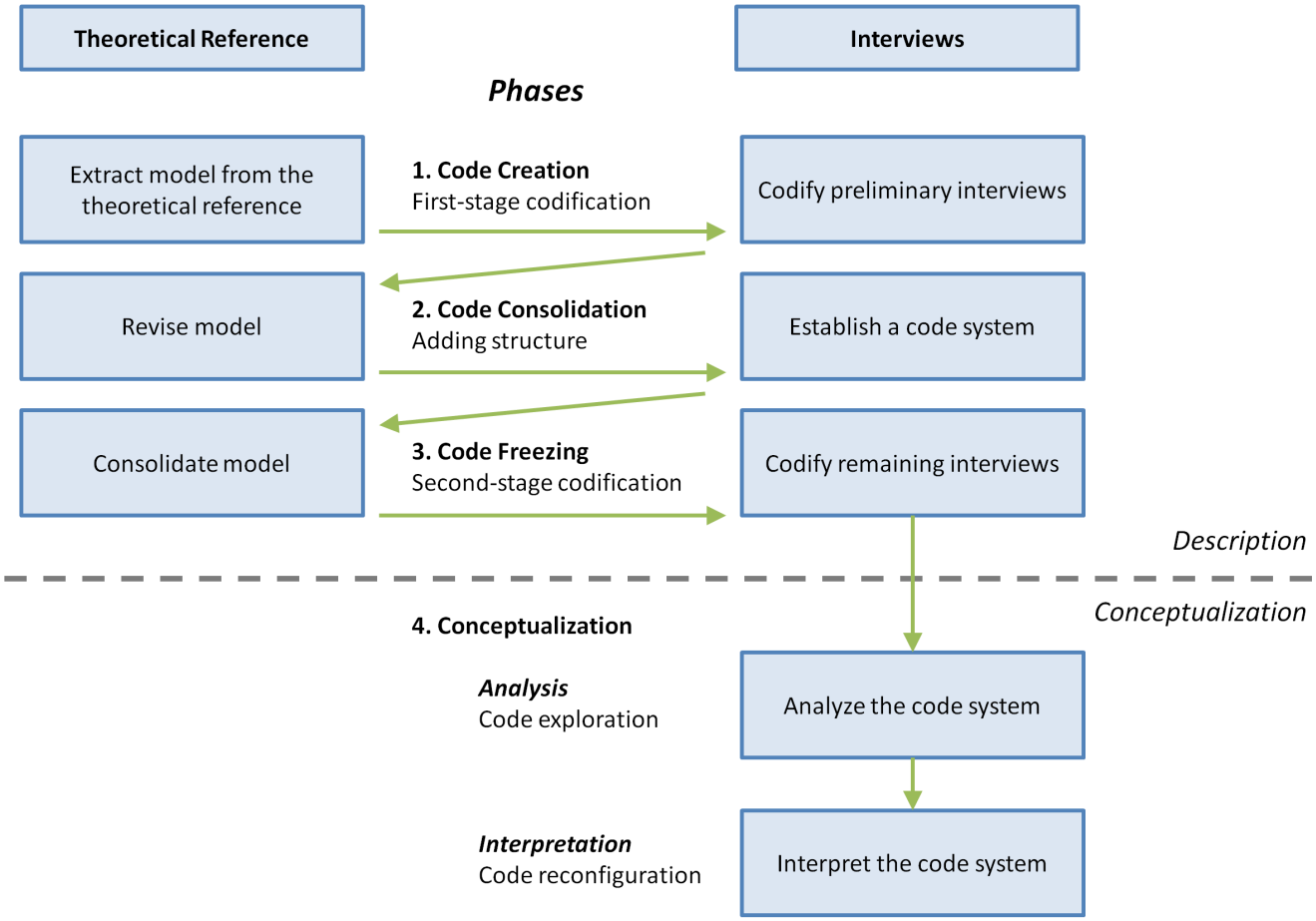

Figure 1. Codification model (Adapted from Friese, 2010)

of collaboration factors derived from the set proposed by Quandt and Castilho (2017), together with the new collaboration factors, four different code groups were created, considering the following statements (Table 4):

1. *Factors that enable knowledge sharing:* a continuous building of positive expectations (Reciprocity) of shared interests, complementary or homogeneous (Sharing), through informal interaction lines (Transparency) among members who have access (Access) to information channels; favourable statement of confidence (Recommendation); and communication skills (Communication of Expertise).

2. *Factors that enhance a creation field:* flexibility for shared creation (Opening) through continuous adjustments of expectations around different perspectives (Flexibility) supported by a flow of emerging interactions (Being Collective) in a social gathering (Partying) where a collective energy (Co-Creation) in a trustful field (Trust at First) provides a giving and receiving (Belongingness) good will (Friendship) attitude.

3. *Factors that enhance individual action for collective results:* mutual aid (Selflessness) based on autonomy and preservation (Self-Sufficiency) supported by a fearless behaviour towards the others (Being an Individual) and a process of free development as an individual (Self-Determination) and conscious of their own character, including feelings and behaviours (Self-Awareness).

4. *Factors that support collective action for an effective execution:* a shared vision (Congruence) that brings a sense of legitimacy to manage tensions that are inherent to collaboration (Mobilization) supported by focus (Concentration) and determination (Purpose), and guided by an awareness of mutual reliance (Interdependence).

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Table 2. Factors that influence collaboration and associated indicators

Factors	Associated Indicators	References
Flexibility: Involves continuous adjustments of expectations around different perspectives in high-tension interactions	• Degree of willingness to change • Degree of encouragement for explanation of differences • Ability to engage in situations of disagreement	Thomson (2006) Antikainen et al. (2010) Crespell et al. (2006)
Reciprocity: Continuous building of social ties, developed around positive expectations of trust and reciprocity	• Degree of positive expectations of reciprocity • How obligations and expectations are met	Thomson (2006) Tsai (1998) Mattesich et al. (2001) Ellinger (2006) Hoffmann (2005)
Congruence: Shared vision based on clear expectations, goals, roles, and responsibilities that brings a sense of identity	• Degree of openness and involvement in decision making • Degree of consistency in decisions	De Clercq et al. (2011) Mattesich et al. (2001) Hoffmann (2005) Chua (2002) Chow & Chan (2008) Hansen (2009) Chua (2002)
Access: People who have access to information	• Degree of access to people • Degree of access to information	Thomson et al. (2007) Chua (2002) Hansen (2006)
Mobilization: The leader ensures the legitimacy to manage resources and manage tensions that are inherent to collaboration	• How much the leader encourages team autonomy • How the leader encourages staff to venture	Ellinger (2006) Huxham (2005) Hurley & Hult (1998) Crespell et al. (2006)
Transparency: Informal interaction lines among members using information channels molded by transparency	• Degree of informal social relations	Thomson et al. (2007) Chua (2002)
Selflessness: Degree of support and mutual aid in the workplace, which is revealed in the interdependence of individuals	• Degree of willingness to help • Degree of willingness to ask for help • In what context one helps the other beyond what is necessary, required, or expected	Chua (2002) Mattesich et al. (2001) Hurley & Hult (1998) Crespell et al. (2006) Antikainen et al. (2010)
Opening: Flexibility and a stimulating environment for shared creation, which provides openness to ideas, but it is sensitive to resource constraints	• Degree of reworked ideas • Level of fault tolerance • Openness to innovative ideas • Degree of tolerance for taking risks	Ellinger (2006) De Clercq et al. (2011) Hoffmann (2005) Gray (1989) Hurley & Hult (1998) Antikainen et al. (2010)
Self-sufficiency: Movements of affirmation between individuals and areas, considering the need for autonomy and preservation	• Degree of acceptance of paradigms from other fields of knowledge • Degree of attachment to their own field of expertise	Chua (2002) Hansen (2009) Mattesich et al. (2001) Hurley & Hult (1998)
Sharing: Process of exchange and combination of shared interests	• Degree of tolerance to behavioural differences • The degree to which each one is perceived to belong to a group	Thomson et al. (2007) Hoffman (2005) Chow & Chan (2008) Chua (2002) Crespell et al. (2006)

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Table 3. Additional factors that influence collaboration and associated quotations

New Collaboration Factors	Quotations from Interviews
Trust at First Creation of a trustful field that supports the building of trustful relationships	• "There is already an established relationship of trust to it and it naturally seems to rebound people who are not very trustful already." (P14) • "In the act of collaborating together – especially within a coworking space – we need to have trust as the first thing." (P22)
Being an Individual A personal positive perception about life that brings a fearless behaviour towards the others supported by trust and creativity	• "It is hard to innovate by yourself alone. People must be in the same frequency so they are fearless and anything is possible." (P20)
Recommendation A favourable statement of confidence suitable for a third part as a path to building a relationship	• "There are different levels of referrals. I know this person. A good recommendation (makes a difference)." (P11) • "A lot of people are introduced to each other here through friends of friends and there is already a basis to trust to it." (P14)
Purpose Determination of doing something intentionally around a specific effort linked to a desired result	• "…a country is a reflection of its people and its people will only be active citizens or happy individually if they care about something with passion." (P13) • "It brings a strong intention of autonomous thinking and the power of a community of creative people…" (P19)
Self-Awareness Knowledge and awareness of one's own character, including feelings and behaviours	• "People … are in a process of life of finding themselves … and they want to do something." (P3) • "We are not ashamed of (proposing) meditation … because you cannot be a good leader if you don't know yourself well yet." (P13)
Concentration The condition or ability to be focused in a particular task without being distracted	• "It is difficult to focus, it is too social, too much laughing going on … for networking. The experience it is really great but if you really want to produce, to focus, it's difficult…" (P1) • "Most of the time I need to focus on my work … If I communicate with people, the job can be very slow. You have to balance these things." (P15)
Self-Determination Able to freely decide and conduct one's own development as an individual	• "A personal behaviour can pop up and being able in collaboration to get you as an individual to a higher level." (P1) • "People-powered problem solving." (P6)
Being Collective A flow of emerging interactions between individuals sustained by a field of vulnerability and trust	• "Many magical possibilities when people meet up together … when people meet together it emerges new kind of business, new possibilities … many outcomes." (P5) • "A coworking space itself needs a lot of passion because it is an energy. (It is soul.) You come here because you want to share your loneliness. It doesn't make sense (from the point of view of efficiency)." (P20)
Belongingness Act of being a member attending the need to give and receive attention to or from the others	• "Everyone talks to outsiders when somebody comes. This is a good community. Not just the mayor but also all the people." (P4) • "They come here and feel they are at home." (P17)
Co-Creation A collective energy that brings different parties together in order to produce a mutually valued outcome	• "How individuals, groups, companies can one affect each other … so they can create new projects, ideas, business, plans, and opportunities for themselves and for the others." (P14) • "To make things happen, it is good to have inspiration with other people." (P16)
Partying A social gathering for pleasure and amusement rich with meaningful experiences	• "Partying that is not a party place but I want to make the office a party place." (P4) • "I started this business for fun. It could be fun if people are really opened up … you have to be open to everybody – it doesn't matter who they are." (P17)
Friendship Good will as a quality of being with others	• "I get along with you – I get a good feeling with you." (P7) • "Collaboration can only happen when people here start to participate in an activity and make friends, and as they become friends, they can trust one another." (P20)
Interdependence: Awareness of mutual reliance between individuals and organizations	• "The experience and feeling of coming together … you are not only centered on ourselves you are also connected to your neighbour." (P10) • "It is not just about people working more but also part of a well-rounded vision of who people are what should be doing how work fits into that…" (P14)

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Table 4. Association between previous model (Quandt & Castilho, 2017) and new factors that influence collaboration around four intervening factors

Intervening Factors	Previous Factors that Influence Collaboration	New Factors that Influence Collaboration
Enabling knowledge sharing	**Access:** People who have access to information **Transparency:** Informal interaction lines among members using information channels molded by transparency **Sharing:** Process of exchange and combination of shared interests **Reciprocity:** Continuous building of social ties, developed around positive expectations of trust and reciprocity	**Recommendation:** A favourable statement of confidence suitable for a third part as a path to building a relationship
Enhancing a creative field	**Flexibility:** Involves continuous adjustments of expectations around different perspectives in high-tension interactions **Opening:** Flexibility and a stimulating environment for shared creation	**Partying:** A social gathering for pleasure and amusement, rich with meaningful experiences **Co-Creation:** A collective energy that brings different parties together to produce a mutually valued outcome **Belongingness:** Act of being a member attending the need to give and receive attention from others **Being Collective:** A flow of emerging interactions between individuals sustained by a field of vulnerability and trust **Trust at First:** Creation of a trustful field that supports the building of trustful relationships **Friendship:** Good will as a quality of being with others
Supporting a collective action to an effective execution	**Mobilization:** The leader ensures the legitimacy to manage resources and manage tensions that are inherent to collaboration when combining assertiveness and courage to take risks **Congruence:** Shared vision based on clear expectations, goals, roles, and responsibilities that brings a sense of identity	**Concentration:** The condition or ability to be focused in a particular task without being distracted **Purpose:** Determination to do something intentionally around a specific effort linked to a desired result **Interdependence:** Awareness of mutual reliance between individuals and organizations
Enhancing an individual acting for the collective	**Selflessness:** Degree of support and mutual aid in the workplace **Self-sufficiency:** Movements of affirmation between individuals and areas	**Being an Individual:** A personal positive perception about life that brings a fearless behaviour towards others supported by trust and creativity **Self-Determination:** Able to freely decide and conduct one's own development as an individual **Self-Awareness:** Knowledge and awareness of one's own character, including feelings and behaviours

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Prevalence of collaboration factors considering both types of coworking spaces

This research proposed, through an interpretive inductive–deductive methodology based on Friese (2010), a model of four different dimensions that summarize collaboration factors regarding coworking spaces. The dimensions are adherent in different degrees to either the "Convenience Sharing" or "Community Building" types of coworking spaces (Figure 2).

The Convenience Sharing type of coworking space resembles the resource approach proposed by Capdevila (2014) as one of the three elements of a collaboration typology for coworking spaces – the other two approaches being cost and relational approaches. The resource approach is about convenience and socialization advantages, more adherent to enabling knowledge sharing and supporting a collective action to an effective execution. In Convenience Sharing coworking spaces, there is a tendency to defend self-interest, and the collective view is not fully internalized. Trust is built over time. Therefore, people are more attracted by personal convenience, and socialization advantages and community-building activities are necessary to keep the sharing mode alive.

In the Community Building type of coworking space, relationships based on collaboration are primarily an act of trust, which is highly dependent on formal commitment. Community-building tends to precede the space itself. It resembles the Capdevila (2014) typology in the sense that the relational level focus is on the synergistic effect of collaboration through a diverse social network of people. Community Building coworking spaces bring interdependence and formal commitments that stem from self-determination and a fearless positive perception towards the others, guided by a common mental ground for emerging relationships (Stumpf, 2013). People with both strong and weak ties choose to share resources serendipitously. A shared mental space of values and beliefs prevails, shaped by a diverse social network, less dependent on community building activities as the desire to share their resources and networks with each other (Kenline, 2012) is much more evident. Thus, the Community Building type tends to be more linked to enhancing an individual action for the collective and to enhancing a creative field.

This simplified representation of four dimensions – and their underlying factors – reflects the meaning and challenges of collaboration. These challenges are mainly expressions of the mutual adjustments being made by the main stakeholders: founders, community managers, and users, in order to deal with a highly complex social context. Mutual adjustments are necessary to keep a balance between conflicting mental models of sharing, privacy, and friendship, and needing and being needed, all within a space that is supposed to enact a more socially oriented approach as well as providing an expression for more privacy-oriented tasks. As the interview subjects indicated in this study, conflicting mental models drive a "stolen idea" culture, a mindset that prevents sharing (P22) as well as a culture of "being a friend of anyone" in clash with a culture of "do not talk to strangers" (P15). That explains the importance of the community builder role as a dialogue initiator (P4). A traditional organizational culture is replaced by the challenge of cultivating a sense of equals together with

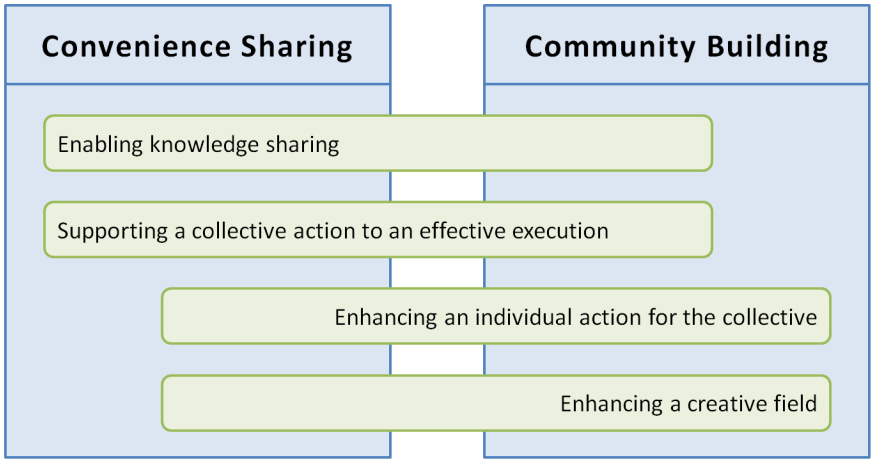

Figure 2. Prevalence of collaboration factors considering the Convenience Sharing and Community Building approaches

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a sense of diversity (P10; P14). These mutual adjustments reflect a polarity between concentration and sharing in a space where there is a double role of doing business as well as being a contributor to this larger "business" that is dependent on the way interaction happens among the members (P14) who are not convinced of the value of collaboration (P14).

Conclusion

This exploratory study proposed a set of dimensions linked to collaborative capabilities in coworking spaces in order to help strategic decision making among coworking founders and community managers. It suggests that collaborative capability in coworking spaces depends on four interconnected dimensions that relate to various extents to two different types of coworking spaces, where collaboration capabilities foster such spaces as enabling contexts to reconfigure organizational resources through knowledge sharing, enhancing a creative field, supporting individual actions for collective results, and supporting collective action towards an effective execution. This study also proposes that Convenience Sharing coworking spaces are mostly related to knowledge sharing and supporting a collective action towards an effective execution, whereas Community Building coworking spaces are more related to enhancing a creative field and enhancing an individual action for the collective.

The study was conducted only in Asian countries in a relatively limited sample of spaces. Possibly, the results would be different if the interviews were conducted in a different cultural setting. Additionally, there are several political, cultural, and social aspects that might reveal differences between developing countries and developed countries within Asia regarding collaboration in coworking spaces. Nevertheless, this study can contribute to the coworkers' perspective, helping them to decide whether a particular co-working space will be more aligned with their particular needs for collaboration. In a broader perspective, this research may also contribute to an evaluation of the level of collaborative capability that can be supported by different types of coworking spaces. This would also support decision-making processes linked to the configuration of coworking space strategies and their capability to promote collaboration among participants. Further studies could involve the application of the resulting model of two types, four dimensions, and underlying factors to coworking spaces in other regions to verify model validation and potential adaptations.

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References

Allred, C. R., Fawcett, S. E., Wallin, C., & Magnan, G. M. 2011. A Dynamic Collaboration Capability as a Source of Competitive Advantage. *Decision Sciences,* 42(1): 129–161. http://doi.org/10.1111/j.1540-5915.2010.00304.x

Antikainen, M., Makiaa, M., & Ahonen, M. 2010. Motivating and Supporting Collaboration in Open Innovation. *European Journal of Innovation Management,* 13(1): 100–119. http://doi.org/10.1108/14601061011013258

Assenza, P. 2015. If You Build It Will They Come? The Influence of Spatial Configuration on Social and Cognitive Functioning and Knowledge Spillover in Entrepreneurial Co-Working and Hacker Spaces. *Journal of Management Policy and Practice,* 16(3): 35–48.

Blomqvist, K., & Levy, J. 2006. Collaboration Capability – A Focal Concept in Knowledge Creation and Collaborative Innovation in Networks. *International Journal of Management Concepts and Philosophy,* 2(1): 31–48. http://doi.org/10.1504/IJMCP.2006.009645

Capdevila, I. 2014. *Different Entrepreneurial Approaches in Localized Spaces of Collaborative Innovation.* Paris: ESG Management School. http://dx.doi.org/10.2139/ssrn.2533448

Clifton, N., Fuzi, A., & Loudon, G. 2014. *New In-House Organizational Spaces that Support Creativity and Innovation: The Co-Working Space.* Paper presented at the R & D Management Conference 2014, June 3–6, 2014, Stuttgart. Germany.

Dalkir, K. 2011. *Knowledge Management in Theory and Practice* (2nd ed.). Oxford: Elsevier.

Friese, S. 2010. *Qualitative Data Analysis With Atlas Ti.* Thousand Oaks, CA: Sage Publications Ltd.

Gray, B. 1989. *Collaborating: Finding Common Ground for Multiparty Problems.* San Francisco, CA: Jossey-Bass Inc.

Hurley, R. F., & Hult, G. T. 1998. Innovation, Market Orientation and Organizational Learning: An Integration and Empirical Examination. *Journal of Marketing,* 62(3): 42–54.

Huxham, V. 2005. *Managing to Collaborate: The Theory and Practice of Collaborative Advantage.* New York: Routledge Taylor & Francis Group.

Kenline, C. 2012. *Defining a Culture: The Paradigm Shift Toward a Collaborative Economy.* Fort Wayne, IN: Indiana University Purdue University.

Kwiatkowski, A., & Buczynski, B. 2011. *Coworking: Building Community as a Space Catalyst.* Fort Collins, CO: Cohere.

Mattesich, P., Murray-Close M., & Monsey B. 2001. *Collaboration: What Makes It Work.* Saint Paul, MN: Fieldstone Alliance.

Moriset, B. 2013. *Building New Places of the Creative Economy. The Rise of Coworking Spaces.* Paper presented at the 2nd Geography of Innovation Conference, January 23–25, 2014, Utrecht, The Netherlands. https://halshs.archives-ouvertes.fr/halshs-00914075

Quandt, C. O., & Castilho, M. F. 2017. Relationship Between Collaboration and Innovativeness: A Case Study In an Innovative Organization. *International Journal of Innovation and Learning,* 21(3): 257–273. https://doi.org/10.1504/IJIL.2017.083400

Ross, P., & Ressia, S. 2015. Neither Office nor Home: Coworking as an Emerging Workplace Choice. *Employment Relations Record,* 15(1): 42–57.

Spinuzzi, C. 2012. Working Alone Together: Coworking as Emergent Collaborative Activity. *Journal of Business and Technical Communication,* 26(4): 399–441. https://doi.org/10.1177/1050651912444070

Stumpf, C. 2013. *Creativity and Space: The Power of Ba in Coworking Spaces.* Masters Thesis, Corporate Management & Economics. Zeppelin University.

Van den Broek, W. 2013. The Future of Coworking. *Deskmag,* October 31, 2013. Accessed December 1, 2017: http://www.deskmag.com/en/the-future-of-coworking-882

Wang, C., & Ahmed, P. 2004. The Development and Validation of the Organizational Innovativeness Construct Using Confirmatory Factor Analysis. *European Journal of Innovation Management,* 7(4): 303–313. https://doi.org/10.1108/14601060410565056

Waters-Lynch, J. M., & Potts, J. 2017. The Social Economy of Coworking Spaces: A Focal Point Model of Coordination. *Review of Social Economy,* 75(4): 417–433. https://doi.org/10.1080/00346764.2016.1269938

Waters-Lynch, J. M., Potts, J., Butcher, T., Dodson, J., & Hurley, J. 2016. *Coworking: A Transdisciplinary Overview.* Working Paper. Melbourne, Australia: RMIT University. http://dx.doi.org/10.2139/ssrn.271221

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