Antecedents, processes and outcomes of collaboration between corporates and start-ups

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Abstract
Collaboration between corporations and sart-ups can dramatically accelerate respective actor's innovation process. Previous research on this phenomenon has mostly considered the large company's point of view on sart-up collaboration. There is therefore a research gap related to sart-ups' objectives, processes and outcomes from corporate collaboration, as well as to the relation between these three categories of variables. The purpose of this study is to identify the critical factors for sart-ups in collaborating with corporations. The paper synthesizes and discusses the findings from 12 qualitative case studies of corporate-sart-up collaboration in Sweden, including different collaboration models and different industrial sectors. It contributes to fill the current knowledge gap in research focused on critical factors for sart-ups in collaborating with large companies for innovation. The study identified three important dimensions: antecedents, outcomes, and collaboration characteristics. For each dimension the main variables and relations among variables are identified. This framework can be useful primarily for sart-ups and could guide them in their decisions related to partnering with large firms. The framework is, however, also useful for other stakeholders involved in corporate-sart-up collaboration initiatives, such as large firms, intermediaries like external accelerators, and the government. This is one of the first studies that explicitly addresses the phenomenon of collaboration between sart-ups and large companies from a sart-up's point of view. The study is not limited to a specific collaboration model such as for example 'accelerators', but includes different models used by large firms. Further, it identifies the factors that could guide sart-ups in analyzing opportunities offered by partnering with larger companies, and therefore could be important parts of their collaboration strategy.

Keywords: Sart-ups; Corporation; Collaboration; Open Innovation; Ecosystem; Partnership.

Paper type: Research paper.

JEL: M13, O32

1. Introduction
Collaboration between large companies and sart-ups is widely recognized as an opportunity to improve the innovation performance of both actors involved (Weiblen and Chesbrough 2015; Eriksson et al. 2019; De Groote and Backmann 2020; Steiber and Alänge 2021). Large companies can get quick access to new technologies, acquire talent, improve reputation, change their culture, and/or speed up their innovation processes (Hochberg 2016; Kohler 2016; Prashantham and Kumar 2019; Rigtering and Behrens 2021; Steiber and Alänge 2021). B2B sart-ups often look for a first paying customer in the form of a large

company. However, through collaboration they can also obtain new technological and managerial knowledge, get access to a network of customers and partners, and improve their reputation (Allmendinger 2019; Bereczki 2019; Kraus et al. 2020; Kaczam 2021). Collaboration is, however not without challenges (Scott et al. 2019) as there is a difference in cultures and operating methods, as well as in end objectives. This often makes interaction between the two 'problematic' (Katila et al 2008; Minshall et al. 2010; Hutter et al. 2020).

In recent years, collaboration models between large companies and sart-ups have multiplied (Weiblen and Chesbrough 2015; Peter et al. 2018; Steiber et al. 2021; Rondi et al. 2021). In addition, more commonly known models such as: corporate accelerators (Gutmann et al. 2019; Crișan et al. 2021), corporate incubators (Morgan 2014; Hausberg and Korreck 2018) and corporate venture capital programs (Huang and Madhavan 2020), have been joined by non-equity models in which the large firm doesn't take any equity in the sart-up. These non-equity models have in the last decades disseminated to many parts of the world. Examples of these models are: co-creation, co-location, platforms, sart-up programs, and sart-up supplier programs (Srinivasan and Venkatraman 2018; Kurpjuweit and Wagner 2020; Steiber et al. 2021).
The common factor between equity-based and non-equity-based models is that the collaboration program is launched and run by *large companies*. For this reason, most of the studies on the subject have therefore concentrated on the point of view of large corporations, striving to identify the characteristics of successful programs (Frow et al. 2015; Kohler 2016; Moschner et al. 2019). However, as the models all are based on the underlying assumption that both parties will win on the collaboration, success cannot be separated from an understanding of the needs, objectives, and operating methods of sart-ups. The large firms' design of collaboration programs must take sart-ups' point of view into account to avoid errors that would otherwise compromise their success (Weiblen and Chesbrough 2015; Prashantham and Kumar 2019). In recent years, therefore, appeals in research literature to address this issue have therefore drastically increased (Minshall et al. 2010; Park and Bae 2018; Steiber et al. 2021).

Some articles have studied the objectives and approaches of sart-ups in the case of specific models of collaboration, such as corporate accelerators (Crișan et al. 2021) or corporate venture capital programs (Riepe and Uhl 2020). But large companies' challenge of choosing the strategically best collaboration model (or portfolio of collaboration models), has not in the same extent been discussed from a sart-up's point of view (Gutmann 2019; Enkel and Sagmeister 2020). It is not clear whether sart-ups have explicit preferences for one collaboration model rather than another. Nor is it clear what the link is between a specific model of collaboration and the results obtained, or the difficulties encountered, based on the sart-ups' objectives and structure (Allmendinger 2019; Steiber et al. 2021). While some empirical research have found that highly innovative sart-ups totally avoid collaboration (Goncalves et al. 2020), or certain forms of collaboration with incumbents (Simon et al. 2019), it is not clear, if the sart-ups base their decision mainly on a general perception of the objectives/culture/capabilities of the large company, or if the model used by the large firm matters for this decision. Some authors suggest that sart-ups have their specific objectives and ways of working when collaborating with large firms (Allmendinger 2019), but these aspects are not researched well enough, and therefore, little understood (Minshall et al. 2010).

There is therefore a gap in the research literature relating to the objectives, processes and outcomes of collaboration with larger firms, from a sart-up's point of view. The assumption made in this study is that sart-ups actively contribute to the modification of collaboration processes. In other words, the same collaboration program results in different collaboration projects based on the features of the specific participating sart-ups. The more specific research questions to be answered are therefore:

R1: what are the critical factors for sart-ups in collaborating with corporations?
R2: how are the critical factors related to each other?

To fill this gap, this paper synthesizes and discusses findings from 12 Swedish qualitative case studies on corporate-sart-up collaboration. The collaboration models used differ between the cases and the cases also represent different industrial sectors.

Instead of using a discrete categorization of interaction models (for example distinguishing between accelerators, sart-up programs, corporate incubators and so on), the critical sub-dimensions, characterizing

the collaboration projects, were identified. Indeed, collaboration models can vary according to dimensions such as, duration, location, level of structure, presence of reimbursement for the sart-up, and if the corporation takes equity or not in the sart-up, just to name some of the main dimensions (Weiblen and Cheesbrough 2015; Steiber et al. 2021). In fact, two programs, or even two projects within the same program, can vary in terms of duration, distance between the partners and so on.

A qualitative and exploratory multiple case study (Flyvbjerg 2006; Yin 2014) is used for identifying the main dimensions (antecedents, organizational characteristics and outcomes) for sart-ups, collaborating with large firms. The main contribution of the paper is an original theoretical framework for analyzing corporate-sart-up collaboration from a sart-up's point of view. The framework identifies not only the main dimensions, from a sart-up's point of view, but distinguishes one collaboration program from another. In addition to distinguish the three dimensions: antecedents, collaboration characteristics, and outcomes, the framework suggests conditions under which certain characteristics of the collaboration will be observed. Given the exploratory nature of this research, the findings need to be validated in future studies.

The framework can primarily be useful for sart-ups and could guide them in their decisions related to partnering with large firms and enter different types of collaboration programs. However, the framework is also useful to other stakeholders involved in collaboration initiatives such as, large firms and intermediaries, like external accelerators, and/or the government. The following sections present the theoretical context, research method, a synthesis and discussion of findings, and finally conclusions and limitations and avenues for future research.

2. Theoretical background

2.1 Defining corporate-sart-up collaboration

The term sart-up indicates companies in the initial stage of their life cycle. In recent decades, the term has often been associated with young companies characterized by a strong drive for innovation and in many cases high technological content. Alternative terms that indicate the same phenomenon are high-tech entrepreneurial ventures or young tech ventures (Kraus et al. 2019). In particular, a sart-up is an entrepreneurial venture in search of enough financial backing to get off the ground. For this reason, sart-ups are characterized by both a scarcity of human and financial resources, but also of experience. The lack of experience commonly translates into poor knowledge of the industry and of management and organizational processes.

Despite this, sart-ups have proven capable of producing disruptive innovations for entire industrial sectors, sometimes so well so they become actors of equal rank to large companies in innovation processes (Del Bosco et al. 2019). This has prompted many large companies to actively seek collaboration with sart-ups through alliances and ecosystems. By collaboration, we mean a form of relationship that is different from both a hierarchy and an open market (Williamson 1991). It is different from the hierarchy because, although the acquisition of the sart-up by the company is one of the possible outcomes of the interaction, at least initially the two entities are legally distinct. Further, it is different from the market because it is not only about the exchange of goods or services in exchange for money, but of much more articulated and coordinated interactions. Collaborative experiments are mostly initiated on the initiative of large companies or governments. The latter, through the promotion of these collaborations, aim to promote innovation processes in general and the growth of innovation ecosystems. The result of the experimentation has been the development of many forms of interaction. Steiber and colleagues have singled out eight possible models (Steiber et al. 2021). Among those, some are equity-based (the alternative is non-equity-based), meaning that the larger firm fund the sart-up by taking equity, some puts premium on geographical proximity, that is that the sart-ups are co-located close to the large firm, and some have a short duration, while other have a longer duration.

2.2 Benefits and challenges of collaboration from the sart-up's point of view

The existing literature has often stressed that the collaboration between sart-ups and large companies allows both to achieve important advantages. Aggarwal and Wu (2018) present an overview of literature on collaborative relationships between sart-ups and incumbent firms, underlining that value creation can occur by combining the knowledge and innovations of the sart-ups with the knowledge assets and complementary

assets of the incumbent firm. Through collaboration with large companies, sart-ups can overcome liabilities of smallness and newness (Ferreira et al. 2019; Kraus et al. 2020) and have a positive effect on their image (Bereczki 2019). By becoming a paying client to a sart-up, a large company can contribute to its growth provided the collaboration is organized to create a supplier that can scale on an open market (Kurpjuweit and Wagner 2020). Nonetheless, some authors challenge the idea that collaboration is equally beneficial for large corporations and sart-ups. Huang and Madhavan (2019) conducted a meta-analytic study of corporate venture capital (CVC) and found that corporate benefits are greater than venture benefits. Minsky (2019) argues that some large companies set up an "innovation theatre" with the aim of improving their image and becoming more attractive for new talents.

Several authors believe that the collaboration between corporations and sart-ups is characterized by the benefits, but also by challenges. Several potential challenges for sart-ups have been identified in the literature.
The diversity between the partners can affect the likelihood of a successful cooperation and a negative experience can even impact the future innovativeness of sart-ups (Gimenez-Fernandez et al. 2019; Ricciardi 2021). Working with large corporations requires dealing with a different cultural approach, as well as a different way of organizing work, based on hierarchies and bureaucracy, which sart-ups are not used to deal with (Bagno et al. 2020). The success of the collaboration is influenced by numerous factors, internal to the sart-up, such as competence, attitude, relationship, and resources (De Groote and Backmann 2020).
The imbalance in the power of partners can be a cause of distrust, especially on the part of sart-ups towards large corporations (Aggarwal and Wu 2018). The suitability of the sart-up for the specific project is also relevant. Even if sart-ups can greatly contribute to exploratory projects, only a minor part of them has the capabilities and resources for scaling rapidly and meet the purchasing demands of regular supplies (Hogenhuis et al. 2016).
Given the entrepreneurial nature of sart-ups, also the personal characteristics of the members of the entrepreneurial team, for example self-efficacy, play a critical role (Allmendinger and Berger 2020).
Sart-ups' perceptions of the characteristics of the large firms also affect their choice of collaboration partners. Goncalves et al. (2020) researched how culture influence organizational agility and how it hinders or enables digital innovation in incumbents and sart-ups. The most innovative sart-ups were those with a clan and adhocracy culture and open to team up with external partners, including incumbents. However, these sart-ups emphasized that it needed to be a win-win situation and they were therefore reluctant to team up with those incumbents that primarily wanted to collaborate with sart-ups in order to improve their own image.

2.3 Model of collaboration

The challenges discussed in the previous paragraph can be mitigated by environmental factors. For example, a reliable intellectual property regime mitigates the fear of a sart-up of losing its intellectual property (Aggarwal and Wu 2018) or other defense mechanisms to protect the sart-up's resources such as secrecy and timing (Katila et al. 2008). Most importantly the partners can actively contribute to overcoming these difficulties by implementing an adequate collaboration model.

In the literature, collaboration models are often presented as a set of discrete solutions, such as sart-up programs, accelerators, incubators, and corporate venture capital firms (Enkel and Sagmeister 2020). Steiber et al. (2021) identified up to eight different models. Again, the perspective is mainly that of the large corporation. Large companies need to select the most suitable collaboration model (Hogenhuis et al. 2016), or combine different forms of collaboration, suitable for its objectives (Gutmann 2019; Enkel and Sagmeister 2020). Less attention has been paid by the literature on sart-ups, whose point of view is often considered only as a function of the impact it has on the success of the initiatives of large companies (Steiber et al. 2021). Some authors, however, point out the need for sart-ups to develop their own collaboration strategy (Bereczki 2019). This implies a need to understand the dimensions, which characterize the collaboration from the sart-up's point of view to propose strategies and interaction models suitable for their goals. Garidis and Rossmann (2019) underline that sart-ups' approaches towards collaboration differ from case to case in terms of cooperation intensity and cooperation quality, with consequent different results in terms of sart-up performance. The intensity and quality of the collaboration are conditioned by the presence of mentorship and coaching services, or even by the presence of financial means, all aspects outside the decision-making

sphere of the sart-up, and in the hands of large companies, or any internal or external intermediaries such as incubators, accelerators or innovation hubs. Simon et al. (2019) found that sart-ups with market-ready technologies prefer looser collaborative agreements with corporations than sart-ups with early-stage technologies that look for closer collaborations, such as joint R&D projects or corporate programs such as accelerators or incubators. Interaction can be characterized by passive knowledge flow among parties as well as by active joint knowledge creation (Aggarwal and Wu 2018).

Even if the difficulty of sart-ups in interacting with the complex organization of large companies is often highlighted in the literature (Bereczki 2019), there is a lack of studies on how collaboration is organized (Bagno et al. 2020). The most frequently cited element is the need to prepare a unique and easily recognizable point of contact (Allmendinger and Berger 2020). Collaboration processes are perceived as rigid by the sart-ups, which suffer from the corporations' unwillingness to discuss and adapt initial agreements (Hogenhuis et al. 2017). Collaboration processes are often conceived as stage-gate processes (Kurpjuweit and Wagner 2020). The most studied phases are those starting with scouting of sart-ups until proof of concept. Less investigated is the integration of the solution provided by the sart-up into existing business units, which according to some authors represents a major problem (Hutter et al. 2021). Hogenhuis et al. (2017) further emphasize that the initial setup and communication leading to a partnership can have a strong impact on the outcomes.
The collaboration can be supported by external intermediaries, for example consultants running accelerator programs, which help reducing the asymmetries between partners, facilitate trust, and help reducing barriers to an effective collaboration (Crisan et al. 2019).

Physical proximity is considered an important dimension. Separation can help avoiding conflicts among sart-ups, and between sart-ups and large corporations, but might also lead to less impact on corporate culture, less integration of talent from sart-ups, and reduced innovativeness for large corporations (Bagno et al. 2020; Rigtering and Behrens 2021).

To summarize, the existing literature has often stressed that the collaboration between sart-ups and large companies allows both to achieve important advantages. However, some authors challenge the idea that collaboration is equally beneficial for large corporations and sart-ups. Further, Steiber et al. (2021) identified up to eight different collaboration models, but the perspective is mainly that of the large corporation. There is therefore a need to understand the dimensions, which characterize the collaboration from the sart-up's point of view, in order to propose strategies and interaction models suitable for their goals.

3. Methodology

3.1 Design and data collection

The study was exploratory to its character and therefore, a multiple qualitative case study approach was chosen to address the research questions. This approach is especially useful to address 'why' and 'how' questions in a real-world context (Yin 2014) and in general for theory building (Eisenhardt and Graebner 2007). Additionally, the multiple-case approach increases external validity and mitigates observer bias (Eisenhardt and Graebner 2007; Yin 2014).

Cases of sart-ups collaborating with Swedish large corporations were strategically selected to obtain enough variation and thereby increase the generalizability of results (Flyvbjerg 2006; Eisenhardt 2021). The participating sart-ups were identified via direct contact with eight corporations, ABB, AstraZeneca, Cytiva, Electrolux, Ericsson, Lantmännen, Stena Metall, and Volvo Group, all part of a government funded three years- research project focused on corporate-sart-up collaboration for increased innovation. All corporations apply different collaboration models, and the researchers collected the corporations' perspective, as well as details about their respective model well before the interviews with their respective sart-ups.

This provided a unique opportunity for the researchers to identify sart-ups' view of different models. Of the eight corporations, seven of them came back with 1-4 sart-ups each to be part of the study. Each corporate then introduced the researchers to someone in the founder, or executive team and an interview was scheduled between the researchers and the sart-up contact. In total 12 sart-ups were interviewed during June 2020 to

September 2021. Neither the corporation, nor any government representatives, were part of the interviews as the researchers wanted to protect the interviewees, and secure an open communication by making the data anonymous.

Table 1 summarizes the main sart-up features.

<Table 1 here>

Data were collected over Zoom in 60-90 minutes interviews, conducted by two senior researchers. In total 12 interviews were conducted, recorded, and transcribed via Otter.ai, as well as via manual notes taken by the researchers. The interviews were then followed up with questions in an email if needed. New insights from the interviewees were used to modify the protocol in later interviews to fill white spaces not identified originally by the researchers. Further, a semi-structured interview protocol was prepared and used to guide the collection of data. The questionnaire included two sections: the first section included questions about structural characteristics of the sart-up (e.g. number of employees, revenues, year of foundation, business model), while the second section included questions related to when they joined the collaboration with the corporation, their expectations on outcome and results from the collaboration, their perspective on the specific collaboration model (benefits and challenges), and their lessons learned from the collaboration (see appendix). The questions were also complemented by showing a figure of a three dimensional framework for evaluating corporate-sart-up collaboration, emphasizing: the Stakeholder perspective; the Performance criteria/metrics used; and the Time dimensions (Figure 1 in Steiber et al. 2021a). Interviewees were, as was mentioned above, the founder of the sart-up or an executive director with extensive knowledge of the sart-up.

To supplement the interview data, additional information on each sart-up was collected from the Internet and documents provided by the partners. Secondary data was used to acquire information about the interviewed sart-ups, their context, and the collaboration projects. Secondary data was also used to complete table 2 below.

A summary of the data collection process is reported in table 2.

<Table 2 here>

3.2 Data analysis

The data analysis was aimed to defining factors that would shed a light on the two research questions presented in the introduction; how both corporations' and sart-ups' objectives and characteristics influence the sart-ups' choice of collaboration models, as well as how the collaboration model influences the results and create difficulties from the point of view of the sart-up. By using and comparing multiple cases, factors were identified and singled out. The analysis of the data was conducted in two phases: first, within-case analyses were carried out to become more familiar with the individual cases. Second, cross-case analyses were conducted to integrate results of the 12 cases, comparing similarities and variations and single out patterns which could be fed in the theoretical analysis (Yin 2014; Eisenhardt 2021). A cross-case analysis can mobilize knowledge from individual case studies and then accumulate case knowledge, compare and contrast cases, and in doing so, produce new knowledge.

In the first phase, data were analyzed with reference to each case individually. For the analysis of content, an approach was used, derived from grounded theory (Strauss and Corbin 2008). Transcripts of the interviews were read and coded by at least two of the authors separately for each of the cases and the aim was to identify relevant factors (Pratt 2009). First-order factors were then grouped together in second-order themes that describe the data at a higher level of abstraction (Clark et al. 2010). Finally, the authors grouped the second-order themes into three aggregate dimensions (Silva et al. 2021). In the second phase, results of the within-case analysis were compared across cases. Factors and themes were further modified to better account

for similarities and variations. For example, the factors related to the outcomes of the collaboration were first grouped in two themes labeled “tangible outcomes” and “intangible outcomes”. These two labels were later changed into “short term benefits” and “long term benefits” since this better described the statements of interviewees across cases. The authors continued to modify the factors and themes at each of the three levels until achieving a satisfying level of internal consistency, cross case consistency and fit with the data. Results were used to devise the theoretical propositions which represent the main result of this paper. The study retained the relationships replicated across most (or all) of the cases (Eisenhardt and Graebner 2007).
The use of secondary data made it possible to keep interviews lean. Besides, this data was used to validate statements from the interviews and help interpreting ambiguous statements and completing missing data (e.g. in some cases the duration of the program reported in table 2). Finally, a workshop was conducted on Zoom, including the researchers, the sart-ups and the large corporations. The workshop was structured into two main parts: a presentation of main research findings on how the sart-ups perceived the collaboration with their respective large firm, followed by an open forum for questions and answers, as well as a discussion around the findings.

Figure 1 shows the data structure for the findings.

<Figure 1 here>

4. Results

The analysis of the cases has led to the identification of three main dimensions through which it is possible to describe the way in which sart-ups see their collaborations with companies: 1) the antecedents of the collaboration; 2) the outcomes or benefits and 3) the model characteristics for the collaboration. Results are summarized in table 2 and are discussed below with reference to each of the three dimensions separately.

<Table2 here>

Antecedents. By antecedents we mean the conditions that led to the activation of the partnership. In this sense, the most frequently discussed topics are 1) the trigger, that is the objective or occasion that gave rise to the collaboration and 2) partners’ objectives.
Regarding the trigger, according to interviewees in most of the cases, the collaboration was a result of the sart-ups actively seeking collaboration with the large company. The following excerpt is an example:

> *“We wanted to decrease the process time and increase the efficiency. We thought we could do it with [name of the large corporation]. We didn't know much about them but had an interview with [name of a manager] and then wrote an application”.*

Only in two cases the sart-up participated in programs launched by a corporation and in one case in a program launched by the government as a response to a public call. Instead, another frequent trigger was the activity of an intermediary organization (e.g., private accelerators) which stimulated both the corporations and the sart-ups to collaborate. Further, improving the company’s brand and facilitating its growth are often the motives for the sart-ups to seek collaboration. Based on their goals, sart-ups look for suitable partners and suitable collaboration projects. Consequently, we identified brand and growth objectives as antecedents of the characteristics of the collaboration.

Regarding objectives, the sart-ups perceived that the large corporations many times looked for access to new technologies or technology competences, and to a lesser extent were interested in a commercial agreement. One interviewee commented that this can also be a reason for a sart-up to be selective when it comes to which large corporation to engage with:

> *“What we learned as a sart-up company since 2017, is that entrepreneurs are not stupid. Many big companies try to invite sart-ups, trying to make them pitching their ideas, but at the end, many of them had really bad attitude. They were just taking these fresh ideas from the sart-ups, and nothing happened either because they don’t want things to happen or they have the wrong people to take the right actions. And it happens here that sart-ups, actually they get like hitting*

back and start to say why should I go and pitch my ideas to someone I don't believe that I have any chance to do business with ."

In a few cases they sold services to the sart-ups as part of their collaboration model. For sart-ups the most frequently cited goal was learning, followed by getting a paying customer and then obtaining visibility or expanding their own network. Most of the times the sart-up had a well- defined set of operational goals that guided them through the collaboration, but lacked more financial or market goals on what to expect in the form of financial or market outcome.

***Outcomes (benefits) of collaboration*.** By benefits it is meant the outcomes of the collaboration. They are usually described in positive terms (hence the term "benefits") and relate to outcomes of the specific project. Our interviewees tended to distinguish between short term and medium- to long- term benefits. For example, an interviewee provided the following statement that was interpreted as a long- term benefit of co-location:

"The interaction with other sart-ups was great! We built our network due to this. [Name of partner company 1] is one of those new contacts. We also came in contact with [Name of partner company 2] and worked close to them. They are our suppliers now and exchanged strategic experiences".

While in one case the fact that the corporation bought a product from the sart-up, output was considered a short- term benefit. In another case the relation with a venture client was viewed as a long- term benefit.

"Getting into the system and being recognized as a supplier to [Name of corporation] is quite complicated. This has been straightforward for us. I was surprised that we became listed as a supplier within a couple of days. Actually, they have been so kind to connect us to their suppliers and now we are working to deliver to [Name of corporation] through them."

The most frequently cited short term benefits for sart-ups include access to skills and equipment available at large companies, acquisition of financing and validation of technology through proof of concepts (PoCs). The long- term benefits for sart-ups, on the other hand, include the improvement of the corporate image and the increased recognition of the brand and the expansion of the network of relationships providing access to new customers. Interviewees stressed the relevance of both short- term and long-term benefits, like learning and networking. For example:

"It has been very good for us, and it has been a journey where we have learned a lot. When we started, we had 2 guiding stars; have fun and not think that we know, but prototype to learn".

In several cases, the sart-ups seemed disappointed with the large corporation's focus on short- term project results. For example:

"We wanted to become a supplier. The PoC was never the end goal. The large firm only wants to do a number of PoCs".

Or with the unbalanced distribution of risks:

The distribution of risks became wrong. We invested 400-800K SEK in a PoC (3-6 months). The end goal for [name of the large corporation] and [name of the intermediary] has been unclear. We have been very clear that a PoC was not the end goal.

The tendency of the large organization to focus on short- term goals, was in many cases perceived as the main challenge and caused related difficulties, like lack of commitment, misaligned communication and mistrust.

Collaboration characteristics. The sart-ups tended to describe the way of working in their collaboration projects along seven dimensions reported in table 2. According to our analysis, collaboration models are characterized by things such as: different project duration, geographical co-location or not, presence or absence of intermediaries and, large firms' acquisition of equity and/or presence of a sart-up reimbursement.

Furthermore, there are projects in which the objective for the collaboration is well focused, for example the conduct of a proof of concept (PoC) versus projects with a broader objective (e.g., co-location of numerous sart-ups for developing an ecosystem). Finally, there are examples of collaboration in which processes are structured, driven by a predefined plan, and others in which interactions are mostly unstructured. For example, the collaboration project described in the following excerpt from an interview was considered based on a structured process:

> *"We have a shareholder agreement with different levels to reach before we activate next step. There is also a policy for distribution of company profit and for exit. The steps were clear: 1. Start the process and quality assure the product and get it CE labeled. 2. PoC in larger scale 3. Scale and diffuse the methodology".*

In general, co-located initiatives prevail over those with remote interactions and those without reimbursement for sart-ups prevail over those with reimbursement. Structured processes, i.e., interactions that follow a predefined methodology, prevail, especially when an intermediary is involved in the process. There is no clear-cut prevalence of long- term over short- term partnerships, or vice versa, and narrow-focus collaborations versus open-scope collaborations are equally common.

Intermediaries, which are associated with structured processes in relation to the scouting and selection phases, are also perceived as supporting the selected sart-ups in navigating in the new context (i.e., new market, new partners) brought about by the collaboration. In broad scope collaborations their role is perceived as critical to stimulate interactions and smooth conflicts.

Relations between the three dimensions. The research evaluated whether there were shared patterns among several cases, that is, if there were groups of cases in which the considered variables assumed similar values. Only the cases in which the focus of the collaboration is broad, that is, those in which the partnership was not created for the realization of a specific objective, but promotes a wider interaction between the partners, show a certain regularity. According to the findings, indeed, this type of collaborations is generally promoted by an intermediary and involves the long-term interaction between the sart-ups and the large company that are located in a common area. Contrary to what one might expect, these collaborations are characterized by structured processes.

In the cases in which the focus of the collaboration was narrow, instead, a great variability was observed in the collaboration models, which seem to be tailored to the specific objective of the collaboration rather than following predefined patterns. In these cases, little emphasis was placed on long- term goals. Where this has happened, the most cited benefit has been the improvement of the sart-up's brand. Among the short- term results, however, the validation of the technology through PoC is often cited.

Not surprisingly the obtained results are not often in line with the goals that triggered the collaboration. For example, sart-ups looking for a paying customer were in several cases disappointed but admitted being satisfied with their collaboration experience since they gained new knowledge and new contacts.

5. Discussion

As was identified in previous literature an imbalance between the large and the small firm can create mistrust between the parties. Further, sart-ups' perception of the large firm, as well as the type of project (providing business value for the sart-up) do play an important role for a successful corporate-sart-up collaboration (Aggarwal and Wu 2018; Goncalves et al. (2020); Hogenhuis et al. 2016).

Therefore, one of the first findings of this study is that sart-ups often demonstrate a high degree of awareness in undertaking collaborative initiatives with large enterprises, which means that they actively seek collaboration with a set of predefined goals. Responses of the interviewees suggest that, independently from their specific objectives (branding, growth, learning and so on), sart-ups actively seek suitable partners and suitable collaboration projects.

The extent of the phenomenon is such that sart-ups, from passive recipients of the initiatives of large corporations, have turned into active actors seeking to influence the collaboration process. These findings suggest an evolution of the phenomenon compared to what has been observed in the past and it is consistent with more recent studies (Kraus et al. 2020; De Groote and Backmann 2020). The active role by sart-ups also includes the action to avoid collaboration with large companies that they don't trust are inclined to develop a collaboration beyond a PoC (Goncalves et al. 2020). Reasons mentioned were the 'Not Invented Here (NIH) syndrome, but also incentive systems in large company's R&D organization that lead the corporate personnel to interact with sart-ups in order to obtain new ideas, and even take ideas from sart-ups in order to fulfil their internal KPIs and then put them on the shelf.

As with corporations, these goals can be of a different nature (Bagno et al. 2020). Some sart-ups have an exploratory attitude and seek learning opportunities in the partnership. Others also combine this with the objective of realizing their activities by achieving economic and financial results. Our findings suggest that the first purpose prevail over the second. Sart-ups with previous experience of collaboration with corporations seem to value domain specific learning from their larger partners. Inexperienced sart-ups tend to appreciate the opportunity to validate their technology as well as strengthen their brand (Simon et al. 2019).

The interviewed sart-ups' perception is that there exist a rather clear distinction between the collaborations in the context of wide-ranging objectives versus the context of specific objectives. The former is characterized by a long- time horizon, geographical proximity between the actors involved, and in general by the presence of an intermediary that facilitates interaction and manages aspects of common interest for the partners. These forms of collaboration are characterized by long term benefits such as the expansion of the sart-up's network of contacts. Consistent with what was suggested by Valkokari et al. (2017), sart-ups try to build their own future innovation ecosystem through collaborative initiatives with large companies (Berman et al. 2021). In collaboration geared by specific objectives, on the other hand, there is a great variability of the forms of collaboration, which seem to be tailored to the needs of the specific project. In this case the benefits obtained are described mainly in terms of learning. Consistently with past studies we found that intensity of interaction is an aspect of the collaboration sart-ups strategically modulate according to their goals (Garidis and Rossmann 2019), even if no strict relation with the level of maturity of the technology, as suggested by Simon et al. (2019), has been observed.

Interaction with large companies is considered as a strategy for acquiring missing skills, even before being a way to obtain economic and financial results. Beyond the technological skills, in fact, the sart-ups, including those interviewed, show in many cases a lack of organizational and market skills. Participation in wide-range, long-lasting initiatives characterized by geographic proximity, allows them to acquire skills of this type. This is consistent with past research, for example with the claim of Riepe and Uhl (2020) that unless financially constrained - sart-ups look mainly for learning, or access to competence/technology, and networking opportunities. Focused interactions involve learning, also from a technological point of view, on specific topics. It is a type of exploitative learning (Midler and Silberzahn 2008).

Consistently with the previous literature we found that intermediaries play a relevant role in the scouting phase (Crișan et al. 2021). From the sart-ups' point of view, they are the main point of contact with large corporations. Even in the cases in which the collaboration was initiated by the sart-up, it happened to be the intermediary organization that created the opportunity for the encounter. They also helped the sart-ups navigating in the new context and were the main point of reference for the sart-ups. If this in any of the cases was perceived as creating a distance to the corporation, it was in most cases still considered as a support in avoiding mistakes and waste of time.

6. Conclusions

The purpose of this paper is to identify the critical factors for sart-ups in successfully collaborating with corporations (create a win-win situation). Specifically, the paper addresses two research questions: what are the critical factors for sart-ups in collaborating with corporations? And how are these critical factors related to each other?

As has been discussed, the three dimensions: antecedents, outcomes, and collaboration characteristics could be used to answer the two research questions. Starting with antecedents it is clear from the results that both the initial trigger, as well as the sart-up's main objective with the collaboration, affect the choice of collaboration model, as well as the results and degree of difficulties. The triggers can be a pitch event, a call for sart-ups to be able to be co-located to a physical place close to a large firm's own R&D, or a normal commercial sales opportunity. The sart-ups in our sample showed a high level of awareness in evaluating these opportunities and based on their main objective with the collaboration, they adapted the collaboration models. Interestingly the sart-ups' objectives and characteristics might not affect the large firm's model. An example of this is when a more mature sart-up contacted a large firm to do business, e.g., to sell a technology license and still had to go through a similar sourcing process and a PoC phase as a less matured sart-up had to do. However, the interviews also revealed that there is a growing awareness within some of the corporations that they need to improve their way of collaborating with sart-ups towards a more tailored approach towards different stages of sart-ups, as well as towards a more agile culture (Rigtering and Behrens 2021)

The second dimension, 'outcomes', will affect the sart-up's overall satisfaction with the collaboration. One of the main difficulties found in the studied cases is the difference in expectations between the large firm and the sart-up. As an example, a more mature sart-up that wants to make business, rather than test and validate their technology, should make sure that both parties share 'industrialization' as the end goal, and that this is clearly communicated and included in the contract. It is important that the large firm is transparent and state their own goals upfront with the sart-up to save time and money for both parties, as well as keep a goodwill within the sart-up community.

Finally, the third dimension 'collaboration characteristics' doesn't refer to a certain category of collaboration models, nor a single model, like corporate venturing, but focuses rather on the underlying dimensions of the model. For example, one dimension could be 'geographical proximity', that is how close the sart-up is to be co-located to the large firm for tapping into the large firm's domain expertise, as well as from other related sart-ups, present in the same area. Another dimension is 'sart-up equity'. If this dimension is important, the sart-up should choose an accelerator, corporate venturing or acquisition model, and the objective is to secure funding and to access the large firm's domain expertise and market channels to scale the sart-up quicker.

This paper has provided new knowledge on how the initial trigger, or sart-ups' objective, as well as how expectation on outcomes, and the set-up of the program, influence sart-ups' willingness to collaborate with a specific large firm via their collaboration model. The paper has implication for theory. It improves our understanding of sart-ups' specific needs and how these correlates with their success (reaching their objectives) by being part of different collaboration models. Currently, many different models have been identified from a corporation's perspective, but little is known on what sart-up characteristics best fit what model and how this model's underlying dimensions affect the sart-up's outcome. As this paper has shown, talking about a certain model on a high level is of less interest to understand how that model truly affects the success of the sart-up. Instead, the models underlying dimensions should be clarified and described and investigated in terms of how each affect the objective of the sart-up.

The findings of this study also have implications for practice. Large firms' bridging units working with sart-ups need to spend more time upfront to truly understand the sart-up's objective and needs, and if these match the objective and needs of the large firm. Further, this put demands on large firms to really think through the objective and strategy behind their sart-up program. Why does it exist? How exactly will it create value to the large firm and to the sart-up? What kind of sart-ups would best match our own objective and strategy with the program? Is there a need to tailor the program to different segments of sart-ups? These kinds of questions should be part of any large firm's process if they want to become serious about their sart-up programs and get some leverage from them.

The primary limitations of this paper and its underlying study is that the number of interviews per case is limited. This might introduce a bias in the perception of the collaboration experience. Besides, only two sart-up cases are from other European countries than Sweden. Each country's business culture could affect the large firms' way of working with sart-ups. Future research needs to investigate how different business

cultures affect the success, or failure of corporate-sart-up collaboration models in different countries. Further, as little previous knowledge exists regarding the integration phase of a corporate-sart-up collaboration, future research is needed to cover this knowledge gap on how the integration phase could be managed in order to secure different outcomes, and thereby value for both parties. Finally, more knowledge is needed on how collaboration between corporations and sart-ups is affected by the parties' different way of working with research and development, e.g., the use of a Stage-gate model versus an agile approach.

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Figure 1. Data structure

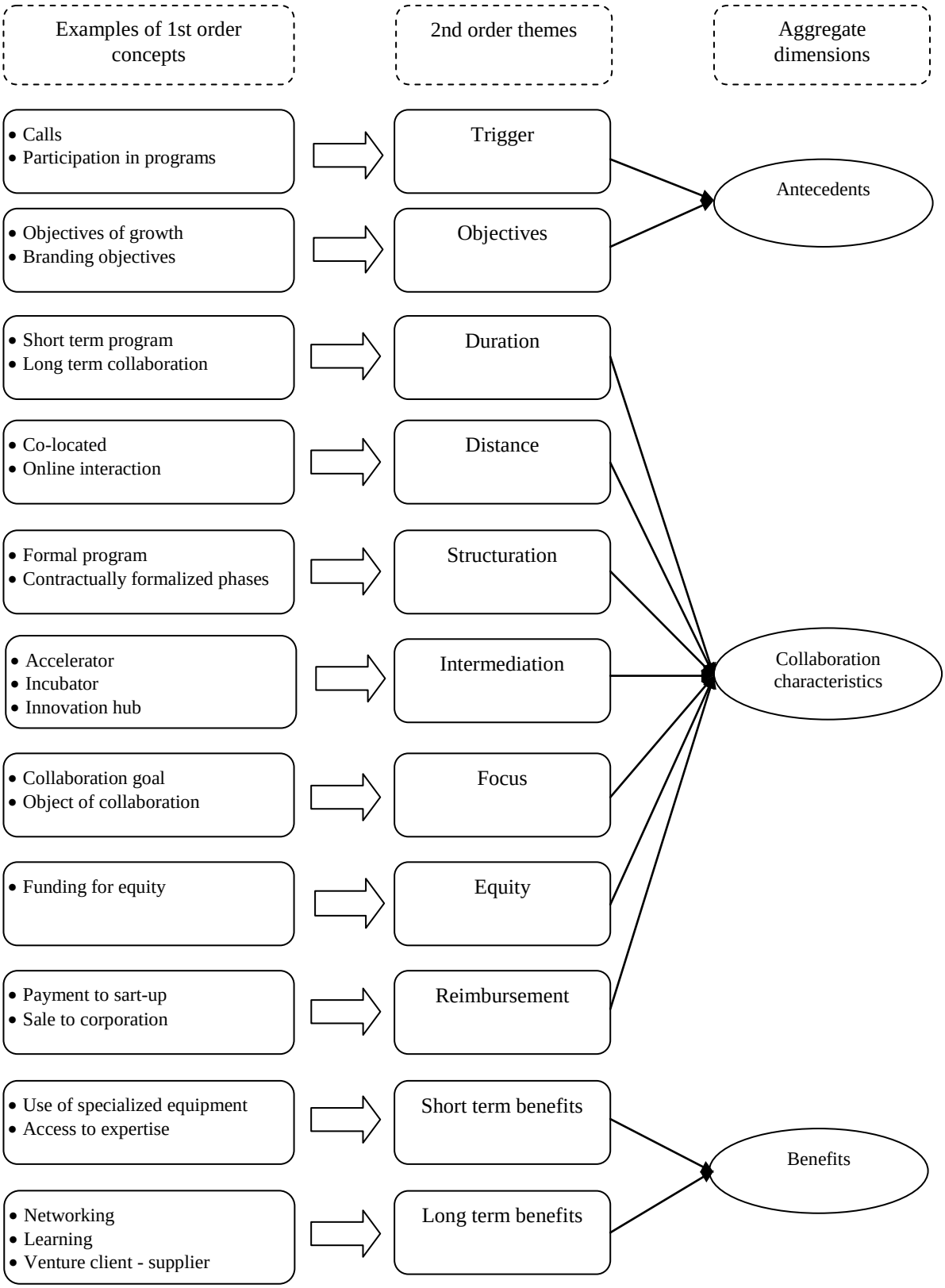

Table 1. Cases and data sources

Sart-up	**Sector**	**Number of employees**	**Partner corporation's sector**	**Product description**	**Interviews number and duration**
Sart-up1	Additive manufacturing	8	Home appliances	The products provide efficient and concrete solution to digital manufacturing and additive manufacturing.	1.25 h interview + 1,5 h. follow-up
Sart-up2	Biotech	70	Pharmaceuticals	Next generation biotherapeutics based on unique proprietary technology platforms.	1 h interview + 1,5 h follow up
Sart-up3	Drone/SW	6	Telecom	Cloud-based software helps you set up efficient drone operations	1.1 h interview + 1,5 h follow up
Sart-up4	Pharmaceuticals	49	Pharmaceuticals	Ground-breaking medical imaging	1 h interview + 1,5 h follow up
Sart-up5	SW in IoT	19	Automotive	Embedded software library – a Software Development Kit – built for the purpose to help developers rapidly and easily deploy edge machine learning.	3 h interview, 2 interviewees + 1,5 h follow up
Sart-up6	Biotech	11	Pharmaceuticals	Tomorrow's antifouling technology – prohibiting growth on ship and boat hulls	1 h interview + 1,5 h follow up
Sart-up7	Pharmaceuticals	11	Pharmaceuticals	A platform technology that delivers flexible, intelligent and individualized dosing of oral medicines	1 h interview 2 interviewees + 30 min follow up
Sart-up8	Recycling	3	Recycling/Waste management	Products for insulation and sound absorption based on recycled materials	1.1 h interview + 30 min follow up
Sart-up9	Advanced materials	14	Industrial automation, buildings and transportation technologies	Materials technology company that invents, develops and sells graphene-based materials	2,5 h interview, 2 interviews + 30 min follow up
Sart-up10	Biotech	7	Pharmaceuticals	Specialized in the development and manufacturing of dextran derivatives and other polysaccharides.	1 h interview + 30 min follow up
Sart-up11	Sound technology	4	Home Appliances	Innovative technologies for state-of-the-art, intelligent audio processing and analysis	1.5 h interview 3 interviewees + 1,5 h follow up
Sart-up12	Environment analysis	1	Recycling/Waste management	Secure and fast environmental analysis	1.5 h interview + 1,5 h follow up

Table 2. Summary of case results

Sart-up	Antecedents			Collaboration characteristics							Benefits for the sart-up	
	Trigger	*Sart-up's objectives*	*Corporation's objectives*	*Duration*	*Distance*	*Structuration*	*Intermediary*	*Focus*	*Equity*	*Reimbursement*	*Short term*	*Long term*
Sart-up1	Corporation's initiative (call)	Get paying customer	Commercial partnership	Months	Distant	Unstructured	No	Narrow	No	Yes	Access to experts Contract	Visibility / Brand Experience
Sart-up2	Sart-up's initiative	Access to corporation assets	Selling services	Weeks	Close	Structured	No	Narrow	No	No	Access to experts and equipment	Network
Sart-up3	Sart-up's initiative	Learning	Commercial partnership	Long term	Distant	Unstructured	No	Narrow	Yes	No	Access to experts and technology	Brand
Sart-up4	Intermediary	Learning	Access to competence / technology	Long term	Close	Structured	Yes	Broad	No	No	Access to experts	Network
Sart-up5	Intermediary	Get paying customer Visibility / Networking	Access to competence / technology	Months	Close	Structured	Yes	Narrow	No	No	PoC	Learning
Sart-up6	Government's initiative (call)	Visibility / Networking	Access to competence / technology	Months	Close	Structured	Yes	Broad	No	No	Facilities Access to lab and technology	Networking Brand
Sart-up7	Intermediary	Learning	Access to competence / technology	Long term	Close	Structured	Yes	Broad	Yes	No	Funding	Brand New human resources
Sart-up8	Sart-up's initiative	Access to corporation assets	Commercial partnership	Long term	Close	Structured	No	Broad	Yes	No	PoC	Network
Sart-up9	Sart-up's initiative	Get paying customer/ Access to corporation assets	Access to competence/ technology Commercial partnership	Long term	Close/ distant	Structured	Yes	Broad	Yes	Yes	Access to lab and expertise	Reference customer Connection to supply chain Networking
Sart-up10	Sart-up's initiative	Learning	Selling services	Weeks	Distant	Unstructured	No	Narrow	No	No	PoC Access to technology	Learning
Sart-up11	Corporation's initiative (call)	Get paying customer	Access to competence /technology	Months	Close	Structured	No	Narrow	No	Yes	PoC	Networking Reference customer
Sart-up12	Sart-up's initiative	Get paying customer	Access to competence /technology	Long term	Distant	Unstructured	No	Narrow	Yes	No	Funding Access to technology	

Appendix: **Questionnaire – The sart-up's perspective on collaboration with large companies**

We are examining the sart-up companies' views on the value of the collaboration with the large companies in open innovation programs. We are interested in the sart-up perspective:

1. Why did you choose to participate [in the innovation collaborative project] and what did you expect to achieve?
2. What goals were set? Were they achieved?
3. How was the collaboration organized?
4. What barriers did you experience in the collaboration?
5. How do you evaluate the experience?
6. How could have the collaboration been improved to create additional value for the sart-up companies?
7. How were assessments and evaluations made at different times - first when assessing project proposals (ex-ante), then during ongoing projects, and finally evaluation after project completion (ex-post)?
8. What is the experience from the collaboration - what has been achieved and how has it been achieved?