Practical Implications On How Established Companies Innovate With Startups: Tools and Guidelines for Innovation Managers

1 Introduction

In order to keep up with today's fast-paced changes in a world that is driven by digitalization, the ability to innovate is a key determinant of success. Current literature on innovation in large companies highlights that open innovation positively influences a firm's performance (Dodgson, Gann & Salter, 2006; Gassmann, Enkel & Chesbrough, 2010). Opening up the innovation process to collaborate with startup ecosystems (Yoo, Henfridsson & Lyytinen, 2010; Kohler, 2016) has become an especially noteworthy and growing trend among large corporations on a global scale. A startup is referred to as a nascent venture, typically restricted by its small size and a lack of resources, and "formed to search for a repeatable and scalable business model" (Blank, 2010). A large corporation is typically complex and restricted by established processes as well as administrative procedures, and thus, slow in its ability to adapt to abrupt market changes. External partnerships with larger corporations do not only help startups in the development and distribution of their ideas or technologies (Dahlander & Gann, 2010), but also play a pivotal role in improving and retaining a corporation's competitive advantage (Weiblen & Chesbrough, 2015). An Accenture (2015) report demonstrates that any form of collaboration between large corporations and startups increases the revenue of large corporations. During this process, the role of corporate innovation managers, as well as their ability to make conscious decisions on how to collaborate with startups, will continue to be pivotal. This paper answers the research question, how the characteristics of prominent open collaborative innovation models may serve as a guideline for innovation managers to choose the right option of collaboration.

Peter, Back & Werro (2018) reiterated the necessity of corporations to innovate with startups based on a literature review study, and the development of a characterizing framework of prevalent collaborative innovation options between corporations and startups. Building on these results, this article develops eight illustrative tools and a weighted decision matrix to answer the question of which collaboration option to choose when innovating with startups (Figure 1) and contributes to the decision-making process of innovation managers.

Design Science Research has been chosen as it qualifies to explore a "wicked problem" (Rittel & Webber 1984) for which "conflicting or sparse theoretical bases exist" (Vaishnavi & Kuechler, 2007, p. 19).

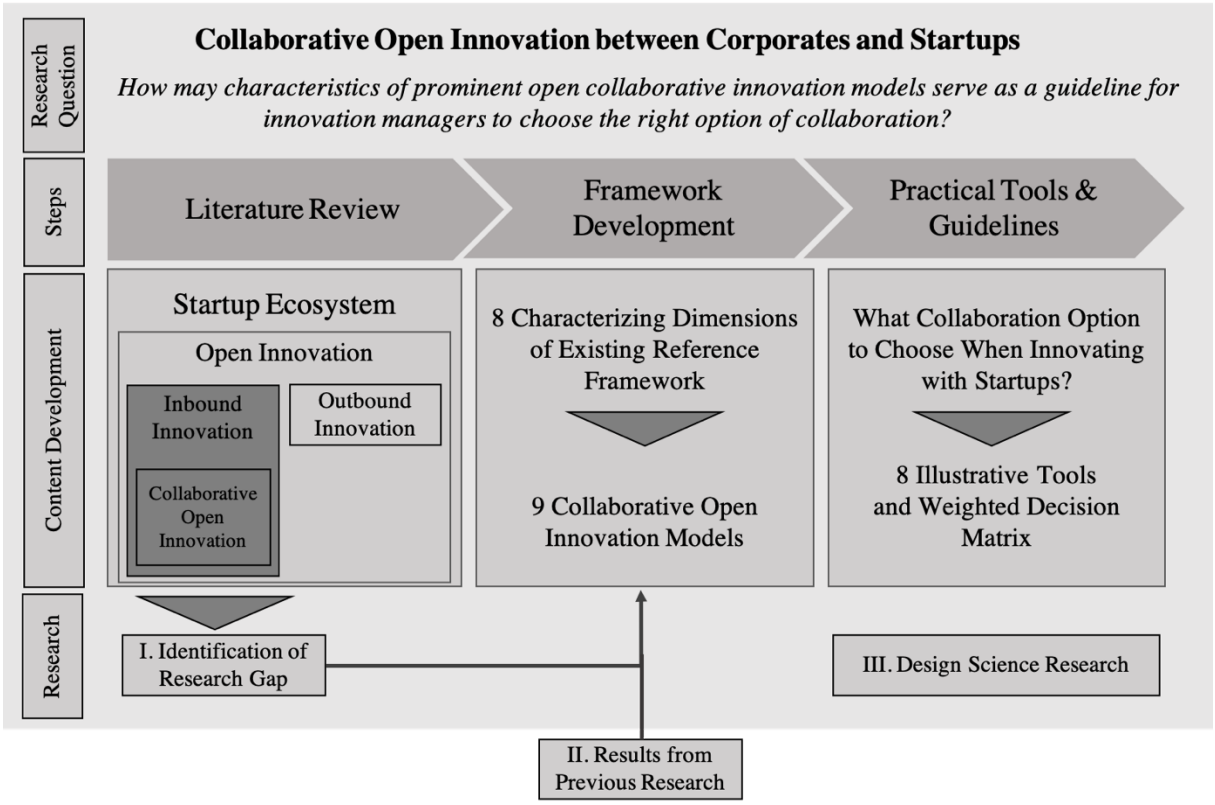


Figure 1: Research question and contribution approach of the present paper.

2 Collaborative Open Innovation with a Startup Ecosystem

Startup ecosystems are constituted of people, start-ups (in diverse stages of existence) and different types of companies all within a location, which could be web-based or physical, working together as a network to produce and expand novel startup firms (Suominen et al, 2016; Smorodinskaya et al., 2017). The involved companies can be broken down further into groups like support organizations e.g. accelerators, joint working areas, incubators etc., large corporations, research firms, universities, service provider companies (e.g. financial and legal service providers) and funding organizations. The current literature on the subject of open innovation within such an ecosystem differentiates between two types: inbound and outbound innovation. Inbound innovation describes an inflow of external technologies or ideas (e.g. from a startup) into an organization (e.g. a large corporation) (Chesbrough, 2003; Gaponava & Korshunov, 2018). In such an arrangement, novel technologies are implemented or made available to benefit the corporation and the startup itself serves a role similar to that of a supplier. Outbound innovation on the other hand, supports the external exploitation of internal knowledge in different markets. Ideas that are a misfit to the core of the business of a corporation are brought to the market, for instance, by partnering with new companies, through the sale of intellectual property (IP) and by proliferation of new technology.

Open collaborative innovation between large corporations falls in the domain of inbound innovation. In practice, the inbound innovation is more common (Chesbrough & Brunswicker, 2014). Collaboration has become a key element within the discourse pertaining to open innovation processes within big corporations and startups alike. According to Peter, Back & Werro (2019) collaboration within the context of open innovation therefore can be defined as:

> *A social and dynamic process of value creation, based on a strongly committed, formal, mutually beneficial, jointly structured and shared relationship between independent startups and large corporations as part of a community within a self-*

sustainable, open innovation-conductive environment (interconnecting the micro and macro level of an economy), aiming at common goals and a common vision to innovate, and which results in entrepreneurship and innovation.

Despite its prevalence in practice and the growing body of literature on open innovation, comparative research with a focus on options for collaborative open innovation is scant. Guidance in the form of tools or reference material of use to large corporations in choosing a suitable collaboration option is next to nonexistent (Spithoven, Vanhaverbeke & Roijakkers, 2013; West & Bogers, 2014). The literature (Docherty, 2006; Gassmann, 2006; Giannopoulou. Yström & Ollila, 2011; Chesbrough & Brunswicker, 2014) points to the difficulty for companies in implementing such practices. There are a number of challenges in accomplishing such collaboration. Collaboratively developed ideas are at high risk of failing when there is a dearth of support from the senior management and thus this becomes an essential and overwhelming requirement for the corporation. To ensure lasting success, a deliberate decision to boost innovation and adopt it as a major component of the chosen business strategy is highly important. Firms need to properly manage the expectations of the shareholders i.e. achieve a balance between the lasting and immediate returns of an investment plan. Major corporate departments might be reluctant to do business with start-ups and to use their relatively novel products if they are unable to get references and recommendations from past corporate customers. Different business departments might have conflicts when collaborating or predicting the possible results of a collaboration and this can cause difference in demands as well as schedule setbacks. Collaborations between large companies and start-ups is significantly different from collaborations between two (or more) large companies or SMEs, as they face a scarcity of resources, simpler organizational processes, and market uncertainties. These factors typically also contribute to more open-minded and strongly vision-driven cultures (Peter, Back & Werro, 2018; Berghaus & Back, 2016). Thus, existing decision-making tools for the choice of options for collaboration between large companies cannot be applied to collaborations between large companies and startups (Vanhaverbeke, Vermeersch & De Zutter, 2012, Chesbrough, 2017, Grippa et al., 2018).

3 The Startup-Collaboration-Model

Pioneering work in the field of comparative research on collaborative open innovation options has been conducted by Sarbacher, Schildhauer, Schleicher & Näfelt (2016) and Peter, Back & Werro (2018). Peter, Back & Werro (2018) developed the Startup-Collaboration-Model (SCM) as a regulatory concept to compare and define the different forms of startup collaboration. The eight dimensions of the SCM are (1) strategy, (2) structure, (3) culture, (4) resources, (5) performance, (6) startup, (7) ecosystem, and (8) financing, as shown in the Figure 2 below.

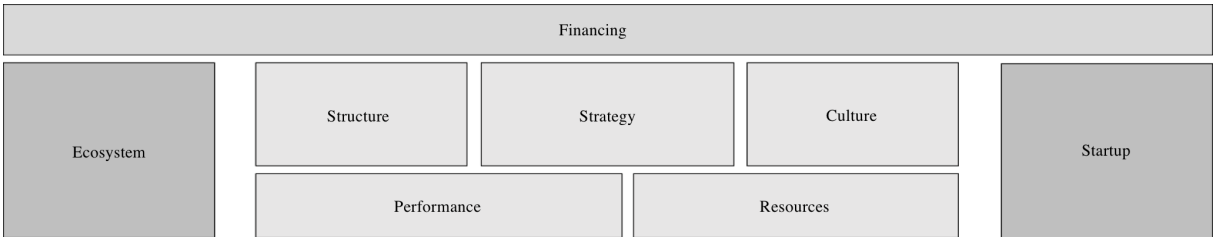


Figure 2: Dimensions of the Startup Collaboration Model (Peter, 2018).

Strategy describes the main (long-term) goals of the collaboration option, in terms of its strategic orientation. *Financing* comprises of the main revenues and costs, including the financial level of investment and risk. *Startups* illustrate the main characteristics of the collaboration options, which are typically targeted startups. *Structure* describes the organizational/program structure, including the startup application process and the associated level of corporate control. *Culture* includes norms, values, attitudes and patterns of arguments of the employees. *Resources* stand for the service or assets, which a company typically offers their startups when collaborating. *Performance* represents the accomplishment of the collaboration, measured against previously defined standards, in order to track the development/results of innovation. *Ecosystem* stands for the startup ecosystem that is constituted of people, start-ups, and different types of companies and other institutions all within a location (Peter, 2019).

Based on the eight dimension of the SCM, nine different types of collaboration forms between startups and established companies in the context of open innovation are defined in the folowing discussion, namely: corporate venture capital (CVC), mergers & acquisitions (M&A), procurement, business incubator (BI), corporate accelerator (CA), corporate company builder (CCB), co-working space (CoS), startup platform programs (SPP) and innovation labs (IL). The different collaboration forms can be defined and compared in terms of the level of innovation (incremental vs. disruptive) and culture (internal vs. external culture) as shown in the Figure 3 below.

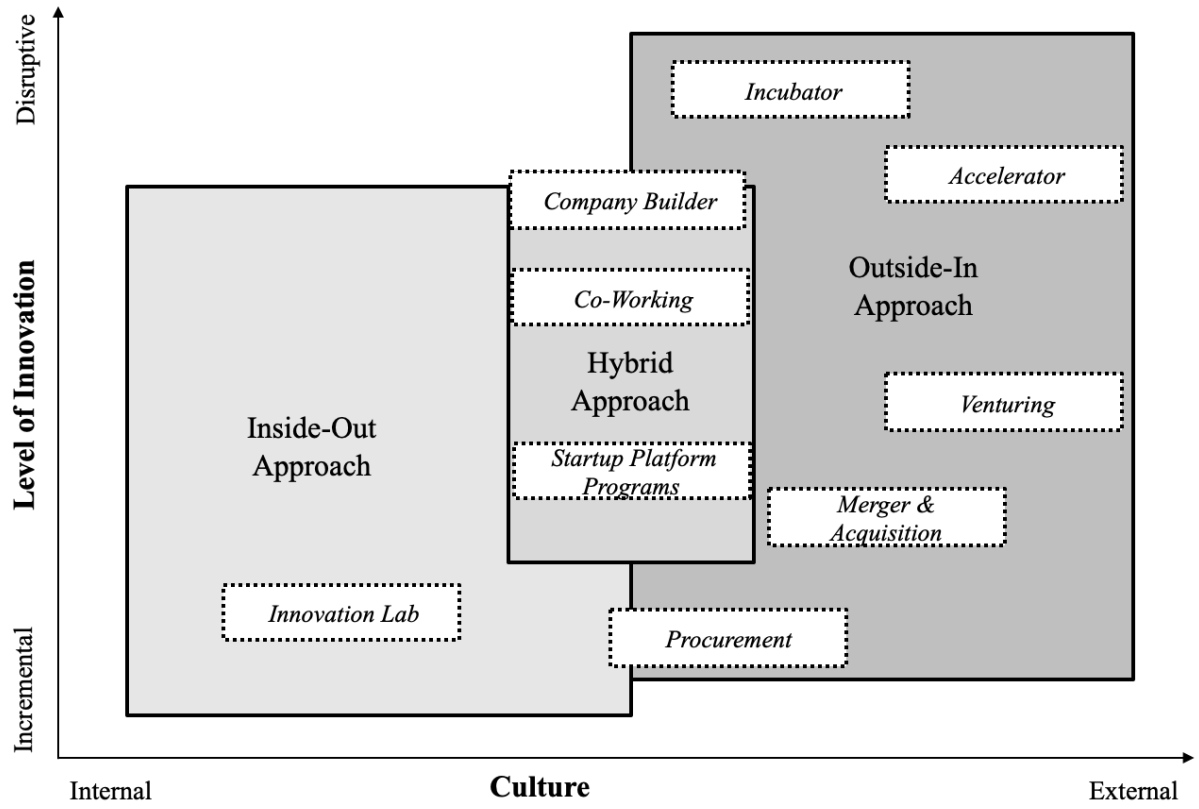


Figure 3: Different types of collaboration forms (own illustration).

Corporate Venturing is a corporate investment program with the main goal of direct extension of a corporation's existing innovation portfolio, focusing on the core- and growth business. Typically mid-term oriented, these investments are strongly driven by financial goals in ventures identified as having significant growth and profit potential (Park & Bae,

2018). Corporate Venturing typically involves investments in a narrow range of very small startups assessed to have high growth-potential in their early to late stages (Wenneberg, 2016). The collaborative efforts typically last between three to five years after investment, while the interactions of corporate management and other staff with the startups are episodic (Mocker, Bielli & Haley, 2015; Brigl, Hong, Roos, Schmieg & Wu, 2016; Kohler, 2016).

Mergers & Acquisitions is the consolidation of two companies or their assets, contextually the combination of a large company and a startup, or a corporation's attainment of a startup's majority stake. By acquiring smaller firms, a corporation is able to quickly solve business problems and boost their (typically core-) products and services, without having to create such capability directly themselves (Werro, 2017). M&A offers a long-term-oriented, fast and effective, and yet relatively expensive way of acquiring complementary technology, capabilities or talent. When acquiring startups, corporations souring for M&A typically focus on a small range of late-stage startups that are already successful and where it is anticipated that the acquisition will help the underlying business to grow and scale further. The typical length of successfully acquiring a startup from the scanning of investment opportunities to the closing of the deal can take 1-3 years (Coyle & Polsky, 2013; Mocker, Bielli & Haley, 2015; Fantasia, 2016).

Procurement expands its traditional focus of supply-management to co-development with suppliers, which includes idea-sourcing and thus significantly affects the corporation's innovation performance. Necessarily, supplier-enabled innovation requires the collaboration of several departments of a business including product development, procurement and R&D. It promotes stronger collaboration among business departments and it promotes internal productivity in terms of improved transfer of knowledge and closer networking to achieve common goals. This lowers the process' inherent risk and improves the innovation value chain. With a short-term integration of innovative suppliers to the company's product development process, procurement can serve to provide access to disruptive technologies and new business models (future business). Large corporations prefer to procure through small-scale collaborations with early to late stage small startups with already developed, marketable and adaptable high-quality products and/or services. Within the co-developing process, a POC is typically devised within one to two months, although this process may take up to three years (Umbenhauer & Sopher, 2013; Taga, Pichai & Doemer, 2015; Batran, Erben, Schulz & Sperl, 2017).

A Business Incubator is a company-supported (on-site or off-site) office space that 'hatches' novel customer-centric ideas with the long-term oriented strategic goal of developing new business models from scratch. The enhanced business portfolio of corporations may enable an improved access to professional services, capital or new markets. Business Incubators mainly focus on medium to large early/seed startups with a strong tech-focus and customer-focus, with the aim of graduating them within a typical length of three to five years of continual exposure to the incubation environment (Weiblen & Chesbrough, 2015; Hackett & Dilts, 2004; Dee, Gill, Livesey & Minshall, 2011; Cohen, 2013; Ringel, Taylor & Zablit, 2016).

There are two particular forms of accelerators to be differentiated. Corporate Accelerators are a subtype of Startup/Seed Accelerators. Miller & Bound (2011) define a startup accelerator as a defined collection of programs which possesses the following features:

1. Emphasis on small teams rather than individual founders
2. The application procedure to the event is unrestricted, yet highly competitive.
3. Start-ups are arranged into groups or "classes" rather than individual firms.
4. Pre-seed investment, with amounts close to 10,000 – 50,000 €, is provided to acquire equity.
5. Time restricted support is provided, with thorough mentoring and educative events inclusive.

While Seed Accelerators are typically independent institutions and are either governmentally (non-profit) or privately (for-profit) funded, Corporate Accelerators are typically set up as subsidiaries of larger corporations and are therefore, generally, for-profit and funded by private sources. The goal of Corporate Accelerators is mainly to accomplish pre-determined financial objectives through the commercialization of startups that are ready to enter the market and scale (Pauwels, 2016). Accelerators typically focus on seed and early-stage startups with small teams. Such startups enter Accelerator programs in cohorts (Kupp et al, 2017). They generally have one or more Minimal Viable Products (MVPs) and few to no customers. The typical length of the collaborative arrangement ranges from three to six months, whereas most programs last three months (Isabelle, 2013; Crichton, 2014; Hathaway 2016).

Corporate Company Builders may be either set up as part of an independent business model or may be operated by a corporation in addition to its core-business. The main objective of a Corporate Company Builder lies in the fast and agile experimentation of many new ideas. This is followed by the building of new companies managed by an externally and/or internally acquired team for financial gain. Here, the focus of innovation is typically distant from the corporation's core business focus. Typically, Corporate Company Builder collaboratively supports its ventures all the way, until they either exit the venture or the venture is dismissed. A Corporate Company Builder is usually more hands-on and has a bigger stake in its ventures compared to Corporate Venturing, Accelerator or Business Incubator. The goal is to work on a portfolio of ideas in parallel and produce batches of startups (Rao, 2013; Jäger, 2016; Sarbacher, Schildhauer, Schleicher & Näfelt, 2016; Rocket Internet, 2017).

Co-Working Spaces are generally understood as open, collaborative, community-based workspaces for like-minded individuals, early-stage startups or other parties engaged in non-routine creative work. The main objective is to detect emerging trends and identify opportunities to innovate (Waters-Lynch & Potts, 2017). By providing an infrastructure specially designed to facilitate social interaction, Co-Working Spaces foster serendipitous innovativeness in yet-to-be-explored business fields, which leads to improved or new business models. Co-Working Spaces are typically small in size including few members who utilize the office space, meet frequently and develop strong relationships. They generally do not have established graduation criteria or competitive application processes. Co-Working Spaces are motivated to retain member companies as a sustainable revenue stream (Pohler, 2012; Bonzom & Netessine, 2016; Bouncken & Reuschl, 2016; Corsi, 2017).

Startup Platform Programs are characterized as initiatives with a goal to stimulate complementary external innovation in order to push an existing corporate innovation. The goal is predominantly customer-centric (Werro, 2017). Startup Platform Programs identify and work with startups that are most aligned with the corporation's customer base from a short-to-mid-term perspective. The corporation then provides startups with an already established corporate technology platform upon which to (indirectly) build such a customer-centric innovation. Startup Platform Programs typically engage with a very high number of seed to early stage startups that are oriented on small solutions with an existing, marketable product. A startup typically goes through a rigorous development phase of 10-14 weeks, followed by a corporate verification of the MVP (Weiblen & Chesbrough, 2015). For example, IBM through its Global Entrepreneurship program, a Startup Platform Program collaborates with a company called Asteria that offers cash flow optimization services. It uses big data strategies to acquire data from already existing corporate software programs to make predictions. It also creates and develops the tools to apply them. This in turn serves as an advantage to IBM.

The aspiration of Innovation Labs is long-term oriented, and its main aim is the fostering of systemic change and driving a collective social impact through an indirect core,

adjacent, or new-to-the-business innovation. The Harvard Business Review defines adjacent innovation as the form of innovation that requires the leveraging of a firm's major strength to a new business venture (Nagji & Tuff, 2012). It also describes core innovation as the collection of company actions towards the firm's present products for their present customers (Nagji & Tuff, 2012, Lichtenthaler, 2016). Intrapreneur labs typically screen for disruptive internal ideas representing a push- (following a top-down theme) and pull (detection through a bottom-up process) structure. Typically, IL focus on early-stage startup ideas that are expected to lead to disruptive trends in their industries. Innovation labs consist of small internal innovation teams that operate separately from the internal R&D unit (Tardy, 2013; Brigl, Hong, Roos, Schmieg & Wu, 2016; Gryszkiewicz, Lykourentzou & Toiyonen, 2016; Ringel, Taylor & Zablit, 2016; Wallis, 2016).

A significant research contribution of previous findings lies in definition and clarification of terminology. These findings serve as the starting point for the identification of practical implications of the state of collaboration options available for innovation managers in considering a choice for one that best suits their requirements. In particular, this paper focuses on the derivation of interrelations, workable diagrams and further guidelines as decision-making tools for innovation managers of large corporations. Thus, the present article contributes to the gap in the literature on guidance and tools for large corporations in the choice of a suitable inbound collaboration option when aspiring to innovate with startups.

4 Methodology

To ensure both rigor and relevance, this paper uses Design Science Research (DSR). DSR is rooted in the science of engineering and arts (Simon, 1996). The term "design" in this context is understood as "the act of creating and evaluating an explicitly applicable solution to a problem" (Peffers, Tuunanen, Genler, Rossi, Hui, Virtanen & Bragge, 2006, p.84; March & Storey, 2008, p. 726). DSR can be described as constituted of four phases:

1. Awareness of Problem: The knowledge of a challenging research problem could emanate from various sources such as fresh happenings in the industry or discovery of issues in an industry discipline. Study within an allied discipline could equally give an opportunity for the integration of fresh discoveries into the field of the researcher. The outcome of this stage is always a Proposal (either official or informal) for a fresh research study.
2. Suggestion: This stage immediately succeeds the Proposal stage and it is closely related to the proposal built on the basis of the first stage. A Tentative Design as well as the review of a prototype jn line with the concerned design is created. Thus, Suggestion is a creative stage where new applications are developed on the basis of a new configuration of the present or the novel elements.
3. Development: Further development and implementation of The Tentative Design takes place in this stage. The implementation method is dependent on the artifact to the produced.
4. Evaluation: The artifact is assessed based on criteria which are explicitly stated within the initial Proposal (Awareness of Problem Stage). Both qualitative and quantitative deviations from expected results are carefully documented and intensively explained. The evaluation stage has an analytic sub-stage where theories are built regarding the artifact. The results and further information gathered from the creation and test-running of the artifact in the evaluation stage are gathered and another iteration of the Suggestion stage is carried out. The artifact is tested for its ability to adjust and thrive in diverse environments (Hevner, 2007). The explanatory hypotheses are thereby generated.

Accordingly, this article uses DSR to develop new practical methodologies for collaboration, with the aim of improving the decision-making process of large corporations on how to collaborate with startups. This paper argues that existing theory about and within the context of prevalent options of collaboration is equivocal and scattered. It therefore proposes the development of a more precise and holistic theory. To explore and solve a "wicked problem" (Rittel & Webber 1984; Hevner, March, Park & Ram, 2004, p. 81), such as the development of a guiding framework on corporate collaboration options with startups, for which "conflicting or sparse theoretical bases exist" (Vaishnavi & Kuechler, 2007, p. 19).

DSR describes an iterative process, which may entail the development of a completely new artifact or the cyclic improvement of an existing one (Hevner & Chatterjee, 2010), and thus is also referred to as "improvement research" (Vaishnavi & Kuechler, 2007, p.46). In doing so, practical relevance (utility) of the framework should be valued equally with the rigor of the research (truth) performed to achieve this result (Hevner & Chatterjee, 2010). Hevner emphasizes on the connection of both relevance (environment) and rigor (knowledge base) with the building and constant evaluation of artifacts. On one hand, the environment symbolizes a relevant problem area and thus implies organizational needs and utility requirements (Hevner, 2007). On the other hand, the result shall both be applicable in the adequate environment and contribute to the knowledge base (Hevner, March, Park & Ram, 2004). It is important to note that Hevner (2007) further places emphasis on DSR being a creative process and thus suggests that sources of inspiration other than theories (such as observations) may be constituents of the knowledge base as well.

In order to answer the research question, the researchers used the Startup-Collaboration-Model (SCM) from a previous study (Peter, Back & Werro, 2018) as a regulatory concept to build their semi-structured interview frame on. After collecting the data, similarities and patterns along the SCM dimensions were detected and analyzed, from which data visualizations/illustrations were drawn. The researchers took an explorative, qualitative approach to elaborate the practical implications of how established corporations innovate with startups (Mayring, 2002; Mumford, 2001). Data visualization involves the creation and study of the illustration of data in a pictorial or graphical format and is considered in many disciplines as an essential element to drawing insights from data (Friendly, 2009; Bikakis, 2018). Visualization of data offers "intuitive ways for the users to interactively explore and analyze data, enabling them to effectively identify interesting patterns, infer correlations and causalities, and support sense-making activities" (managerial decisions) (Bikakis, 2018). Data visualization in the field of business analytics is further useful in drawing actionable insights (Aparicio & Costa, 2014). It is thus chosen as a suitable method to meet the objective of providing new managerial insights pertaining to collaborative open innovation between large corporations and startups.

As opposed to defining research deliverables beforehand, an explorative approach is chosen, with input from expert professionals in the field so as to ensure validity of research. The findings were primarily the result of field research at Swisscom. Field research began on September 1, 2012 and concluded on April 1, 2018. For detailed insight on the different practical implications of the collaboration forms, data from observation within Swisscom was utilized. The aim of this observational study was to gain an understanding of the behavior of observed subjects in their work-settings without being influenced by the researcher (Patry, 1982). Interviews with over 136 individuals was carried out, 24 workshops were held and documented, and a focus group of 8 participants was initiated. The focus group was scheduled to meet on a quarter-yearly basis for discussion of results. Besides the field study at Swisscom, interviews with an additional 12 individuals from the startup ecosystem was carried out (constituted of 6 startup founders, 4 innovation managers from other corporations, 2 innovation management consultants). Six of the interviews were fully transcribed, and all the other outputs were collected in the form of a summary.

Reliability of research was ensured by adhering to standards of academic research and data analysis. Although there is considerable scope for further research than what is presented, the contribution to the research on the subject is nevertheless significant. The extent of conducted research was limited owing to limitations on the availability of time. The inter-rater tool was used, which assessed the findings as having high reliability. Despite such inter-rater reliability, there were differences of perspective in the collected data that had to be resolved. To ensure transparency, thorough documentation of the process of research was carried out throughout the course of research. Internal validity was addressed by peer-critique of findings at seminar presentations and from holding discussions with fellow researchers. Based on rigorous research, scientific articles identified as having high validity are utilized here in the comprehensive review of literature discussed in the following sections (Brewerton & Millward 2001; Brandenburg, Govindan, Sarkis & Seuring, 2014; Reim, Parida & Örtqvist, 2015).

5 Practical Tools & Guidelines

Based on the reference framework proposed in past research, the Startup-Collaboration-Model (Peter, Back & Werro, 2018), advanced practical implications concerning the decision-making of innovation managers are derived.

A discussion of the strategic orientation of various collaboration options is provided as follows. Figure 4 illustrates commonalities between various collaboration options as they relate to main strategic goals of the options. It serves as a guideline tool for innovation managers as it outlines the main (long-term) goals of various collaborations in relation to one-another. Key to the success of achieving these goals is their alignment with the overriding corporate strategy, a crucial consideration for innovation managers (Chesbrough & Appleyard, 2007; Mercandetti et al., 2017; Lopez et al., 2018).

However, it is important to note this is a simplified presentation of correlations and not all – though most – of the collective strategic goals are illustrated below. For example, CVC, CA and CCB share similar strategic goals (new market entry and financial returns; as depicted in Figure 4), while CVC additionally pursues market insights and influence. CAs strive for efficiency and the commercialization of innovations, while CCBs aim at copying existing/building new companies, as well as the fast and agile experimentation of ideas, as an addition to their shared strategic goals depicted below.

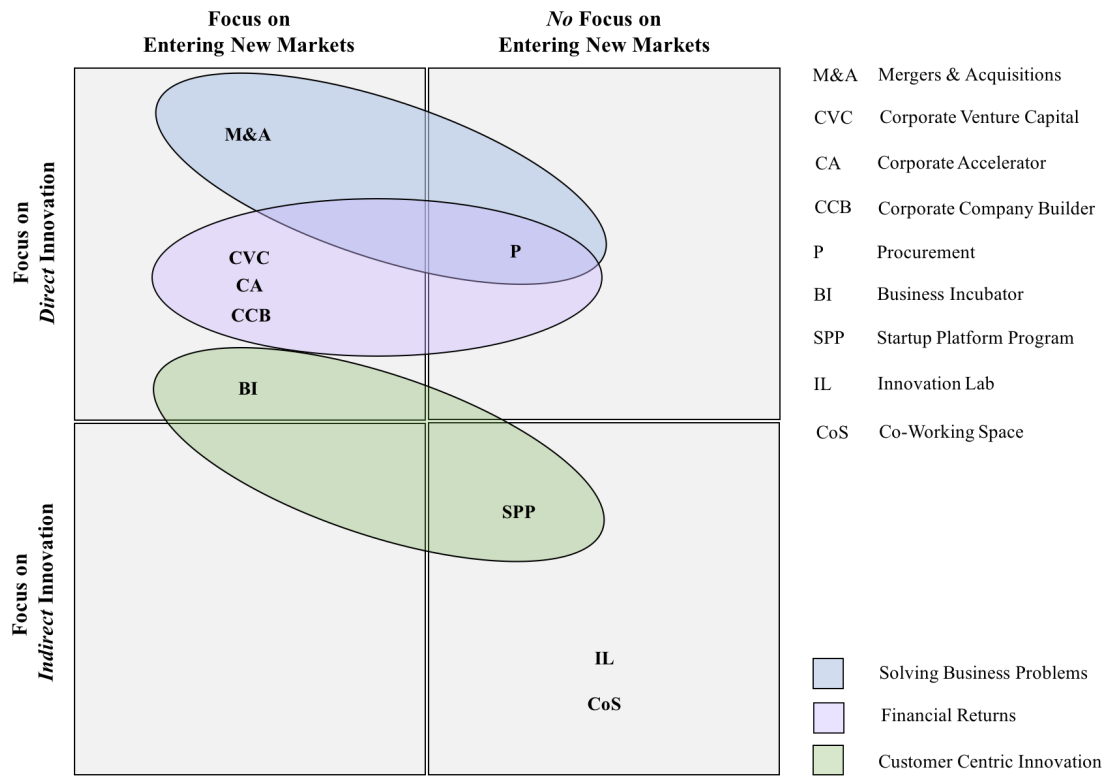


Figure 4: Commonalities among strategic goals of collaborative open innovation options (own illustration).

Further implications may be derived from correlations among the very high- to very low-level spectra recorded in the given framework.

Figure 5 depicts financial considerations of risk and investment. It is apparent that the levels of investment show a similar pattern to the levels of risk when comparing collaboration options. The levels of risk and investment are either comparable to one another (e.g. M&A, CCB, CA, SPP, IL), or the risk level is higher than the option's equivalent investment level (e.g. BI, CVC, P, CoS). This indicates that high financial investments are associated with a similar or a higher level of risk and vice versa. Based on this analysis, a guideline proposed for innovation managers is that when pursuing a risk-averse investment strategy, the safest options (in relation to the financial investments required to pursue options) are ILs and SPPs. In considering both strategic goals and financial considerations (Figure 4), a correlation is observed between the level of financial investment and the scope of the main strategic goals. One important observation for innovation managers is that while CA pursues a relatively wide range of strategic goals (financial returns, direct innovation, entering of new markets, efficiency, commercialization) it typically requires a medium-level of investment.

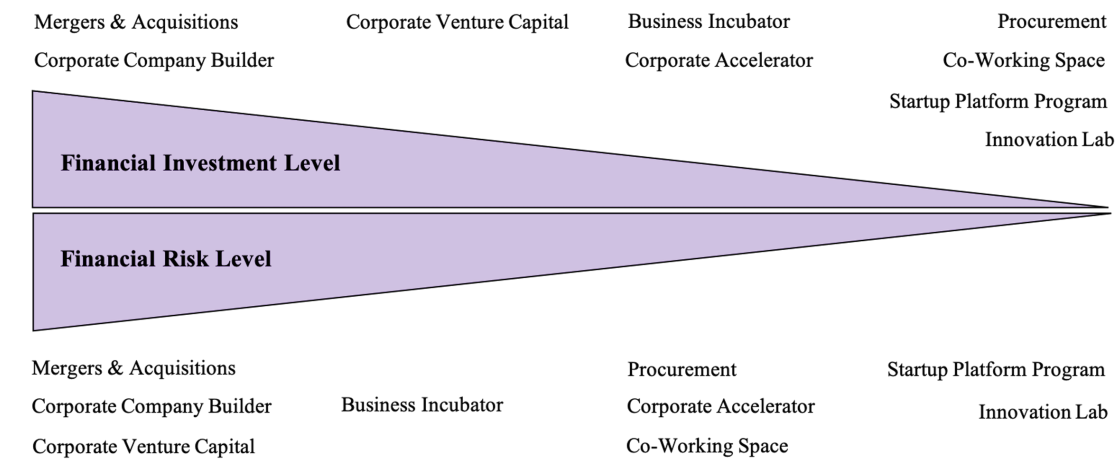


Figure 5: Spectrum on financial levels of investment and risk (own illustration).

By comparison of spectra in Figure 5 and Figure 6 below, a correlation is observed in the spread of the collaboration options concerning their general level of corporate control (Figure 6) and the spread of the investment level of the option (Figure 5). However, the procurement option deviates from this trend, where the level of corporate control is higher than its investment level. In general, this implies that the level of corporate control over the startup's course (in particular, its growth direction and graduation outcome) is correlated to the level of financial investments made. Procurement is the only option which offers a comparatively high level of corporate control in relation to the level of required investments.

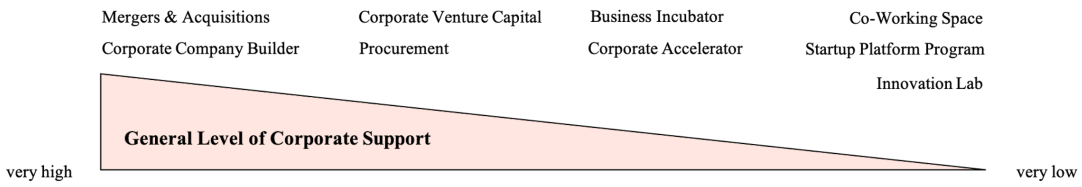


Figure 6: Spectrum on general level of corporate control (own illustration).

Figure 7 illustrates the spectrum of the general startup support level provided by corporations towards the growth of their affiliated startups. A high startup support level indicates a high general provision of resources to the benefit of startups.

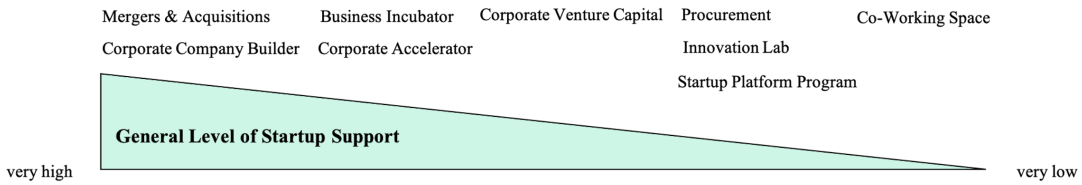


Figure 7: Spectrum on general level of startup support (own illustration).

A combined analysis of support level and a categorical assessment of the contribution level of resources and its six indicators human resources, physical capital, financial capital, business assistance & network (with regard to the Startup-Collaboration-Model) is presented in Figure 8. These details reveal the resource intensity associated with each collaboration

option. Innovation managers may consider this information when estimating their capability to support startups with necessary resources.

The analysis further reveals that business assistance, knowledge, access to a network (and by extension to the startup ecosystem) and human resources/skill-sets are the most crucial needs of startups across most of the collaboration options.

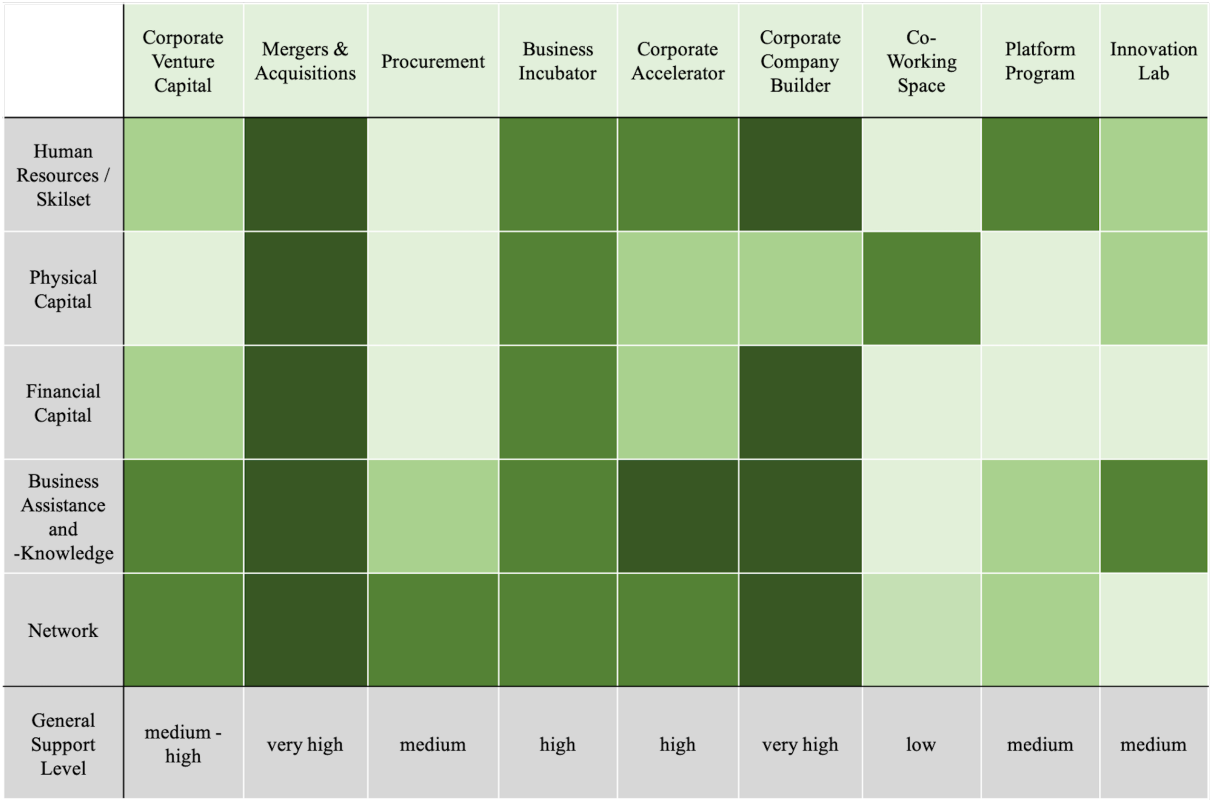


Figure 8: In-depth view of startup support with a categorical assessment of corporate intensity of resource contribution (the darker the shade of green, the more intense is the contribution of resources towards startups) (own illustration).

The startup ecosystem is an important consideration in assessing options for collaboration. It is observed that the leverage of such an ecosystem is crucial for most of the collaboration options (Figure 9). The leverage ranges from medium to high across various options. However, this consideration in relation to CoS (considering the community) must be considered contextually, since this option only integrates startups to the program. This is thought to be owing to their (primarily passive) striving for simpler soft strategic goals. Subsequently it is very important for a corporation to reach out and to become part of the surrounding startup ecosystem by building valuable relationships with the community through mutual support, networking events, referrals and the inclusion of beneficial actors into internal corporate processes. The offering of a collaborative innovation program to engage with startups may serve as a catalyst for corporations to become integrated and influential parts of the ecosystem.

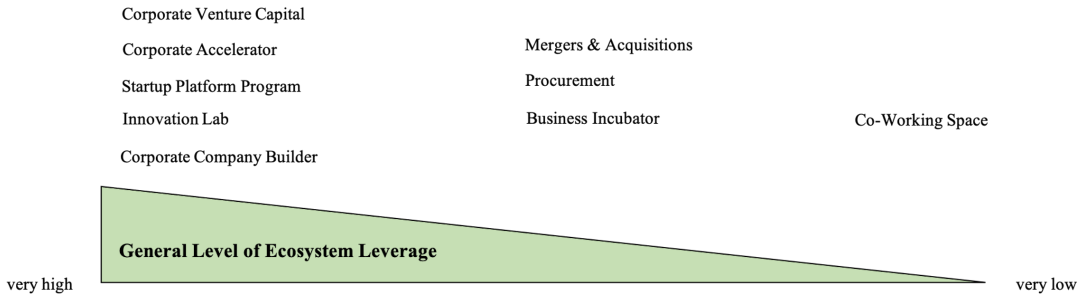


Figure 9: Spectrum on general levels of (startup) ecosystem leverage (own illustration).

In particular, the following analysis combined data on (a) the programs' time-frames, (b) the startup entry-stages, and (c) the corporate scope of growth phase-support, which resulted in a cubic matrix as presented in Figure 10. The matrix compared the different emphases of the various options on the said three characteristics at a glance.

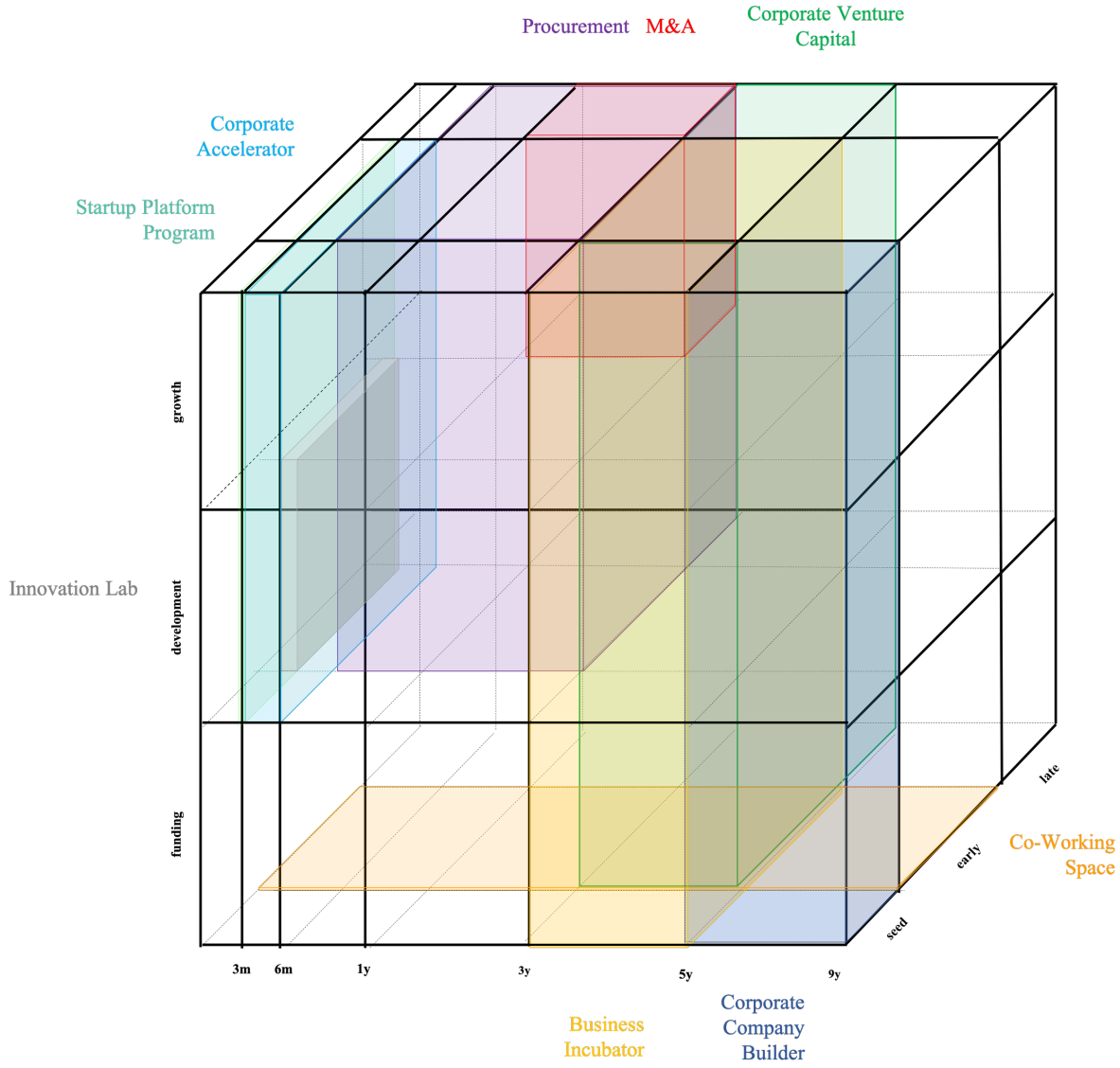


Figure 10: Cubic matrix, displaying dimensions of corporate involvement along with the collaboration programs (own illustration).

When interpreted at a higher level, the data suggests that general corporate flexibility in collaborating with startups is beneficial.
A programs' width on the x-axis (timeframe) represents the level of an options' adaptive capacity over time, while the breadth along the y-axis (entry-stages) represents the corporate versatility of including startups to programs, and the height along the z-axis (scope of growth phase support) represents the capability of the corporation of providing resources for stage-specific startup needs.

In conclusion, it is suggested that the volume of each option-specific cube positively correlates with the general level of adaptability in relation to the program realization of that option. Larger volume options such as CVC, BI and Procurement are hence expected to offer agile program features. Innovation managers should be aware of these differences in groups of options and prepare accordingly when pursuing one of large-volume options.
As seen from the findings presented in this section, the various options show some overlap in characteristics, depending on the perspective from which they are observed. However, taken as a whole, all of the collaboration options reveal unique characteristics with considerable innovation potential.

General challenges in the execution of such collaborations may result from differences in organizational culture and work practices and differences in organizational timelines. Without sufficient freedom (vs. control) and a lean orientation of corporate structures, the success and innovation of startups may be significantly limited. A lean orientation here refers to the culture of experimenting, iterating, investigating and testing in the creation of products or in service innovation. It is thus crucial to put careful thought into deciding what collaboration option to pursue and to strive for the mutual benefit of both the corporation and startup. It is therefore important for the process to involve trustworthy internal mediators determined to push forward innovation and to facilitate the fostering of internal connections to both the involved business units and the C-level management.

In order to develop a more holistic view in deciding which collaboration option to pursue, innovation managers may consider using a weighted decision matrix as shown in Figure 11. Within the matrix, corporation-relevant decision criteria (extracted from the framework) may be listed and assigned an importance-score (rated based on corporate-specific requirements, ranging for example from 1-5). For every listed criterion, the most suitable option(s) may be marked with a cross. The multiplication of each criterion's importance score with 1 for suitable options and 0 for unsuitable options, followed by the addition of every individual options' scores across criteria, may assist in making the choice of which collaboration option would be most appropriate to pursue. Specifically, the option with the highest total score best meets the corporation's requirements for a collaboration.

Criteria	Score	Corporate Venture Capital	Mergers & Acquisitions	Procurement	Business Incubator	Corporate Accelerator	Corporate Company Builder	Co-Working Space	Platform Program	Innovation Lab
Strategy: focus on direct innovation	5	X	X	X	X	X	X			
Strategy: focus on financial returns	3	X		X		X	X			
Risk level: low	3			X		X		X	X	X
Availability of resources: medium	4	X		X				X	X	X
Scale of startup collab.: medium-large	2				X	X	X			X
(…)	(1-5)									
Total weighted score		12	5	**15**	7	13	10	7	7	9

Figure 11: Simple example of a weighted decision matrix that might be used as a guideline to support choice on what collaboration option to pursue (own illustration).

In the example used in Figure 11, procurement would be the most suitable collaboration option to pursue because it reveals the highest weighted total score (15) for this particular scenario.

As a final remark, it is important to note that the above discussion of practical implications is not complete and only presents some of the most informative comparisons retrieved from the reference framework (Peter, Back & Werro, 2018).

6 Discussion and Conclusions

This article presented a variety of data illustrations to offer practical insights for open collaborative innovation options between large corporations and startups. Past research addressing guidance, tools and references for large corporations to aid their choice of a suitable option for collaboration with startups is scant. Challenges result from substantial differences between collaborating businesses in cultures, work practices, as well as differences in organizational timelines. Without an appropriate level of freedom (vs. control) and a lean orientation of corporate structures, the success of startups may be limited. To face those challenges, it is crucial for management at corporations to put careful thought into what collaboration option to pursue and to strive for mutual benefits for both corporations and startups. Particularly important resources in doing so are trustworthy internal mediators determined to push forward innovation, and excellent internal connections between the business units and the c-level management. Owing to the significant differences between startups and established corporations particularly regarding availability of resources and structure (Vanhaverbeke, Vermeersch & De Zutter, 2012), the implementation of such partnerships is a challenge which is identified as an important research gap.

The data illustrations provided address this gap as they serve to aid such decision making and implementation of collaborations. Further, the illustrations highlight the significant differences between the various startup-corporate collaboration options presented. The choice of collaboration option may be influenced by several corporate prerequisites and aspirations, such as availability of resources, risk-appetite and strategic goals. Based on Peter, Back & Werro (2019), this paper has put into context various collaboration options by illustrating them across decision-relevant dimensions. This includes, for instance, the option-specific depiction of the different levels of resources that are expected to be contributed towards the development of startups. Furthermore, striking correlations were observed between the level of investment and the corporate level of control over a startup. Moreover, the results highlight the interdependencies of corporate involvement and the required level of adaptability of the program realization of options (flexibility). A weighted decision matrix can complement decision-making tools utilized by innovation managers by facilitating consideration of various options at a high-level of analysis.

Making the right decision in choosing the appropriate collaboration option may help large corporations to be adaptive in a fast-changing market. It is equally important for corporations to strive for mutual benefit with the involved startups and to have an equal footing in that dialogue. The findings of this body of work constitute a hands-on guide to attaining this desired condition of mutually beneficial stasis and calls for further academic emphasis to be placed on matter.

However, there are certain limitations in generalizations made from exploratory research of field studies. There are practical implications of the study, in that there is no one objectively right decision to be made based on the findings presented, and the final decision on how to collaborate has to be made by practitioners, based on their individual and subjective criteria. Corporations may encounter further challenges when applying this decision-making framework in both the determination and the measurement of performance indicators. The measurement of performance of innovation in general is challenging given the ambiguity in determining what constitutes successful innovation. Moreover, the performance

of an innovation program is further challenging and difficult to measure, because it is typically not possible to objectively and unambiguously evaluate if the performance was a direct result of the program. For example, a BI that engages with top-quality startups but offers a poorly managed program might achieve similarly good results as a BI that works with average startups but manages to transform them into highly valued ventures. Primarily based on the learnings from expert interviews, the researcher suggests for corporations to set their KPIs as closely linked to the program's specific goals over a long-term period. Thus, KPIs that are linked to the overall company goals (e.g. innovation portfolio growth, entry of new markets, talent acquisition) should be applied with prudence.

Future studies may seek to further develop the proposed tools of analysis and to validate their general applicability. It would be of further interest to investigate whether, and if so, to what extent, large corporations ought to combine different collaboration options. This could be explored by means of additional case studies and expert interviews, including perspectives from both corporations and startups.

References

Accenture (2015). Harnessing the power of entrepreneurs to open innovation. G20 Young Entrepreneurs Alliance Summit, Istanbul. Retrieved July 4, 2018, from https://accntu.re/2H5IedG.

Aparacio, M. & Costa, C.J. (2014). Data Visualization. *Communication Design Quarterly*, 3.1, November 2014.

Berghaus, S. & Back, A. (2016). Gestaltungsbereiche der Digitalen Transformation: Entwicklung eines Reifegradmodells. *Die Unternehmung. Swiss Journal for Research and Practice*, 70(2), 98–122.

Bikakis, N. (2018). *Big Data Visualization Tools*. Encyclopedia of Big Data Technologies, Springer.

Blank, S. (2010). *What's a startup? First principles*. Retrieved July 11, 2018, from http://steveblank.com/2010/01/25/whats-a-startup-first-principles/.

Bonzom, A. & Netessine, S. (2016). *How do the world's biggest companies deal with the startup revolution*. Retrieved December 3, 2018, from http://698640.hs-sites.com/500corporations.

Bouncken, R.B. & Reuschl, A.J. (2016). *Coworking-spaces: how a phenomenon of the sharing economy builds a novel trend for the workplace and for entrepreneurship*. Heidelberg: Springer.

Brandenburg, M., Govindan K., Sarkis, J. & Seuring, S. (2014). Quantitative Models for Sustainable Supply Chain Management: Developments and Directions. *European Journal of Operational Research*, 233 (2), pp. 299–312.

Brewerton P. & Millward, L (2001). *Organisational research methods*. London: Sage.

Brigl, M., Hong, M., Roos, A., Schmieg, F. & Wu, X. (2016). *Corporate venturing shifts gear. How the largest companies apply a broad set of tools to speed innovation*. The Boston Consulting Group. Retrieved December 6, 2018, from http://image-src.bcg.com/Images/BCG-Corporate-Venturing-Shifts-Gears-Apr-2016_tcm102-150374.pdf.

Chesbrough, H. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Cambridge, MA: Harvard Business School Press.

Chesbrough, H. & Appleyard, M. M. (2007). Open innovation and strategy. *California Management Review*, 50(1), pp.57-76.

Chesbrough, H. & Brunswicker, S. (2014). A fad or a phenomenon? The adoption of open innovation practices in large firms. *Research-Technology Management*, Vol. 57 No. 2, pp. 16-25.

Chesbrough, H. (2017). The Future of Open Innovation. The future of open innovation is more extensive, more collaborative, and more engaged with a wider variety of participants. *Research-Technology Management*, 60(1), 35–38.

Cohen, S. (2013). What Do Accelerators Do? Insights from Incubators and Angels. *Innovations*, 8 (3), 19-25.

Corsi, P. (2017). *Case Study: Growth Through Cooperation, Work, Time and Space, in Going Past Limits to Growth: A Report to the Club of Rome EU-Chapter*. Hoboken, NJ: John Wiley & Sons, Inc..

Coyle, J. F. & Polsky, G. D. (2013). Acqui-hiring. *Duke Law Journal*, 63(2), 281-346.

Crichton, D. (2014). *Corporate Accelerators Are An Oxymoron*. Tech-Crunch. Retrieved November 4, 2018, from https://techcrunch.com/2014/08/25/corporate-accelerators-are-an-oxymoron/.

Dahlander, L. & Gann, D.M. (2010). How open is innovation? *Research Policy*, Vol. 39 No. 6, pp. 699-709.

Dee, N., Gill, D., Livesey, T. & Minshall, T. (2011). *Incubation for growth: A review of the impact of business incubation on new ventures with high growth potential*. Nesta. Retrieved August 28, 2018, from https://www.nesta.org.uk/sites/default/files/incubation_for _growth.pdf.

Docherty, M. (2006). Primer on 'open innovation:' principles and practice". *PDMA Visions*, Vol. 30 No. 2, pp. 13-17.

Dodgson, M., Gann, D. & Salter, A. (2006). The role of technology in the shift towards open innovation: the case of Procter & Gamble. *R&D Management*, Vol. 36 No. 3, pp. 333-346.

Fantasia, R. (2016). Acquihiring: A New Process for Innovation and Organizational Learning. In: Ricciardi F., Harfouche A. (Ed.) *Information and Communication Technologies in Organizations and Society. Lecture Notes in Information Systems and Organisation*. Heidelberg: Springer.

Friendly, M. (2009). *Milestones in the history of thematic cartography, statistical graphics, and data visualization*. Retrieved August 28, 2018, from http://www.math.yorku.ca/SCS /Gallery/milestone/milestone.pdf.

Gaponova, O.S. & Korshunov, I.A. (2018). Deploying a Corporate Learning System at the Innovative Startup. *Russian Education & Society*, 60:4, 289-314.

Gassmann, O. (2006). Opening up the innovation process: towards an agenda. *R&D Management*, Vol. 36 No. 3, pp. 223-228.

Gassmann, O., Enkel, E. & Chesbrough, H. (2010). The future of open innovation. R*&D Management*, Vol. 40 No. 3, pp. 213-221.

Giannopoulou, E., Ystrom, A. & Ollila, S. (2011). Turning open innovation into practice: open innovation research through the lens of managers. *International Journal of Innovation Management*, Vol. 15 No. 3, pp. 505-524.

Grippa, F. et al. (2018). *Collaborative Innovation Networks: Building Adaptive and Resilient Organizations*. Cham: Springer.

Gryszkiewicz, L., Lykourentzou, I. & Toivonen, T. (2016). *Innovation Labs: Leveraging Openness for Radical Innovation?* Retrieved January 6, 2019, from https://doi.org/10.2139/ssrn.2556692.

Hackett, S. & Dilts, D. (2004). A systematic review of business incubation research. *The Journal of Technology Transfer*, 29 (1), 55–82.

Hathaway, I. (2016). What Startup Accelerators Really Do. *Harvard Business Review*, 7, 2016.

Hevner, A., March S., Park, J. & Ram, S. (2004). Design science in information systems research. *MIS Quarterly*, 28(1), 75–105.

Hevner, A. (2007). A Three-Cycle View of Design Science Research. *Scandinavian Journal of Information Systems*, 19(2), 87-92.

Hevner, A. & Chatterjee, S. (2010). *Design Research in Information Systems - Theory and Practice*. Retrieved January 6, 2019, from https://doi.org/10.1007/978-1-4419-5653-8.

Isabelle, D. (2013). Key Factors Affecting a Technology Entrepreneur's Choice of Incubator or Accelerator. *Technology Innovation Management Review*, 16–22.

Jäger, M. (2016). *Company Builder am Beispiel von Rocket Internet. Founders Owl.* Retrieved November 11, 2018, from http://www.founders-owl.de/glossar/company-builder/.

Kohler, T. (2016). Corporate accelerators: Building bridges between corporations and startups. *Business Horizons*, 59(3), pp. 347–357.

Kupp, M. et al. (2017). Corporate accelerators: fostering innovation while bringing together startups and large firms. *Journal of Business Strategy*, Vol. 38 Issue: 6, S.47-53.

Lichtenthaler, U. (2016). Five steps to transforming innovation processes: continually adjusting to new environments. *Journal of Business Strategy*, Vol. 37 Issue: 5, S.39-45.

Lopez-Hernandez, A.K. et al. (2018). Team collaboration capabilities as a factor in startup success. *Journal of Technololgy Management & Innovation*, 2018. Volume 13, Issue 4.

Mahmoud-Jouini, S.B. et al. (2018). Key Factors in Building a Corporate Accelerator Capability. *Research-Technology Management*, 61:4, 26-34.

March, S.T. & Storey, V.C. (2008). Design science in the information systems discipline: An introduction to the special issue on design science research. *MIS Quarterly*, 32(4), 725–730.

Mayring, P. (2002). *Einführung in die Qualitative Sozialforschung: Eine Einleitung zu qualitativem Denken (5. Auflage).* Basel: Beltz Verlag.

Miller, P. & Bound, K. (2011). *The Startup Factories. The rise of accelerator programmes to support new technology ventures*. Retrieved January, 4, 2019, from https://www.bioin.or.kr/InnoDS/data/upload/policy/1310018323687.PDF.

Mocker, V., Bielli, S. & Haley, C. (2015). *Winning together – A Guide to Successful Corporate Startup Collaboration*. Retrieved January, 4, 2019, from https://www.nesta.org.uk/publications/winning-together-guide-successful-corporate-startup-collaborations.

Mercandetti, F. et al. (2017). Innovation by Collaboration between Startups and SMEs in Switzerland. *Technology Innovation Management Review*, December 2017, Vol.7, Issue 12.

Mumford, E. (2001). Advice for an action researcher. *Information & People*, Vol. 14, Issue 1, pp. 12-27.

Nagji, B. & Tuff (2011). *A Simple Tool You Need To Manage Innovation*. Retrieved Januara, 4, 2019, from https://hbr.org/2012/05/a-simple-tool-you-need-to-mana.

Park, J.-H. & Bae, Z.-T. (2018). When are 'sharks' beneficial? Corporate venture capital investment and startup innovation performance. *Technology Analysis & Strategic Management*, 30:3, 324-336.

Patry, J.L. (Ed.). (1982). *Feldforschung. Methoden und Probleme sozialwissenschaftlicher Forschung unter natürlichen Bedingungen*. Bern: Huber.

Pauwels, C. et al. (2016). Understanding a new generation incubation model: The accelerator. *Technovation* 50–51:13–24.

Peffers, K., Tuunanen, T., Gengler, C.E., Rossi, M., Hui, W., Virtanen, V. & Bragge, J. (2006). The design science research process: A model for producing and presenting information systems research. Proceedings of the *First International Conference on Design Science Research in Information Systems and Technology* (DESRIST 2006), 83–106.

Peter, L., Back A. & Werro, T. (2018). A Taxonomic Framework on Prevalent Collaborative Innovation Options between Corporations and Startups. International Journal of DIGITAL TECHNOLOGY & ECONOMY (IJDTE), Volume 3, Number 2, 2018, S. 63-94.

Peter, L. (2019). Gestaltungsbereiche für Grossunternehmen zur Kollaboration mit Startups: Das Startup-Collaboration-Model. *Die Unternehmung – Swiss Journal of Business Research and Practice,* Heft 03/2019.

Peter, L, Back A. & Werro, T. (2019). Conceptual framework for collaborative open innovation with a startup ecosystem". *International Journal of Innovation in the Digital Economy (IJIDE)*, Volume 11, 2019, Issue 1, Article 2.

Pohler, N. (2012). Neue Arbeitsräume für neue Arbeitsformen: coworking Spaces. *Österreichische Zeitschrift für Soziologie*. 37, 65–78.

Rao, M. (2015). *15 innovation tips: how large corporation can successfully engage with startups. Your Story*. Retrieved January, 4, 2019, from http://yourstory.com/2015/04/tips-for-corporates-to-engage-startups.

Reim, W., Parida, V. & Örtqvist, D. (2015). Product–Service Systems (PSS) Business Models and Tactics – A Systematic Literature Review. *Journal of Cleaner Production*, 97, pp. 61–75.

Richter, N. et al. (2017). Outsourcing creativity: An abductive study of open innovation using corporate accelerators. *Creative Innovation Management*, 2018; 27: 69–78.

Ringel, M., Taylor, A. & Zablit, H. (2016). *The Most Innovative Companies 2016: Getting "Not Invented Here." The Boston Consulting Group (BCG).* Retrieved January, 4, 2019, from https://media-publications.bcg.com/MIC/BCG-The-Most-Innovative-Companies-2016-Jan-2017.pdf.

Rittel, H. & Webber , M. (1984). *Planning problems are wicked problems. Developments in Design Methodology, N. Cross (ed.).* New York: John Wiley & Sons.

Rocket Internet (2017). *Company Homepage*. Retrieved July 11, 2018, from https://www.rocket-internet.com/.

Sarbacher, M., Schildhauer, T., Schleicher, T. & Näfelt, A. (2016). *Die 2. Welle der Open Innovation*. Retrieved July 11, 2018, from https://www.jku.at/ham/content/e35389/e318923/e318945/e318946/DownloadVortragThomasSchildhauer.pdf.

Simon, H.A. (1996). *The Sciences of the Artificial*. Cambridge, MA: MIT Press.

Smorodinskaya, N. et al. (2017). Innovation Ecosystems vs. Innovation Systems in Terms of Collaboration and Co-Creation of Value. *Proceedings of the 50th Hawaii International Conference on System Sciences*, Big Island, Hawaii, January 4-7, 2017, 5245–5254.

Spithoven, A., Vanhaverbeke, W. & Roijakkers, N. (2013). Open innovation practices in SMEs and large enterprises. *Small Business Economics*, Vol. 41 No. 3, pp. 537-562.

Suominen, A. et al. (2016). Innovation Systems and Ecosystems: A Review and Synthesis. *XXVII ISPIM Innovation Conference*. Porto, Portugal, 19-22 June 2016.

Taga, K., Pichai, H. & Doemer, F. (2015). *Telecom operators: Open Innovation with start-ups. Arthur D. Little White Paper Series*. Retrieved August 28, 2018, from http://www.adlittle.com/downloads/tx_adlreports/ADL_Telco_Start-ups_OpenInnovation.pdf.

Tardy, F. (2013). *Frédéric Tardy, Chief Marketing & Distribution of AXA Group announces the creation of the AXA Lab*. Retrieved August 28, 2018, from https://www.youtube.com/watch?v=bdoh5Mg4-rc.

Umbenhauer, B. & Sopher, S. (2013). *Charting the course: Why procurement must transform by 2020*. Deloitte Consulting LLP. Retrieved August 28, 2018, from https://www2.deloitte.com/content/dam/Deloitte/us/Documents/process-and-operations/us-cons-charting-the-course-071013.pdf.

Vaishnavi, V.K. & Kuechler, W. (2007). *Design Science Research Methods and Patterns: Innovating Information and Communication Technology*. New York: Auerbach Publications.

Vanhaverbeke, W., Vermeersch, I. & De Zutter, S. (2012). Open innovation in SMEs: how can small companies and start-ups benefit from open innovation strategies? *Flanders District of Creativity*, Leuven.

Wallis, I. (2016). *Europe's 25 Corporate Startup Stars. Startups – The UK's No.1 starting a business resource*. Retrieved August 28, 2018, from http://startups.co.uk/europes-25-corporate-startup-stars/.

Waters-Lynch, J. & Potts, J. (2017). The social economy of coworking spaces: a focal point model of coordination. *Review of Social Economy*, 2017.

Weiblen, T. & Chesbrough, H. W. (2015). Engaging with Startups to Enhance Corporate Innovation. *California Management Review*, 57(2), pp. 66–90.

Wennberg, K. et al. (2016). Variable risk preferences in new firm growth and survival. *Journal of Business Venturing*, 31(4), 408–427.

Werro, T. (2017). How Corporates Innovate with Startups - Options and Guidelines for Collaborative Open Innovation with Examples from Silicon Valley. *Master Thesi*s, Universität St.Gallen.

West, J. & Bogers, M. (2014). Leveraging external sources of innovation: a review of research on open innovation. *Journal of Product Innovation Management*, Vol. 31 No. 4, pp. 814-831.

Yoo, Y., Henfridsson, O. & Lyytinen, K. (2010). The new organizing logic of digital innovation: An agenda for information systems research. *Information Systems Research*, 21(4), pp. 724–735.