

Corporate engagements with startups: antecedents, models, and open questions for innovation management

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Abstract: Corporate Engagements with Startups (CEwS) are Open Innovation initiatives in which large established companies interact with startups aiming at improving innovation performance. Complementary characteristics of established companies (*e.g.* resource availability, inertia...) and startups (resource scarcity, flexibility, technologies...) are starting points for such engagements. However, large companies and startups are remarkably different so that working together can be overly challenging. Especially for large companies, many intricacies emerge to interact with nascent businesses (*e.g.* processes, culture, resource sharing, information disclosure, etc.). This study summarizes the current literature on CEwS and identifies the main strands and antecedents of this phenomenon, as well as the main reference models available in the literature. Then, the paper presents and discusses some open questions for innovation management under the perspective of large companies, based on the gaps identified between the presented literature on CEwS and the organizational debate within the innovation management field. Finally, we present implications for theory and practice and suggest directions for future studies on CEwS.

Keywords: corporate engagements with startups, open innovation, innovation management, literature review.

1. Introduction

Innovation has been largely considered a mandatory path for companies to stay competitive (Adams et al., 2006; O'Connor et al., 2008; Tidd et al., 2001). Especially in the context of large established companies, efforts aiming at improving innovation performance are in permanent conflict with other demands associated with short-term operational efficiency (Duncan, 1976; O'Connor et al., 2008; O'Reilly 3rd & Tushman, 2013; Tidd et al., 2001). This is likely to be the most central challenge of innovation management over the last decades.

The concept of Open Innovation, coined by Chesbrough (2003), has remarkably influenced the thoughts in this field. When innovating openly, knowledge flows inbound and outbound a company so that risks and uncertainties associated with innovation projects are gradually mitigated (Chesbrough, 2003; Huizingh, 2011). Notwithstanding, even though an open innovation approach can leverage companies' innovation potential through external ideas, resources, and expertise, the building of a systematic open innovation capability is a result of a long organizational change process (*e.g.* Chiaroni et al., 2011). Current literature provides us with many alerts regarding the

risks for companies when they outsource their innovation capabilities – a misinterpretation that managers often make when they see the opportunities offered by open innovation approaches (*c.f.* Huizingh, 2011). Therefore, instead of using open innovation to avoid the challenges associated with organizational transformation to innovate, the conduction of efforts towards open innovation requires itself a transformational experience.

In this context, Corporate Engagements with Startups (CEwS) have emerged as a strong and promising form of open innovation. Many studies report growing numbers of companies interacting with startups (Kohler, 2016; Livieratos & Lepeniotis, 2017; Prashantham & Kumar, 2019; Weiblen & Chesbrough, 2015). Largely propelled by the recent advances and diffusion of digital technologies, CEwS have been occurring in many different formats, purposes, and levels of interaction. Generally, for large established companies, CEwS represent a way to mitigate the uncertainties associated with radical innovation; for startups, by turn, CEwS are opportunities to access resources and extra help to propel their business.

CEwS as a particular field of research is still in its early days and it is largely dedicated to understanding how corporate programs work, basic rules to establish startup engagements and recommendations on how to select partners (Hogenhuis et al., 2016; Selig et al., 2018; Spender et al., 2017). A further understanding of how large established companies organize for systematic engagements with startups, aiming at consolidating open innovation capabilities and leveraging the overall performance in the management of innovation is still not clear. Therefore, to propose connections between startup engagements and innovation management in large companies, we need first to delimitate the antecedents and the models that underlie the current debate on CEwS so that the opportunities to bridge these strands can emerge. Such opportunities come in the form of open questions to be addressed to the innovation management field aiming at generating new insights for academic research and the management practice in large companies.

The present study aims to cope with this challenge. It offers a landscape of the current theoretical approaches on CEwS, identifying their antecedents, the main strands, and the available models. Following, we discuss the gaps between the current CEwS studies and the organizational aspects of innovation management, elucidating implications, and directions for future practice and research from the perspective of large companies.

2. Method

To perform a systematic review on the subject of CEwS aiming also to identify its antecedents, we based our steps on previously published efforts in innovation management field concerning literature reviews and document search (Bagno et al., 2017a; Bagno et al., 2017c; Silva et al., 2014). Thus, the bibliography search was firstly done on Scienedirect and Ebsco Business Source platforms in April 2019. We used the following expression: (startup or start-up or start up or startups or start-ups) AND (engagement or partnership or agreement or acceleration or incubation), filtering the results by the field. As a complementary procedure, we combined the first part of the expression using AND command with (company OR companies OR mnc OR firm OR corporate). After carefully reading titles and abstracts, we obtained 19 articles that potentially could add insights into CEwS subjects. Similar expressions were tried in other academic search platforms with no significant contribution to the initial list except for adding management reports from consulting firms and enterprise organizations available in public domains.

Such a procedure allowed us to recognize the studies of Weiblen & Chesbrough (2015) (354 citations in Google Scholar, 100 citations in Scopus database on August 10, 2020) and Kohler (2016) (257 citations in Google Scholar,

75 citations in Scopus database on the same date) as central for CEwS current debate. Then we have revisited the academic databases in search of recent articles that cited at least one of these central studies and, again, we filtered the results by reading titles and abstracts, analyzing the affinity with our subject. A snowball approach was also applied along these readings to identify potential insightful papers that were cited frequently across the sample. At last, 66 documents among academic papers, books, and industry reports were judged relevant to a more careful exploration. From those, 52 corresponded to journal articles, and 33 of them were published after Weiblen & Chesbrough (2015)'s seminal work. As not all of the documents were considered to delineate the general landscape of CEwS offered in this paper so that Appendix 1 shows details of the complete list of selected documents used to explore the subject.

The list of documents returned from this search revealed that no academic journal concentrated the debate but nine innovation-related journals presented three or more contributions to the final list, as shown in Figure 1.

Borrowing some recommendations for clarity and transparency in systematic reviews from PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses, a standard originally proposed for healthcare field; Liberati et al., 2009; Moher et al., 2009), one important concern lay on the bias – of the search itself and the authors when selecting studies from the database results. We dealt with authors' biases by systematically comparing the overall search for articles and reports made in separate by two different authors of this study, making corrections on the main list when a text emerged with high priority in one list, but not in the other. Such an exercise helped to adjust the individual criteria for selecting documents and also for categorizing strands as well as increased confidence in the final list of papers/reports.

Translating the meaning of bias to the management field, we can assume that search biases might occur in terms of (i) the size of companies involved in the open innovation initiatives and the side of the partnership to take into consideration for analysis; (ii) the theoretical perspective (i.e. the main strands that influence the study and shapes its analysis); (iii) the industrial/economic sector on which the studies might be focused. Since such biases may not be declared in each study, they were then identified throughout the readings and processed in favor of the study's central interests and discussions as follows.

Regarding the first source of bias, although several studies are dedicated to understanding corporate engagements from the view of startups (or small companies as a whole) or even intended to take a program perspective (considering the program design regardless of the organization), we decided to focus on studies that explicitly considered the challenges for large companies in some level. This is so because the

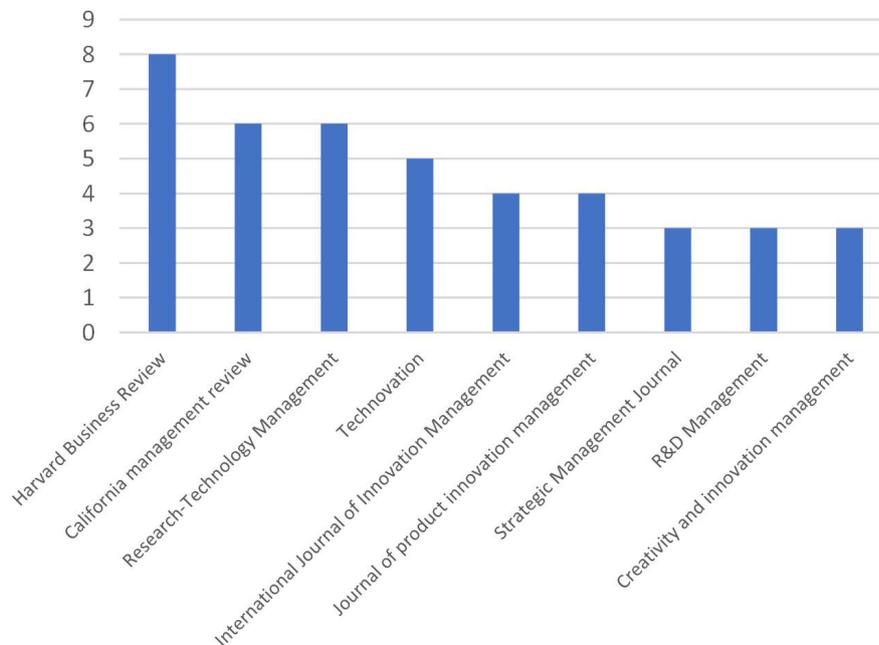


Figure 1. Most retrieved journals for CEwS studies. Source: the authors.

inertia associated with innovation and the trajectory traps that potentially decreases the propensity to engage with change is typical of complex organizations. In line with this aspect, the research question explicitly declared the focus on large organizations, and the search procedure was designed to filter the documents accordingly.

Secondly, in what regards the theoretical lenses from which each study embraces the CEwS, the texts were grouped according to their similarities in terms of approach and strands, which later inspired the topics of the sections 3 and 4.2.

About the third aspect of bias, we could realize that many of the retrieved studies are highly influenced by the dynamics of digital-born companies, in special by the experience and lessons of the so-called FAAMG (Facebook, Apple, Amazon, Microsoft, and Google, also known as The Big Five). Even though we recognize that digital technologies are the main lever of the CEwS phenomenon in the last years (which is discussed in section 4.1), the challenges behind CEwS for systematic innovation is likely to differ dramatically between these experiences and that of large companies of traditional industrial sectors due to similar reasons as those discussed in the first aspect.

These gaps first inspired the topics of section 5, which is designed to bring insights to a broader audience of large companies' practitioners and researchers. Moreover, as the lack of connection between CEwS and systematic innovation management literature became clear we gradually refined the discussion presented in section 5, based on our previous investigations on the subject (e.g. Bagno et al., 2017b; Bagno et al., 2017c; Melo & Bagno,

2017). Finally, the conclusion section summarizes our final thoughts and directions for future research.

3. Antecedents of CEwS

As an emerging field of study, before discussing the contemporary forms and models of CEwS, the identification of the strands that influenced the practice and research on this field is of vital importance to understand the different elements and perspectives highlighted by each theoretical lens to shape the richness of initiatives that we call today as CEwS. Yet, open questions and opportunities to improve the management of innovation from CEwS analysis come from the recognition of its roots and hidden assumptions.

Even though a careful analysis on the literature searched may reveal many hues, branches, and connections among studies, the efforts of categorizing papers, as described in section 2, led us to recognize at least three broad perspectives to guide our understanding of CEwS' influences and antecedents: one coming mainly from the financial thinking (that gradually steps towards open innovation approaches), other from the exploit-explore dilemma (comprising both studies from strategic and organizational perspectives) and a final one that focuses on the nature of the partnerships. The next subsections present a summary of each one as well as their central ideas.

3.1. Corporate venturing initiatives and open innovation

Corporate Venturing Capital initiatives (CVC) conducted by large-sized companies are likely the most influential antecedents of the current debate on CEwS. However, in the early days of Venture Capital investments (VC), these

initiatives were very transactional, viewed as enablers of financial options, or, at most, associated with direct acquisitions of technology or whole businesses with no other inner interaction between the organizations involved. Today, CVC initiatives are considered as important sources of strategy renewal and new business opportunities (e.g. Basu et al., 2011). Weiblen & Chesbrough (2015) consider that corporate venture capital along with corporate incubators are the most consolidated models for companies to engage with startups due to their significative diffusion and maturity in the market. Livieratos & Lepeniotis (2017) argue that we live the fourth wave of CVC, in which the companies' programs are increasingly integrated with open innovation efforts and, as so, they come to get technical and managerial support from several other innovation initiatives.

3.2. Corporate entrepreneurship and organizational ambidexterity

Corporate Entrepreneurship, a concept coined in the strategy field, is a way for companies to get incremental value from their current businesses and, simultaneously, bet on promising innovation opportunities (Selig et al., 2018; Shankar & Shepherd, 2018). This central idea is remarkably similar to that one found in organizational ambidexterity strand (which root in organizational studies) that postulate that a company needs to exploit its current business (*i.e.* improving operational efficiency, incrementally innovating within their domains) and, at the same time, explore disruptive opportunities (radical innovation, outside the company's domains) (O'Reilly & Tushman, 2004; Raisch & Birkinshaw, 2008).

Since established companies are usually biased towards exploitation, Alänge & Steiber (2018) affirm that engaging with startups could represent a path to thrive in the ambidexterity challenge of incumbent companies by bringing "exploration" closer to the organizational routine. These authors offer a framework of operational modes for ambidexterity based on the successful experiences of large manufacturing companies in their interactions with innovative nascent businesses.

3.3. Asymmetric partnerships

Asymmetric Partnerships are those in which the partners are strongly different from each other in terms of size, resources, or commercial experience (Minshall et al., 2010). This is exactly the case when established companies and startups work together, even though this study line investigates the abovementioned partnerships involving large and small companies in general and so, it has developed much before the startup movement got prominence.

The expropriation of resources from the "weak side" of such kind of a partnership is one of the central problems

discussed in this study line. According to Freytag (2019), startups and established companies can achieve success in long-term partnerships only if the interests of both sides are properly considered – which is not necessarily obvious in the context of large firms that lead over long and mature value chains.

Long organizational trajectories, strongly marked by verticalized interinstitutional relationships and centralized network governances, frequent use of bargain power, and strictly detailed contracts that seek to predict and rule every single move from suppliers and other partners are examples of factors that highly influence the general mindset applied to partnerships in many large-sized companies (Bagno et al., 2012; Humphrey & Schmitz, 2000). Although the asymmetric partnerships strand presents many concerns and warnings applicable to corporate-startup partnerships, Minshall et al. (2010) argue that asymmetric relations between large established companies and startups can flourish and provide both sides with economic advantages.

4. Corporate engagements with startups

As discussed in previous sections, the increasing numbers of CEwS observed in the last years are highly influenced by the rise, modularity, transversality, accessibility, and decreasing costs of digital technologies. These aspects have fostered many technology entrepreneurship initiatives with high potential to meet the demands of large companies under the pressure for efficiency in the context of industry 4.0 and the impacts of digital transformation over their businesses. Hence, section 4.1 brings some concepts and considerations from this field to pave our understanding of the contemporary forms of CEwS. Following, section 4.2 presents the seminal studies on contemporary CEwS and the main models.

4.1. The role of digital technologies for contemporary CEwS

Castells & Hall (1994) affirmed that cities and regions would have their whole structures changed by three main historical processes, viz, a revolution based on information technologies, so relevant as were the energy sources for the former industrial revolutions; a global economy that comprises elements like capital, management, work, technology, information and markets; and new production patterns in which competitiveness comes to be highly dependent on new knowledge and on the level by which the organizations access and process information properly.

Prashantham & Kumar (2019) observe a sense of urgency in industries perceiving disruption through digitization. According to Basu et al. (2011), commitment to activities like CVC is greater in industries with rapid technological change, high competitive intensity, and weak appropriability. Moreover, digital platforms and platform-oriented companies are currently getting increasing recognition as the main enablers of ecosystem innovations.

In doing so, a platform leader needs to be able to nurture an entire ecosystem of players (*e.g.* startups) in mutual relations and diverse combinations to innovate (Accenture, 2015).

Erzurumlu (2018) considers digital technologies as the main driver of the current revolution as they are far from any saturations and have the potential to transform every sector in the economy. The author emphasizes five digital technologies, considered fundamental for businesses in the contemporary context: cloud, big data analytics, cognitive computing, internet of things (IoT), and augmented / virtual reality (AR/VR). Minsky (2019) highlights that companies of almost all sectors are paying special attention to technologies such as IoT, robotic process automation (RPA), artificial intelligence, VR, and blockchain. Likewise, Alänge & Steiber (2018) pose that the Internet and cheap information processing have accelerated rates of change and product life cycles in many industries, also fostering new collaborative approaches to innovation with partners outside the firm.

Surely, engagement with startups is not an effort restricted to firms of a specific industrial sector nor startups are all digital. Noteworthy that the so-called “deep techs” – which comprises, for instance, advanced materials, biotechnology, and photonics – have enormous transformation power and have been attracting increasing investments in the CV market (Portincaso et al., 2019). Even so, digital technologies are undoubtedly central to the so reverberating growth of technology entrepreneurship in last years (Prashantham & Kumar, 2019; Selig et al., 2018) and the majority of studies in CEwS report on cases that keep strong relation to the digital technologies.

Wikhamn & Styhre (2019) and Hsieh & Tidd (2012) reinforce that it is different to design an open business model for a small app developer and an innovation for a large biopharmaceutical firm. Native digital companies can be considered today the pioneers in engaging more proactively with startups, and examples are somewhat spread in recent literature (Davenport, 2018; Minsky, 2019; Weiblen & Chesbrough, 2015). Minsky (2019) observes that big healthcare or construction companies represent sectors reluctant to collaborate with startups, support corporate accelerators, launch a venture capital arm, or even acquire startups. On the other hand, powerful new platform technologies now emerge and have the potential to nurture innovation patterns in the next several decades. Such a phenomenon seems to simultaneously occur in machine learning and quantum computing, but also in genetic sequencing and other biotech and, together, generate a momentum that drives a new industrial revolution (Innovation Leader, 2019).

4.2. Models for CEwS

According to Kohler (2016), companies seek to engage with startups to develop new products and services together, explore new market opportunities, or share technology

and talents to solve business challenges. For a startup, the large company may be an important partner to test the product-market fit, leverage efforts to scale-up operations, support product distribution, raise funds or even attract more credibility to the business by sticking the startup to a recognized brand (Kohler, 2016). In addition, Lawton (2019) highlights that engagements with startups can help established companies to foresee their industries’ future by the lenses of the entrepreneurs, change the organizational culture towards an agile behavior and reduce inefficiencies and costs. Kaplan (2019) concludes that despite large companies and startups can be considered totally different worlds, their marriage may be the path to sustainable innovation.

The forms by which established companies and startups interact are numerous. Spender et al. (2017) list many adopted mechanisms like CVC, internal incubators, strategic alliances, and joint ventures. Lawton (2019), besides the corporate acceleration programs, cites the bootcamps, sponsorships to entrepreneurs, and direct engagements with previously identified startups in a specific industry. By turn, Minsky (2019) refers to corporate accelerators, direct cooperation with startups and investments, and/or acquisition of startups, whereas Kohler (2016) categorizes CEwS in corporate hackatons, business, and corporate incubators, corporate venturing and mergers, and acquisitions. Weiblen & Chesbrough (2015) identify four fundamental types of engagements between large companies and startups, which result from crossing two variables: innovation flow (outside-in or inside-out) and equity involvement (Figure 2): Corporate Venturing, Startup Program (Outside-In), Corporate Incubation and Startup Program (Platform).

Although the increasing number of initiatives and studies on CEwS may offer vast possibilities in innovation and entrepreneurship fields, the enthusiasm associated with this idea is also balanced by unsuccessful cases. Engaging large companies with startups comes with complex challenges underlying the dominant discourse of its benefits. Thus, recent research reveals that many CEwS efforts do not reach their goals and are subsequently abandoned (Prashantham & Yip, 2016; Weiblen & Chesbrough, 2015). Minshall et al. (2010) alert about the many managerial challenges to overcome before a proper implementation of partnership management between the large company and startups is set. Special efforts are needed to forge such relationships and making them work. Therefore, how to build an organizational capability to systematically partner with startups becomes a relevant challenge in this context (Innovation Leader, 2019; Prashantham & Kumar, 2019).

Figure 3 shows a conceptual map that summarizes the presented debate on CEwS, emphasizing the gap of interlocution with the field of systematic innovation management – an almost untouched discussion among the CEwS antecedents and that offers the enormous potential of contribution on how companies should organize to better engage with startups.

		Direction of Innovation Flow	
		Outside-In	Inside-Out
Equity Involvement	Yes	Corporate Venturing Participate in the success of external innovation and gain strategic insights into non-core markets.	Corporate Incubation Provide a viable path to market for promising corporate non-core innovations.
	No	Startup Program (Outside-In) Insource external innovation to stimulate and generate corporate innovation.	Startup Program (Platform) Spur complementary external innovation to push an existing corporate innovation (the platform).

Figure 2. Types of CEwS. Source: Weiblen & Chesbrough (2015).

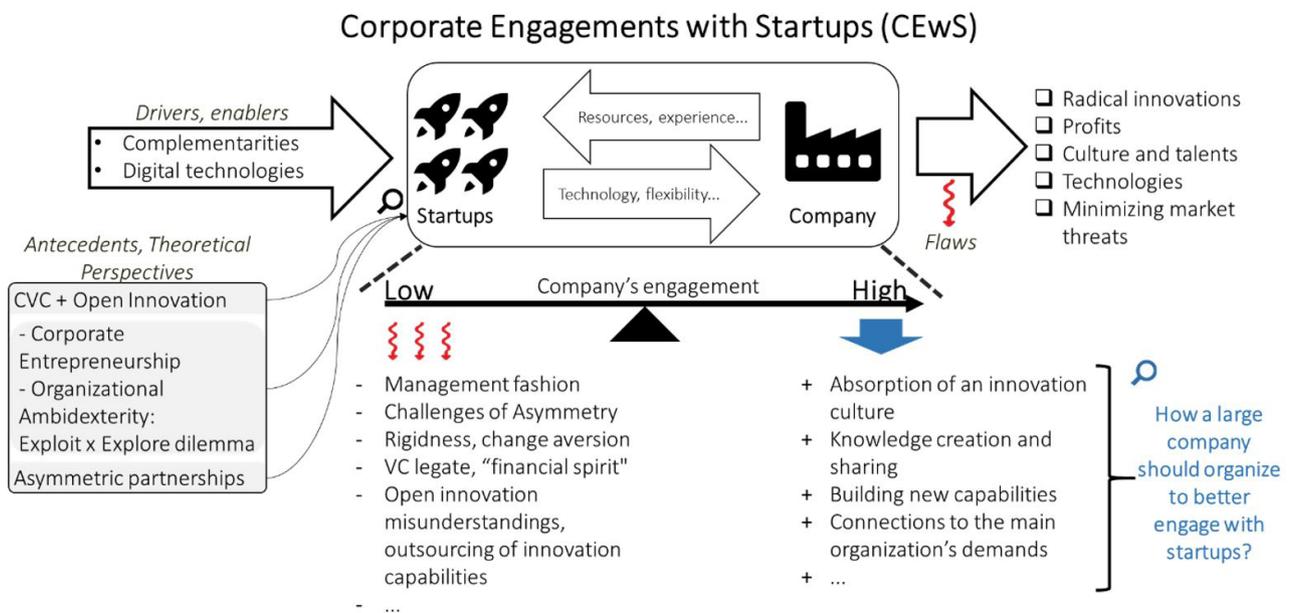


Figure 3. Conceptual map of the general debate on CEwS and the gap to the field of systematic innovation management. Source: the authors.

5. Critical Analysis and Implications: open questions for innovation management

In our journey on CEwS to discuss the antecedents, models, and open questions for innovation management, section 3 covered the antecedents, section 4.1 established the connections with the rise of digital technologies, that appears as the main contextual background of the increasing numbers of CEwS initiatives, and section 4.2 presented the main CEwS models. The present section goes into some open questions that emerge from the gaps identified between

the presented literature and the organizational debate within the innovation management field.

Although offering many important insights on how to leverage innovation performance through partnering with startups, the current debate on CEwS largely neglects the subjacent complexity of the internal organizational elements of established companies to allow them to engage with startups effectively and fruitfully in a systematic way. Many of the studies recognize the problem but tend to oversimplify it by, for instance, mentioning the simple need for a maverick champion who should work to broaden the organizational limits and give support to the startups. The next subsections

present the questions and topics that represented, according to our analysis, the main opportunities to bridge CEwS to innovation management so that new insights for academic research and the management practice in large companies can be fostered.

5.1. What's touched within the organization? Neglected topics in CEwS' studies concerning the management and organization of large companies

Selig et al. (2018) note that the external implications of opening the company's innovation process have gained a lot of attention in recent years, while the internal aspects of such an opening still need further investigation. In general, the CEwS literature does not focus on the organizational aspects that result from these engagements, neither go beyond the immediate issues associated with the design and operation of startup programs. Examples are available by examining the objectives of studies such as Kohler (2016, p. 348), Richter et al. (2018), Shankar & Shepherd (2018), or Kanbach & Stubner (2016).

The problems of not sufficiently consider the CEwS organizational aspects echo the arguments of Greenwood & Miller (2010, p. 78) who state that organizational design has been largely neglected in recent times despite its critical importance for organizations' performance. Especially in the field of innovation management, a disproportionate emphasis on management processes would have masked the complexities of building management systems and organizational structures that can catalyze the occurrence of innovations in large companies (O'Connor, 2012, p. 361).

According to Mahmoud-Jouini et al. (2018), a low level of engagement and attraction of resources from the organization's internal environment would prevent good startups from being attracted as well. Therefore, being a "safe" and "attractive" partner is fundamental not only for the success of CEwS itself but also for the connection of these initiatives with other processes and actions within the company. When resources are immobile and incentives misaligned, the innovation process slows down (Freeman & Engel, 2007).

5.2. Who's involved? The orchestration of CEwS beyond the champion role

Younis et al. (2019) report that innovation leadership is usually dispersed throughout the company, resulting in too many top-management roles, temporary committees, and other alternatives. Some studies emphasize the managerial role of driving the interface between the company and startups by identifying an "influential champion" to lead the initiative (Innovation Leader, 2019) or by considering the support given by "dedicated business developers" (Mahmoud-Jouini et al., 2018) who would act as hubs

or agents to open the organization's doors in favor of the relationships with startups. Kohler (2016) places corporate accelerator managers as the links between startups and corporations by providing startups with access to the right people within the organization and ensuring that innovations developed externally be used internally. For this purpose, such people should have the ability to work with startups and simultaneously navigate well within the organizational structures. Wikhamn & Styhre (2019)'s case presents the role of the innovation hub Chief Operating Officer (COO) who was assigned to develop processes and infrastructure for innovation as well as to act as a bridge and gatekeeper to the internal experts of the parent company. Whatever the name assigned to the champion role, our analysis is that the expectations around it are too high.

As noted by Freeman & Engel (2007), organic forms of innovation in large organizations are difficult to implement and usually rely on the heroic efforts of few individuals who constantly struggle against many internal barriers (*e.g.* cultural, political, resource disputes), excessive hierarchies and rigidities in processes and rules (Arenas et al., 2017; Kelley, 2009; O'Connor et al., 2018). Minsky (2019) argues that what companies do is "innovation theater" when they declare that they are attentive to the startups' scenario but present almost no concrete actions in place. Regarding the work structure, Lawton (2019) points out the need for dedicated teams in the company to work with new partners and reinforces that educating internal stakeholders in this direction requires immense effort. Lastly, the author states that the time and attention that executives from established companies employ to engage with startups dictate the value of the entire initiative and, as a counterpart, they can learn even more than they actually give to the program, which may influence the organization routines as a whole. Therefore, when selecting the ventures to interact with, a company should put its eyes more on startups' people that will be brought inside than on the product/technology they offer (Lawton, 2019).

5.3. How close, how far? The level of involvement with startups and the tension between separation and integration to the main company

Most of the initiatives reported in the selected studies describe CEwS-related programs that ran physically separated from the main organization (*e.g.* Livieratos & Lepeniotis, 2017; Prashantham & Kumar, 2019; Selig et al., 2018). In fact, separate structures would allow more autonomy to startup programs and avoid conflicts with the complex organizational structures of large organizations (Kohler, 2016). This scenario, however, contrasts with

certain expectations normally associated with CEwS, such as offering cultural and behavioral overflows to the company, influencing its internal processes, integrating the talent of people from startups in favor of the company, feeding the company's strategy or establishing regular connections between startups and different internal organizational functions.

In general, programmatic forms would tend to run the innovation process separated from the internal informal networks which are needed to adapt and support innovation – a conflict well consolidated in the organizational ambidexterity strand. In this way, innovations are developed outside the organization's social ecosystem and can be weakened when facing integration challenges (Arena et al., 2017).

5.4. A good trigger or the whole agenda? The “buts” of riding in the digital transformation

Although the possibilities for CEwS based on digital technologies are promising, this avenue deserves more scrutiny. Tabrizi et al. (2019) alert that a vision for the organization should drive technology decisions, not the opposite. Thus, the lack of the right mindset and/or keeping inappropriate organizational practices will just cause the digital transformation to magnify the companies' flaws. For instance, not rarely the fear of being replaced installs on people of an organization under digital transformation efforts, so that they may - consciously or not - resist the changes (Tabrizi et al., 2019). Gobble (2018) concludes that all the new beyond-new-product-development challenges like platform initiatives, new business models, digitalization, and servitization demand early the participation of the whole organization. For large ones, that innovation in the management itself to support the advances in technology means a slow and gradual process in which the final intent is to reshape an overly complex social system.

Furthermore, some studies alert that in many CEwS initiatives the technologies are captured late, assigning a bias towards mature technologies (Basu et al., 2011; Shankar & Shepherd, 2018). Moreover, the rapid advancements as so as the short development lifecycles of products and services associated with digital technologies are remarkable characteristics of this field and shape many of the tools, methodological approaches, and supporting programs of technology entrepreneurship. Regarding this point, Freeman & Engel (2007, p. 104) alert that “the scales for both dimensions vary substantially across industries, business models, and organizational forms. For internet companies, time may be measured in months; for software firms, in years; and for biotech companies, in decades.” Spender et al. (2017) propose that future research consider the link between startups and Open Innovation within different industries.

6. Conclusions

This study focused on three objectives: (i) offering an overview of the current literature on Corporate Engagements with Startups, identifying the main strands and antecedents of this phenomenon; (ii) identifying the main reference models available in the recent literature; and, since large companies conduct such initiatives mainly to boost their innovation performance – an objective often conflicting with short-term demands for efficiency – the paper aimed at (iii) presenting and discussing some open questions for innovation management field. To do that, the study applied systematic review techniques (culminating in a visual summary of the general debate), and critical analysis over the results from the perspective of the challenges and gaps they represent for systematic innovation management.

In regard to (i), we found that the antecedents of CEwS can be grouped into three broad categories of studies, viz, corporate venturing initiatives and open innovation (that starts with a purely financial perspective but gradually steers to open innovation approaches); corporate entrepreneurship and organizational ambidexterity (that aggregate studies from both strategic and organizational levels concerning the exploit-explore dilemma); and asymmetric partnerships (that focus on the nature of the partnerships performed between actors and their dissimilarities). Concerning (ii), even though the corporate acceleration and corporate incubation models have received much attention, mainly due to the fact that these models carry a legatee from their older forms in non-corporative settings, a diversified group of studies emerged in the last five years exploring many forms of engagement, in single or combined applications, serving multiple stakeholders and objectives of the companies. Lastly, regarding (iii), as the main open questions and challenges for using CEwS as a lever to systematic innovation in large companies, we point the need of unveiling the organizational elements behind the conduction of CEwS initiatives; the limitation of the single champion approach to establish innovation and startup engagement as permanent disciplines in the organization; the trade-off in placing the CEwS initiative too close or too far from the main organization to properly balance the access to resources and vulnerability to constrains; and the potential traps of setting the whole dynamics of innovation management by the digital technologies' agenda.

Above all, the informational economy, as defended by Castells & Hall (1994), would be characterized by new organizational forms, an idea that holds implications for both the internal structure of established firms and the inter-organizational forms of innovating. Thus, more horizontal networks among companies and other agents (such as startups) and more flexible and specialized production systems should emerge.

Corporate Engagement with Startups is an open innovation modality that has gained enormous emphasis in a context of rapid evolution, diffusion, and access to technologies – especially the digital ones – in intercession with the advent of the new industrial revolution (*i.e.* Industry 4.0). Numbers related to these engagements are increasing and point to a scenario in which CEwS become one of the main forms of open innovation. However, the field is still embryonic and there are many opportunities for research and further study in both theory and practice.

Above all, it was evidenced that more dialogue between CEwS studies and the field of innovation management is desirable to move forward the research and practice. Such interaction can enrich the debate and subsidize more complex and lasting network arrangements in favor of systematic innovation.

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Appendix 1 – Complete reference list used for CEwS studies after the search process

#	AUTHORS	YEAR	TITLE	TYPE	SOURCE
1	R. A. Burgelman	1984	Designs for corporate entrepreneurship in established firms	Journal Article	California management review
2	M. T. Hansen, H. W. Chesbrough, N. Nohria and D. N. Sull	2000	Networked incubators. Hothouses of the new economy	Journal Article	Harvard business review
3	H. W. Chesbrough	2002	Making sense of corporate venture capital	Journal Article	Harvard business review
4	R. C. Sampson	2007	R&D alliances and firm performance: The impact of technological diversity and alliance organization on innovation	Journal Article	Academy of management journal
5	J. Freeman and J. S. Engel	2007	Models of innovation: Startups and mature corporations	Journal Article	California Management Review
6	R. Katila, J. D. Rosenberger and K. M. Eisenhardt	2008	Swimming with Sharks: Technology Ventures, Defense Mechanisms and Corporate Relationships	Journal Article	Administrative Science Quarterly
7	S. Prashantham and J. Birkinshaw	2008	Dancing with gorillas: How small companies can partner effectively with MNCs	Journal Article	California management review
8	T. Minshall, L. Mortara, R. Valli and D. Probert	2010	Making “asymmetric” partnerships work	Journal Article	Research-Technology Management
9	S. Basu, C. Phelps and S. Kotha	2011	Towards understanding who makes corporate venture capital investments and why	Journal Article	Journal of Business Venturing
10	S. Anokhin, D. Örtqvist, S. Thorgren and J. Wincent	2011	Corporate venturing deal syndication and innovation: the information exchange paradox	Journal Article	Long Range Planning
11	P. Carbone	2011	Acquisition integration models: How large companies successfully integrate startups	Journal Article	Technology Innovation Management Review
12	H. W. Chesbrough	2012	GE’s ecomagination challenge: An experiment in open innovation	Journal Article	California management review
13	B. Leten and W. Van Dyck	2012	Corporate venturing: Strategies and success factors	Journal Article	Review of Business and Economic Literature
14	L. Diestre and N. Rajagopalan	2012	Are all ‘sharks’ dangerous? new biotechnology ventures and partner selection in R&D alliances	Journal Article	Strategic Management Journal
15	K.-N. Hsieh and J. Tidd	2012	Open versus closed new service development: The influences of project novelty	Journal Article	Technovation
16	L. Pérez, J. Florin and J. Whitelock	2012	Dancing with elephants: The challenges of managing asymmetric technology alliances	Journal Article	The Journal of High Technology Management Research
17	S. Blank	2013	Why the lean start-up changes everything	Journal Article	Harvard business review
18	B. Battistini, F. Hacklin and P. Baschera	2013	The state of corporate venturing: Insights from a global study	Journal Article	Research-Technology Management
19	A. Onetti	2014	Scaleups. When does a Startup turn into a Scaleup	Electronic Article	
20	N. Sharif and H.-H. H. Tang	2014	New trends in innovation strategy at Chinese universities in Hong Kong and Shenzhen	Journal Article	International Journal of Technology Management
21	R. Vandaie and A. Zaheer	2014	Surviving bear hugs: Firm capability, large partner alliances, and growth	Journal Article	Strategic Management Journal
22	C. S. Dempwolf, J. Auer and M. D’Ippolito	2014	Innovation accelerators: Defining characteristics among startup assistance organizations	Report	
23	T. Weiblen and H. W. Chesbrough	2015	Engaging with startups to enhance corporate innovation	Journal Article	California Management Review
24	R. Harms and S. T. Walsh	2015	An introduction to the field of technology entrepreneurship: Editorial to the special issue	Journal Article	Creativity and innovation management

#	AUTHORS	YEAR	TITLE	TYPE	SOURCE
25	Accenture	2015	Harnessing the power of Entrepreneurs to Open Innovation - The Digital Collaboration Index	Report	
26	S. Prashantham and G. S. Yip	2016	Engaging with startups in emerging markets	Journal Article	MIT Sloan Management Review
27	T. Kohler	2016	Corporate accelerators: Building bridges between corporations and startups	Journal Article	Business Horizons
28	R. Cross, R. Rebele and A. Grant	2016	Collaborative overload	Journal Article	Harvard Business Review
29	Y. V. Hochberg	2016	Accelerating entrepreneurs and ecosystems: The seed accelerator model	Journal Article	Innovation Policy and the Economy
30	D. K. Kanbach and S. Stubner	2016	Corporate accelerators as recent form of startup engagement: The what, the why, and the how	Journal Article	Journal of Applied Business Research
31	B. N. Hogenhuis, E. A. van den Hende and E. J. Hultink	2016	When Should Large Firms Collaborate with Young Ventures? Understanding young firms' strengths can help firms make the right decisions around asymmetric collaborations	Journal Article	Research-Technology Management
32	P. C. Varrichio	2016	Uma discussão sobre a estratégia de inovação aberta em grandes empresas e os programas de relacionamento voltados para Startups no Brasil	Journal Article	Revista de Administração, Contabilidade e Economia da Fundace
33	M. G. Colombo and K. Shafi	2016	Swimming with sharks in Europe: When are they dangerous and what can new ventures do to defend themselves?	Journal Article	Strategic Management Journal
34	C. Pauwels, B. Clarysse, M. Wright and J. Van Hove	2016	Understanding a new generation incubation model: The accelerator	Journal Article	Technovation
35	J.-C. Spender, V. Corvello, M. Grimaldi and P. Ripa	2017	Startups and open innovation: a review of the literature	Journal Article	European Journal of Innovation Management
36	M. Kupp, M. Marval and P. Borchers	2017	Corporate accelerators: fostering innovation while bringing together startups and large firms	Journal Article	Journal of Business Strategy
37	A. D. Livieratos and P. Lepeniotis	2017	Corporate venture capital programs of European electric utilities: Motives, trends, strategies and challenges	Journal Article	The Electricity Journal
38	C. J. Selig, T. Gasser and G. H. Baltes	2018	How Corporate Accelerators Foster Organizational Transformation: An Internal Perspective	Conference Paper	IEEE International Conference on Engineering, Technology and Innovation
39	M. Bogers, H. W. Chesbrough and C. Moedas	2018	Open innovation: research, practices, and policies	Journal Article	California Management Review
40	N. Richter, P. Jackson and T. Schildhauer	2018	Outsourcing creativity: An abductive study of open innovation using corporate accelerators	Journal Article	Creativity and Innovation Management
41	T. Krufft, M. Gamber and A. Kock	2018	Substitutes or Complements? The Role of Corporate Incubator Support and Innovation Climate for Innovative Behavior in the Hosting Firm	Journal Article	International Journal of Innovation Management
42	R. K. Shankar and D. A. Shepherd	2018	Accelerating strategic fit or venture emergence: Different paths adopted by corporate accelerators	Journal Article	Journal of Business Venturing
43	S. Brunswicker and H. Chesbrough	2018	The Adoption of Open Innovation in Large Firms	Journal Article	Research-Technology Management

#	AUTHORS	YEAR	TITLE	TYPE	SOURCE
44	S. B. Mahmoud-Jouini, C. Duvert and M. Esquirol	2018	Key Factors in Building a Corporate Accelerator Capability: Developing an effective corporate accelerator requires close attention to the relationships between startups and the sponsoring company	Journal Article	Research-Technology Management
45	W. Hora, J. Gast, N. Kailer, A. Rey-Marti and A. Mas-Tur	2018	David and Goliath: causes and effects of coepetition between start-ups and corporates	Journal Article	Review of Managerial Science
46	S. Alänge and A. Steiber	2018	Three operational models for ambidexterity in large corporations	Journal Article	Triple Helix
47	S. Blank	2019	Why Companies Do “Innovation Theater” Instead of Actual Innovation	Electronic Article	
48	S. Kaplan	2019	How Big Companies & Startups Use “Co-Creation” to Innovate	Electronic Article	
49	C. Minsky	2019	Big corporates are only interested in “innovation theatre”	Electronic Article	
50	Y. Striletskyi	2019	The biggest challenges of scaling for startups and how to tackle them	Electronic Article	
51	J. Lawton	2019	What to expect from your corporate accelerator	Electronic Article	Innovation Leader Pointers
52	B. R. Wikhamn and A. Styhre	2019	Corporate hub as a governance structure for coupled open innovation in large firms	Journal Article	Creativity and Innovation Management
53	M. Köttig	2019	Corporate incubators as knowledge brokers between business units and ventures	Journal Article	European Journal of Innovation Management
54	B. Tabrizi, E. Lam, K. Girard and V. Irvin	2019	Digital transformation is not about technology	Journal Article	Harvard Business Review
55	S. Prashantham and K. Kumar	2019	Engaging with startups: MNC Perspectives	Journal Article	IIMB Management Review
56	M. P. Allmendinger and E. S. C. Berger	2019	Selecting corporate firms for collaborative innovation: entrepreneurial decision making in asymmetric partnerships	Journal Article	International Journal of Innovation Management
57	J. K. Groote and J. Backmann	2019	Initiating open innovation collaborations between incumbents and startups: How can David and Goliath get along?	Journal Article	International Journal of Innovation Management
58	T. Krufft and A. Kock	2019	Towards a comprehensive categorization of corporate incubators: Evidence from cluster analysis	Journal Article	International Journal of Innovation Management
59	A. Onetti	2019	Turning open innovation into practice: trends in European corporates	Journal Article	Journal of Business Strategy
60	J. Gonthier and G. M. Chirita	2019	The role of corporate incubators as invigorators of innovation capabilities in parent companies	Journal Article	Journal of Innovation and Entrepreneurship
61	G. D. Lauritzen and M. Karafyllia	2019	Perspective: leveraging open innovation through paradox	Journal Article	Journal of Product Innovation Management
62	B. R. Wikhamn	2019	Open innovation change agents in large firms: how open innovation is enacted in paradoxical settings	Journal Article	R&D Management
63	R. Freytag	2019	Strategic negotiations: three essentials for successful partnerships with startups	Journal Article	Strategy & Leadership
64	Innovation Leader	2019	Startup engagement: best practices for large organizations (report excerpt)	Report	
65	M. Portincaso, A. d. I. Tour and P. Soussan	2019	The Dawn of the Deep Tech Ecosystem	Report	
66	Z. Younis, A. Desai and M. Sigal	2019	Unlocking innovation through startup engagement: best practices from leading global corporations	Report	