FOSTERING DIGITAL INNOVATION THROUGH INTER-ORGANIZATIONAL COLLABORATION BETWEEN INCUMBENT FIRMS AND START-UPS

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Research paper

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Abstract

Digital technologies offer multiple opportunities for firms, but they also involve many challenges. Incumbent firms especially need to pursue digitalization in their businesses and create digital innovations in order to stay competitive in the market. For this purpose, an increased number of incumbent firms have been collaborating with start-ups with the aim of identifying and developing new business fields. Influencing factors in the context of collaboration between incumbent firms and start-ups aiming to foster digital innovation have barely been addressed in the research. Against this background, we have compiled a literature review on collaboration and conducted a qualitative study based on 30 interviews with experts from incumbent firms and start-ups. We investigate the increasingly important inter-organizational form that is emerging from collaborative innovative processes by influencing factors identified in terms of intra-individual and interactional levels. Our main interest is in showing what factors affect incumbent firms and start-ups in pursuit of collaboration with the aim of creating and implementing digital innovation. With our results, we are contributing to the literature on collaboration as well as providing practitioners valuable guidance for fostering digital innovation by illustrating relevant factors that can be considered in future inter-organizational collaborations.

Keywords: Collaboration, Digital Innovation, Qualitative Study, csQCA.

1 Introduction

Following crowdsourcing, co-creation, or open innovation, firms are increasingly using newly emerging concepts to foster digital innovation. Currently, collaboration between incumbent firms and start-ups is enjoying a resurgence through the pervasive phenomenon of digitalization (Tilson, 2010; Yoo, 2010), which significantly affects incumbent firms and their operating markets. Due to rising opportunities as well as threats, they have to adapt digital technologies and create digital innovations in order to stay competitive in the digital era. In this way, incumbent firms can enter into new markets that were originally dominated by other firms. Companies such as Google, Apple, Facebook, and Amazon – also called the “Big Four” of the digital economy – are able to challenge organizations from long-established industries like the automotive or banking industry. For instance, by providing a car that drives on its own, Google threatens established premium automobile manufacturers, such as Mercedes and BMW, in their core market. Furthermore, by offering a mobile payment option, Apple provides an alternative to traditional credit card payments. These and many other examples illustrate how firms can act as cross-boundary disruptors, evoking change in existing market structures (Burgelman and Grove, 2007). However, not only the Big Four have dominated the digital market: Start-ups, with their new business models that exploit opportunities arising from advanced digital technologies, can generate a significant impact as well. For instance, the start-up Airbnb, one of the
largest accommodation agencies in the world, has established a digital platform in order to increase customer loyalty through an innovative digital service.

It is not surprising that digitalization is one of the top issues currently being discussed. Several consulting firms have only recently released reports on digitalization, and various conferences have focused on the issue (e.g., Thinking Digital 2016 in the UK, Cebit 2016 in Germany, CEO2CEO Summit 2015 in the US), and even politicians in the annual meeting of the World Economic Forum in 2016 discussed how to face challenges and take advantage of new opportunities in terms of digitalization. Thereby, the objective of today’s discourse on digitalization is to create new business value with innovative products, services, or business models – especially in the form of digital innovation is defined as “a product, process, or business model that is perceived as new, requires some significant changes on the part of adopters, and is embodied in or enabled by IT” (Fichman et al., 2014, p. 330). With this in mind, previous research has examined reasons for firms to engage in collaborations in the context of innovation processes (Chesbrough, 2006). However, recently, a new dimension of inter-organizational collaboration has emerged: Start-ups no longer only play a supportive role, drive change, or provide improvement in specific areas. Instead, start-ups intertwine with and potentially merge with the markets of incumbent firms. As start-ups influence the environment of incumbent firms, collaborations between incumbent firms and start-ups are becoming more important, and they possess great advantages in the field of open innovation (Chesbrough and Schwartz, 2007; Combs and Ketchen Jr, 1999; Kohler, 2016; Lisowska and Stanislawski, 2015). Against this background, a few incumbent firms have a willingness to collaborate with start-ups and have established corporate-start-up programs such as, for example, Microsoft Ventures and the newly founded InnoJam++ event by SAP in cooperation with Volkswagen. Aside from these, there are scores of incumbent firms that have not yet addressed the opportunity of collaborating with start-ups to meet their challenges in the digital era. In contrast, start-ups are often dependent on external support by incumbent firms on the one hand, and, in some cases, on the other hand, the collaboration fails to live up to expectations, and start-ups may struggle to continue the partnership (Lindgreen et al., 2015). With this in mind, only a few studies exist that have made collaboration between incumbent firms and start-ups a subject of discussion (e.g. Minshall et al., 2010). For instance, researchers have found that, when the two work together, it is a balancing act, as it is a cooperation and competition at the same time. This form of collaboration is also about strategies for dealing with emerging cooperative competitive tensions (Ansari et al., 2015). Therefore, it remains open whether incumbent firms and start-ups – despite culture clashes – can foster digital innovation through inter-organizational collaboration. To obtain insights in this research field, we have compiled a literature review and conducted 30 interviews with managers of incumbent firms and founders of start-ups with the primary aim of figuring out what factors are relevant from a two-sided perspective in the context of collaboration. Thereby, we have determined the fostering of digital innovation to be an outcome measure of collaboration efforts. As a result, we have identified 20 influencing factors of collaboration between incumbent firms and start-ups.

This presented paper is structured as follows: In the next section, we provide a brief overview of the theoretical background. Consecutively, we describe the initial situation, relevant definitions in the digital era, and illustrate our literature research process. Thereby, as collaboration is a multidisciplinary phenomenon, we include publications not only from the fields of Information Systems (IS), but also organization studies, (social) psychology, and management studies. Afterwards, we describe how the qualitative study was designed and expert interviews executed. Based on this, we present the key findings that are relevant in collaborations between incumbent firms and start-ups with regard to fostering digital innovation. Thereby, we illustrate what influencing factors are essential for successful collaboration by using crisp-set qualitative comparative analysis (csQCA). In addition, we compare the results of the literature review as well as those of the expert interviews and discuss our compiled results. Finally, we conclude by describing the contributions, limitations, and avenues for future research.
2 Theoretical Background and Related Works

While one stream of literature discusses digitalization as a driver of organizational change (Bharadwaj et al., 2013; Matt et al., 2015; Piccinini et al., 2015), other researchers have considered the importance of digital innovation and have already established that digital innovation is typically influenced by various internal and external factors. For instance, the driving forces of service innovations in the telecommunication industry have been investigated, as well as the role of users and customers in digital innovation (Abrell et al., 2016; Cummings and Kiesler, 2003; Kim and Triche, 2013).

The creation and implementation process of digital innovation in firms can be enhanced through intra- or inter-organizational collaboration. Thereby, collaboration “involves people working together to solve problems and accomplish work in ways that are synergistic – where more is accomplished than organization members could achieve separately and additively” (Shipper et al., 2013, p. 100). The approaches to open innovation and cross-industry innovation can be appropriate for establishing inter-organizational collaborations (Chesbrough and Schwartz, 2007; Chesbrough, 2006; Enkel and Gassmann, 2010). The concept behind these approaches is to open the innovation process up to external partners, such as primarily suppliers, customers, and other firms. Previous research in this field has investigated the use of external knowledge sources or collaboration partners tending to make firms more innovative (De Man and Duysters, 2005; Lee et al., 2010; Tomlinson, 2010). Furthermore, other researchers have investigated the role of the manager in specifying and articulating innovation problems (Felin and Zenger, 2014), focus on the motives and perceived challenges when small and medium-sized enterprises adopt open innovation practices ( Sağ et al., 2016) or on the open innovation practices of business services which include IT support services, among others (Mina et al., 2014). Besides that, there are research works about predictors of the relationship between Research & Development (R&D) collaboration with external partners (Pilav-Velić and Marjanovic, 2016) and open innovation efficiency is defined by several factors, such as the level of development of legislation and availability of highly qualified personnel (Rogo et al., 2014). However, there have barely been any profound insights into the fostering digital innovation through collaboration between incumbent firms and start-ups. A challenge of the dominant paradigm with the focus on incumbent firms and start-ups is especially due to immense gaps in work practices of both actors (Weiblen and Chesbrough, 2015). In order to gain an insight in the research field of collaboration between incumbent firms and start-ups, the compilation of a literature review is fundamental to determining the current state of research (Baker, 2000). The focus on the following literature review is on acquiring an overview of the existing work that lays the foundation for future research and can be utilized by researchers and practitioners to access existing relevant findings. Moreover, the literature review should provide a synthesis of the results of the relevant influencing factors in the context of inter-organizational collaboration between incumbent firms and start-ups with regard to fostering digital innovation (Webster and Watson, 2002).

In the following, we present our literature research process with a complete review of past research in inter-organizational collaboration between firms – especially between incumbent firms and start-ups in the context of open innovation. The literature review that is presented in this study is based on the framework that was developed by Vom Brocke et al. (2009). The approach has five essential phases:

1) The definition of the review scope. According to Cooper (1988), the focus is to identify the relevant research results and theories with the aim of obtaining a broad understanding of the relevant influencing factors. Therefore, the perspective is neutral, and the coverage is full of selective citation. Furthermore, the organization of our review scope is conceptual, and the target group of our research is specialized researchers and practitioners.

2) Conceptualization of topic. To identify papers that adequately represent the topics above, we initially explanatively searched the full texts of articles in the Google Scholar and Business Source Premier database regarding the aforementioned research object. This procedure helped us to conceptually understand the topic and led to the identification of keywords that describe the topic comprehensively for the systematic database search.
(3) Literature search. The following search terms were derived from the result of the conceptualization and keywords with synonyms, as well as related words. We used only the English forms of terms and searched the titles, keywords, and abstracts of relevant books, journal articles, and conference papers. The following search query presented was used for the ScienceDirect database: ("factor" OR "success" OR "enabler" OR "inhibitor" OR "barrier" OR "determinant" OR "dimension") AND ((("collaboration" OR "cooperation" OR "partnership" OR "interfirm" OR \{inter-organizational\} OR \{inter-organisational\} OR "collaborative entrepreneurship" OR "collaborative innovation" OR \{co-opetition\} OR "coopetition") AND ("innovation" OR "new product" OR "new service" OR "R&D" OR "research and development") OR "open innovation" OR "cross-industry innovation") AND (((start-up) OR \{start-ups\} OR "startup" OR "new firm" OR "new venture" OR "entrepreneurial")). Search queries for other databases differed slightly due to the technical specifics for each database. Because of the assumption that the existing literature in the research field of interest covers different subsets of research fields, different databases have been used to allow for a comprehensive literature review. Therefore, the keywords were used to query seven databases: AIS eLibrary (AISeL), ScienceDirect, and EBSCOhost, via the databases ECONLit, Business Source Premier, PsycARTICLES, PsycINFO, and eBook Collection. The preliminary search process resulted in 773 publications that had been published before December 2016. The perusal of the titles and abstracts of these identified publications resulted in the elimination of some publications. Thereby, duplicates and research-in-progress papers were filtered out. In addition, publications that focused on non-commercial organizations and government or scientific institutions were left out. The same applied to publications that used collaboration in contexts different than here and outside the organizational boundaries, but only within the same organization (e.g., between departments). This procedure led to the selection of 82 publications. After screening the full texts, publications that did not have an explicit reference to our research field were also excluded. As a result, we have identified a manageable number of publications – in total, four papers. Afterwards, forward and backward searches as proposed by Webster and Watson (2002) were conducted by utilizing Thomas Reuters’ Web of Knowledge and by reviewing the cited references and all relevant sources. Finally, five papers remained, which were read in detail with a focus on identified contributions. An overview of the structured literature search process for the publications identified with regard to number of publications is provided in Figure 1.

Figure 1. Overview of the structured search.

(4) Literature analysis and synthesis. The literature identified was analyzed in detail. In the following, this literature is described with the main findings in terms of relevant factors in context of the research framework. According to recent studies published in 2016, the object of investigation was corporate accelerator programs. Kohler (2016) conducted interviews with managers and participants from corporate accelerators (n=40). The main finding was that corporates need to create mutual value and to gain the commitment of internal and external experts and mentors. Start-ups have to focus on achieving product and market fit (instead of corporate fit). Furthermore, start-ups should accept that corporates participate in start-up innovation. Based on these findings, the author here presents a framework and strategies for designing corporate accelerators. Similarly to this study, Kanbach and Stubner (2016) examined in-depth case studies (n=13) of corporate accelerator programs and discussed a typology for corporate accelerators, assessing objectives and design configurations. The main finding was that top management support is a relevant factor for successful corporate accelerator programs. This is also crucial for gaining commitment and encouraging the participation of all employees within the organization. Across all types, it is helpful to have an overall mixed team of people with company-internal and company-external work experience. Furthermore, the definition of clear objectives is a relevant factor as well. Aside
from these two recent studies, a study by Wise and Valliere (2014) investigated the effects that the experience level of accelerator management teams has on the performance of the accelerators they manage. The authors have ascertained that increased knowledge of accelerator managers reduces the risk of firm failure and that this reduction can be attributed more to differences in the amount of direct experience that the accelerator management team has as founders of start-ups than to differences in connectedness to the ecosystem. Moreover, Frimodig and Torkkeli (2013) have conducted a qualitative study based on semi-structured or thematic interviews (n=18) with accelerator founders, accelerator managers, mentors, and topic-related professionals. These authors found significantly that preconditions for success include access to business competence and the ability to transfer it to start-ups. Furthermore, mentor selection is relevant in the context of accelerator programs. In addition to those studies, Weiblen and Chesbrough (2015) examined how large corporations from the tech industry have begun to tap into entrepreneurial innovations from start-ups, and they presented a typology of corporate mechanisms to map the ways corporates can bridge the gap between themselves and the start-up. The main findings of these authors have led to the conclusion that determination of the expected output of a corporation’s engagement with start-ups is highly relevant.

In summary, the results of the literature review can be synthesized as follows: The factor “clear definition of a company’s value proposition towards a start-up” is one of the most frequently identified factors in the literature. Thereby, the factors identified in the literature are subsequently examined with respect to their interdependency and their relation to their research field of interest. Furthermore, the literature findings show that most of the publications presented above deal with corporate accelerator programs and do not focus on inter-organizational collaboration in general with the aim of fostering digital innovation.

(5) Research agenda. The literature evaluation has led to potential future research directions. A better and more holistic understanding of collaboration between incumbent firms and start-ups is relatively under-explored in the existing literature. As the importance of all innovative activities increases with respect to their employees’ contributions to innovation performance in organizations (Cheng and Huizingh, 2014), investigation at the individual level is of special interest to the current research. With this in mind, the identification of the relevant factors of intention to collaborate and of actual behavior during collaboration as a whole provides scope for further varied research. For investigation of the individual level – based on the perspectives and behavior of employees of incumbent firms and start-ups –, the framework of theory of reasoned action (TRA) can be used. According to the TRA, the behavior of a person is determined by their intention that results from the personal attitude towards the act or behavior as well as the subjective norms. Subjective norms are the sums of subjective social and normative assumptions (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1977). By taking these observations described above together, our research addresses the following question: What enabling and inhibiting factors are relevant in the context of collaboration between incumbent firms and start-ups with regard to fostering digital innovation? Against this background, in the following section, we have evaluated the findings in the related literature via statements by experts interviewed from incumbent firms and start-ups to verify the relevance of the known factors and to prove further factors. Then, we discuss the compiled findings from the expert interviews and literature review.

3 Research Study

As we wanted to identify the influencing factors in the context of collaboration between incumbent firms and start-ups with regard to fostering digital innovation, we decided to conduct a qualitative study based on interviews with experts from the field. Therefore, we decided on an explorative approach that offered the possibility of innovative and flexible processing of the research question (Neuendorf, 2002; Yin, 2013). In the following, data collection and analysis method as well as empirical results and discussion of findings are described in detail.
3.1 Data collection and analysis method

We interviewed two groups of experts, those from incumbent firms (Group IF) and those from start-ups that primarily had business models based on digital innovations (Group SU). Thereby, incumbent firms and start-ups can be distinguished by the life-cycle approach (Black, 2003; Huse and Zattoni, 2008). Start-ups can be categorized at the beginning – introduction stage – of the life-cycle approach. Basically, they have a solid foundation for creating technology-specific innovation (Colombelli et al., 2016; Hanks, 1994; Reis, 2011). Incumbent firms are located at the end of the growth stage when they reach the maturity stage, so they are characterized by their strong position in the market (Christensen, 2013).

We decided to conduct semi-structured verbal interviews with the experts. We used a standardized guideline for each group. This ensured that all the interviews covered the main topics. At the same time, it allowed us to address the peculiarities of the respective organizations’ contexts. Furthermore, the experts interviewed had the opportunity to give unlimited answers (Yin, 2013). The expert interviews were conducted in the period from June to August 2015 and from November to December 2015. In total, the sample is comprised of 30 interviews. Of these, 15 belong to Group IF and 15 to Group SU. Table 1 provides an overview of the 30 experts interviewed, sorted by foundation year.

<table>
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<th>Group IF: Managers of incumbent Firms</th>
<th>Group SU: Founders of start-ups</th>
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<tr>
<td><strong>ID</strong></td>
<td><strong>Business field</strong></td>
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Table 1. Overview of experts interviewed.

As presented in Table 1, we decided to interview managers from incumbent firms and founders of start-ups, especially those who had the necessary practical experience in collaborative innovation processes. The selected incumbent firms and start-ups were deliberately selected from across various sectors.

The interviews were held in non-public spaces and lasted 42 minutes on average. All the interviews were tape-recorded. For easier analysis, the recorded material was transcribed. This process resulted in 142 pages of transcripts. The interview data was analyzed by using the qualitative content analysis technique developed by Mayring (2014). This type of analysis was chosen because new theories are not built from scratch; instead, existing views are confronted with new data. Accordingly, we have aimed at reducing the raw data material to a category system. In this context, the coding was divided into the following major steps: First of all, the individual statements were summarized as codes. Afterwards, we checked whether the codes could be summarized in relevant categories. According to Mayring (2014) approach, each code was related to a category when the term, synonym, or description was stated by the experts interviewed. Then, the categories were grouped and assigned to the relevant factors. Finally, linkages among the factors were analyzed. This way, the relations among different
influencing factors in the context of collaboration between incumbent firms and start-ups could be investigated.

3.2 Empirical results and discussion of findings

Presenting our results in detail, we have provided an overview of the influencing factors that have been derived by expert interviews. Thereby, the presentation of factors primarily serves as an overview of the results of the expert interviews and therefore largely dispenses partially with literal quotations.

Our data analysis identified 12 factors for incumbent firms and 8 in start-ups affecting, on the one hand, intention to collaborate and, on the other hand, actual collaboration behavior following the TRA framework. These factors are summarized in Figure 2 and sorted by the number of presences per category. It follows that the symbol “+” means that the factor identified has a positive effect on intention to collaborate and actual collaboration behavior, and the symbol “-” means that the factor has a negative effect.

According to the approach of McKinlay and McVittie (2009), we assigned the factors identified to the intra-individual and the interactional levels. While the intra-individual level focuses on the investigation of individuals who are observable – in our empirical results, associated with “intention to collaborate” –, the interactional level focuses on the investigation of more than two people – in our research, associated with “actual collaboration behavior” from the two-sided perspective.

In the following, the factors identified (F) are distinguished as incumbent firms or start-ups and are described in detail with quotations that highlight the relevant factor.

![Figure 2](image-url)  
**Figure 2. Influencing factors in the context of collaboration between incumbent firms and start-ups.**
Incumbent Firms

[F_1 | +] Perceived increased Innovation Performance. All the experts who had direct experience with collaboration stated numerous benefits of collaboration with start-ups. One of these benefits was innovation performance as a significant expected outcome of a successful collaboration, whereby start-ups have been seen as “a relevant intermediate to significantly increase the needed performance” (Interview IF-02). In relation to customer-centric thinking, the aspects of flexibility and adaptability characterized by start-ups were stated by experts, as the following quotation illustrates: “Start-ups ask for the benefit of the customer while we think about KPIs, etcetera […] start-ups think service-oriented, while we think product-oriented. For this reason, start-ups can help me to get more driven in digital innovations” (Interview IF-13).

[F_2 | +] Perceived Velocity of Start-ups. In addition, velocity was described with regard to innovative digital-based products, service, and processes. Experts discussed velocity in the context of problem-solving; one expert emphasized this in the following words: “Start-ups can solve small problems very well and quickly and, thus, react quickly to customer requirements and […] bring quickly innovative products into the market” (Interview IF-05). A large number of experts saw a benefit in the acceleration of business processes in the field of digital innovation through collaboration with start-ups, as “traditional organizational structures were good for the industrial age, but are overtaken in the digital age, […] start-ups can help to speed up“ (Interview IF-14).

[F_3 | +] Image Accretion. Experts saw a positive image effect achieved by collaboration with start-ups. Other expert statements aimed at an exclusively image-oriented collaboration, emphasizing good publicity. One of these experts described this impression in the following words: “Incumbent firms need a fresh breeze and innovative ideas […] I collaborate with start-ups because there is a trend” (Interview IF-03).

[F_4 | –] Perceived Risk due to short-lived Start-ups. Some experts from incumbent firms saw high risk in collaboration with start-ups, which indicates a skeptical attitude towards collaboration. In this context, some experts stated that, “statistically, only nine out of ten start-ups stay on the market more than a year. This is too risky for me and my work level” (Interview IF-01).

[F_5 | +] Access to Digital Natives. Digital natives are “young people growing up in the digital world with access to the technologies and the skills that I do not have” (Interview IF-02). In this context, some experts stated that “most of us (employees) grew up in an analog era” (Interview IF-01). In the same line of reasoning, one expert mentioned that, “without digital knowledge, it is challenging to integrate new digital products and services” (Interview IF-13).

[F_6 | +] Digital Business Strategy. With a corresponding digital business strategy, awareness and the importance of digital innovation are supposed to be ensured. Having such a strategy in place is “essential to pursuing digitalization and especially receiving support from top-management and […] this [digital business strategy] is often associated with the demand for a person responsible (e.g., chief digital officer) who provides a budget for collaboration efforts” (Interview IF-15). Furthermore, some experts stated that a digital business strategy enables “to seek to collaborate with start-ups” (Interview IF-08).

[F_7 | +] Thirst for Action by Start-ups. Most of the experts interviewed were excited about the power of start-ups. They stated that they were “full of struggles, adrenaline, and the intention to succeed” (Interview IF-09). This enables the motivation of some experts in a way, for instance, “to rethink longstanding methods” (Interview IF-02) in their usual work environment.

[F_8 | –] Culture Clash. Although start-up culture has been described as agile and fast, a start-up has also been characterized by short decision-making processes due to lean organizational structure. This cultural aspect of the start-up was viewed by most experts as a strong contrast to the culture of incumbent firms. For instance: “In my work environment, we need planning security” (Interview IF-15). Another expert stated: “The cultural difference makes it difficult to ensure the smooth running of the collaboration process. In addition, interface communication is often a problem” (Interview IF-14).
One-sided Power Relation. Incumbent firms prefer the sole decision-making power in the collaboration relationship. This means, “The higher the power position of the incumbent firm is in relation to the start-up, the more there is the power to govern the innovation process in the desired direction” (Interview IF-09). Furthermore, one expert emphasized a sentiment shared by others: “Authority and market experience are useful to enforce the interests of our firm” (Interview IF-01).

Unrealistic Conception of Start-ups. For some points, incumbent firms have more experience and knowledge than start-ups. Thus, many experts illustrated that they had to “[...] get start-ups back to reality” (Interview IF-06). One expert further stated, “Some ideas are not workable in practice or are simply unrealistic in their implementation. Some ideas are even uneconomical. [...]”, this is an unsatisfied outcome of collaboration efforts” (Interview IF-08).

Missing Awareness of Mutual Learning. Some experts from incumbent firms illustrated that “collaboration should be a mutual fertilization of start-ups and incumbent firms, [...] because incumbent firms can scale well and start-ups can deal with new thinking approaches and methods quickly [...] and go to the market” (Interview IF-03). However, “start-ups do not take part in any advice or pursue their ideas further” (Interview IF-11). Therefore, some experts recognized the necessity of a mentality of mutual learning.

Age Differences. In most cases, the representatives of incumbent firms were significantly older on average than the representatives of start-ups. According to the statements, the age differences led to misunderstandings and made collaboration considerably more difficult, as start-ups do not speak the “same language as the experts from incumbent firms. This means the language of the young entrepreneurs and digital natives” (Interview IF-04).

Access to required Resources. One of the most common characteristics of a start-up is limited resources. Most of the founders of start-ups interviewed stated that they hoped “to get relevant resources they need to scale their business model” (Interview SU-02). Thereby, the founders of start-ups emphasized that access to resources such as “budget, equipment, and business competence” (Interview SU-04) is highly relevant if the intent to collaborate with incumbent firms is to increase.

Perceived Risk due to Agreements. One of the most frequently stated factors was the design and arrangement of a contract that is negotiated and concluded for collaboration between incumbent firms and start-ups. One expert emphasized this issue in the following words: “The contract was very inconsistent, it had quite a lot of gaps and was very one-sided and showed only the interests of the incumbent firm and in no case the interests of my start-up” (Interview SU-13). When working together, forms were preferred in which the start-ups were not restricted in their freedom and were able to further develop the product and the business model without external influence. For many founders of start-ups, the services required were communicated very poorly or very late in the collaboration process. Instead, often “high-quality sounding, but not very helpful, training and mentoring programs were offered” (Interview SU-09). One of the interviewees found very clear words for this inhibiting factor: “Many programs promise lots of benefits, [...] and somewhere on the third page, it costs 5 or 7% of our start-up [...] They are working with entrepreneurs, therefore they should make a deal that is interesting for me” (Interview SU-14).

Digital Knowledge. Another relevant factor is the support of the collaboration process via the digital knowledge of the founders, as emphasized in the following words: “I have comprehensive digital knowledge, [...] this specific knowledge is necessary in the digital era and useful in a collaboration process” (Interview SU-03). For example, start-ups’ digital knowledge about burgeoning technical matters leads to the creation of data-driven business models; one of the founders summed it up by saying, “Our enabler is that we know that they can work with data” (Interview SU-11).

Unequal Power Relation. An important point for many founders of start-ups was to avoid external influences on the creative process of digital innovation. Especially in the early stage, after the founding of a start-up, it was important for many founders “to be able to change the digital innovation created, which has not yet been finalized, in order to meet their own requirements” (Interview SU-01).
[F_17 | −] Lack of Seriousness towards Start-ups. Some of the respondents had problems being taken seriously by incumbent firms. In some cases, internal processes hindered possible collaboration, mostly due to the “young age, the small size, and the lack of reputation” (Interview SU-03). One of the biggest obstacles was usually convincing the collaboration partner of their own abilities and not frightening them with the young age and small size of the start-up.

[F_18 | −] Limited Market Experience. Start-ups, which had particular difficulties explaining their products due to limited market experience, were more likely to report negative experiences than those who were able to present the functions and advantages of their products very precisely and simply. For example, one start-up founder emphasized this in the following words: “Due to our newly founded business, we do not have relevant experience. […] Therefore, we see a barrier to collaborating successfully” (Interview SU-06).

[F_19 | +] Usage of innovative IT-Tools. In this context, start-ups support the collaboration process with the benefit of IT-based innovative tools. One of the founders described this as follows: “We can operate at such a magnitude […] and I definitely think that is an enabler, because we base our activities on several IT-based, innovative tools” (Interview SU-09).

[F_20 | −] Usage of Cloud Computing. Another obstacle was seen by founders in cloud computing, especially with regard to data security. In the collaboration process, outsourcing of data to the cloud led to uncertainty by collaboration partner. In this context, the following quotations highlight the security concerns: “They (incumbent firms) do not trust us. Because we are a newly founded start-up, they are concerned with whether we are in charge of meeting their IT security requirements” (Interview SU-05). Furthermore, some founders stated that “in some practice, it is better when I use our common solutions based on cloud computing; however, the partner is not really happy about this handling […] Therefore, in most cases, I decline the usage of cloud computing, even though I could work faster (Interview SU-09).

Summarizing our findings, Table 2 illustrates how often each of the factors discussed above were mentioned throughout the interviews with experts. Each row contains a factor and each column one interview. The percentage of interviews in which a factor was mentioned (indicated by the symbol “■”)) was calculated separately for both groups. Furthermore, the last row contains the successful (S) collaborations stated by experts. Therefore, a successful collaboration means that the outcome was a digital innovation which was created and implemented.

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Table 2. Overview of the factors and their presence in the expert interviews.

As seen in Table 2, by comparing both groups, the enabling factor most frequently stated by experts from incumbent firms was “Perceived Innovation Performance”, and the enabling factor most frequently stated by start-ups was “Access to required Resources.” Furthermore, it is interesting that
while the “Thirst for Action by Start-ups” was often cited as the enabler for collaboration by incumbent firms, the “Seriousness towards Start-ups” was missing by start-ups and hindered the collaboration with incumbent firms.

The results of the expert interviews show that a few of the factors identified can be found in the literature. Analogous to Frimodig and Torkkeli (2013), access to business competence and the ability to transfer it to collaboration partner are also relevant factors in our research context. However, we also determined that the limited market experience of start-ups hinders the actual collaboration behavior process. This is a vicious cycle: On the one hand, incumbent firms have business competences that they can provide to start-ups; on the other hand, compared to start-ups, the limited market experience hinders start-ups to collaborate successfully. This can possibly be explained by culture clashes, as stated by incumbent firms, and a lack of seriousness towards start-ups, as stated by start-ups. Furthermore, the results of interviews illustrated that none of the collaborations observed had a clear definition of expected output, even though, according to Weiblen and Chesbrough (2015), this essential in a collaboration process. It is interesting to see that the literature has postulated that corporates need to create mutual value (Kohler, 2016), but experts from incumbent firms have stated that they missed the awareness of mutual learning by start-ups. Moreover, the management support is also a relevant factor (Kanbach and Stubner, 2016) that we have found in similar form in our empirical results. In a comparison of the factors presented in the literature with our findings, it can be noted that there is several newly identified factor in each category of the TRA separated between incumbent firms and start-ups.

To further discuss the findings of our research study, we used a crisp-set qualitative comparative analysis (csQCA) for systematic factor comparison. Originally, this research method has been known in political science and sociology. Meanwhile, csQCA has been applied also in Management Science, Business and Economics, and IS, among others (Ahuja et al., 2016; Greckhamer and Mossholder, 2011; Levallet and Chan, 2015; Marx, 2010; Ragin, 2006; Ragin, 2014). The csQCA allowed us to elaborate valid causalities from the database with a multitude of possible combinations of factors by applying Boolean algebra. First of all, we transformed the data-matrix from Table 2 into binary values (crisp-set: 1 = factor is fully in; 0 = factor is fully out) to determine which combinations of numbers of factors (k) are mapped for each case. Then, we calculated all the hypothetically (non-theoretical) possible $2^k$ combinations and determined which outcome had what combination. This procedure was applied to the dataset of incumbent firms and start-ups. This means that, for incumbent firms, there are $2^{12}$ opportunities, and, for start-ups, there are $2^8$ opportunities for factor combinations. Afterwards, we searched for the shortest combination to explain selected conditions without declaring a case with another outcome by using software tool (Drass and Ragin, 1992). After this reduction process, we generated the following solution formula in Figure 3, with Y representing successful collaboration from the viewpoint of incumbent firms (IF) as well as start-ups (SU). Thereby, in the boolean algebra, the character “+” stands for “or”.

$$
\begin{align*}
\text{ABCdeFGhijkl} + \text{ABCdefGHijkl} + \text{ABCDefGhijkl} + \text{AbCDEfGhljjkl} + \text{AbCDefGHijkl} + \text{ABcdEiGHiijkl} + \text{ABcDEfGHiJkl} + \text{ABCdeFGhiJkl} + \text{ABCdefGHJkJl} + \text{ABCDefGhiJKl} \rightarrow & \ Y(\text{IF}) \\
\text{bcDefgh} + \text{aBcDefg} + \text{AbCDEfgh} + \text{AbcDEfgh} + \text{ABcdefGH} + \text{AbCDEfGh} + \text{AbCDEFGh} & \rightarrow \ Y(\text{SU})
\end{align*}
$$

Legend:

- $A = F_{13}$ is fully in, ..., $L = F_{12}$ is fully in and $a = F_{1}$ is fully out, ..., $1 = F_{12}$ is fully out.

- $bcDefgh + aBcDefg + AbCDEfgh + AbcDEfgh + ABCdefGH + AbCDEfGh + AbCDEFGh \rightarrow Y(\text{SU})$

- $A = F_{13}$ is fully in, ..., $H = F_{20}$ is fully in and $a = F_{1}$ is fully out, ..., $h = F_{20}$ is fully out.

Figure 3. Solution formula for systematic factor comparison.
To take closer look at the equations presented above, the interesting results are that some factors can be overcome by other factors, and, nevertheless, collaboration between incumbent firms and start-ups can work successfully. For instance, the “Perceived Innovation Performance” by incumbent firms is essential and has a necessary condition in all factor combinations in order to have the best chance at collaborating successfully (see “A”, first solution formula). In contrast, from the perspective of start-ups in most cases, the sole existence of the highly relevant factor of start-ups’ “Digital Knowledge” does not have the sufficient condition to collaborate probably successful, but rather, it requires the presence of other factors (see “C” and “c”, second solution formula).

4 Conclusion

In the paper presented, we have illustrated that there is a need for current research and practice to pause and reflect on the accumulated body of research about collaboration between incumbent firms and start-ups with regard to fostering digital innovations. Our first step towards the formation of a corresponding insight into this phenomenon was, on the one hand, the demonstration that the existing literature has hardly dealt with the research topic discussed and, on the other hand, the identification of existing influencing factors from the related literature. The second step was to conduct a qualitative study based on 30 interviews with experts from incumbent firms and start-ups. The aim was to figure out whether the interviewees stated the factors that were found in the related literature and, in addition, whether there are new unknown factors. The results from the interviews with experts were interpreted, and the practical findings were compared with the theoretical findings. In this way, firstly, we have illustrated influencing factors that are relevant to incumbent firms’ and start-ups’ views in pursuit of collaboration with the aim of fostering digital innovation. In particular, we have provided new findings related to the enabling and inhibiting factors from a holistic viewpoint as a basis for the research discussion. By using csQCA, we were especially able to show what factors have necessary and sufficient conditions for successful collaboration between incumbent firms and start-ups. Secondly, especially for practitioners, we have shown the relevant factors, independent of the specific collaboration type, that should be considered when incumbent firms and start-ups want to collaborate with each other in order to be competitive in the digital era.

As in other studies, several limitations underlie our qualitative research. However, at the same time, these limitations provide interesting avenues for further research: By relying on a sample of experts from incumbent firms and start-ups, we were able to obtain a holistic view and could see how both groups behaved in the context of inter-organizational collaboration. For future studies, it might be very interesting to have a look at the sustainable success of each collaboration type (e.g., corporate-start-up accelerators, incubators, knowledge-based projects, etc.) at the organizational level. Against this backdrop, it would be interesting to analyze how organizational conditions should be designed so that employees of incumbent firms as well as start-ups can integrate the values – in terms of digital innovation – that are created through collaboration. Furthermore, due to the interpretive nature of our research, the results we have described represent the sense-making process of the researchers. Subjective personal judgments cannot be ruled out completely, even though we took great care to reflect the subjects’ opinions as accurately as possible. Moreover, it is difficult to make quantitative predictions. Therefore, it is necessary to validate our results with a quantitative study and discuss these results through the lens of relevant collaboration types.
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