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ARTICLE

Open innovation: assessing critical factors of corporate incubation programs

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ABSTRACT

The objective of this research is to understand how startups and established companies perceive the factors that are critical to the cooperation between them in the context of corporate incubation programs. We interviewed innovation managers, analysts, and project leaders from three large companies and the entrepreneurs of the startups that interacted with these companies. The results show that established companies and startups have different perceptions regarding insufficient dedication to the program and cultural differences, although both considered these factors to constrain the collaboration. Regarding motivation and incentives and autonomy, the findings were to some extent different. Implications include the difference in the perceptions of the startups and employees of the established companies directly involved in the program and the two factors identified as critical—dedication to the program and cultural differences—due to their potential to risk the incubation program. To practitioners, this research offers empirical results that can guide decision-making to manage corporate incubation programs.

KEYWORDS Open innovation; Corporate incubation; Corporate acceleration; Startups; Technology innovation.

1. Introduction

Large companies are under pressure to innovate if they want to stay at the top of their game. New ventures, known as startups, are a real threat to corporations because they can rapidly launch new products and services, attract key personnel, and steal market share (BECKER; GASSMANN, 2006a; KIM; BAE; BRUTON, 2012). This competitive environment burdens corporations to be vigilant and adapt as competitors come through (EUCHNER; GANGULY, 2014). One of the strategic responses large companies have adopted is to embrace open innovation. Open innovation presupposes the use of external ideas and resources to develop new technologies, processes, and services to the organization (outside-in) and the use of internal ideas to launch new products, services, and even new businesses to the market (inside-out) (CHESBROUGH; VANHAVERBEKE; WEST, 2006).

Although startups are often perceived as a threat to large companies, they can also be seen as a source of external innovation (KIM; BAE; BRUTON, 2012; KOHLER, 2016). Large corporations are associated with startups to foster open innovation in different ways. Chesbrough and Brunswicker (2014) found evidence that open innovation is widely practiced in American and European large companies, in which some practices—such as corporate business incubation and joint venture activities—have received increased attention over time. The incubation programs are designed to examine external markets looking for innovative ideas, supporting startups in developing new technologies; thus, the established companies can make use of these technologies in their processes or launch new products and services in the market (BECKER; GASSMANN, 2006a).

Moschner et al. (2019) identified four different models of corporate-startup engagement: in-house accelerator, hybrid accelerator, powered by accelerator, and consortium accelerator. This research refers to the consortium accelerator, in which large companies launch corporate incubation programs through an external independent accelerator

provider. The accelerator usually provides its services to several corporate organizations, also offering startup paths for development based on learning, validation, access to professional knowledge, and growth (CRIȘAN et al., 2019).

The success of a corporate incubation program lies in the ability of the established companies to provide all the resources the startups need, in exchange for speed, innovative ideas, customer expectations fulfillment, and sustainable development preservation (KIM; BAE; BRUTON, 2012; SHANKAR; SHEPHERD, 2019; KAMBIL; ESELIUS; MONTEIRO, 2000). On the other hand, startups can work with large companies to obtain financial resources, physical structure, market testing and development, and networks (BECKER; GASSMANN, 2006a). The association between established corporations and startups in the form of incubation programs is advantageous for both: large companies can innovate faster, and new ventures can test their ideas and scale up efficiently (KAMBIL; ESELIUS; MONTEIRO, 2000; BECKER; GASSMANN, 2006a; KOHLER, 2016; HAUSBERG; KORRECK, 2020).

However, the collaboration between established companies and startups is not an easy task. The challenges arise from the vast differences between them (KOHLER, 2016). The range of differences begins with the nature of the business model, in which startups are designed to be flexible, whereas large companies are more resistant to change (KÖTTING, 2020). Christensen, Bartman and van Bever (2016) add that new ventures have more questions than answers and are still building their business model. In contrast, established companies are all about metrics, processes, and capabilities that work well enough to settle their profit formula over time (CHRISTENSEN; BARTMAN; VAN BEVER, 2016). The formal structures mold internal processes and managerial decision-making, letting open innovation aside from the organizational routine (KIM; BAE; BRUTON, 2012). The structural and cultural barriers make the collaboration between large organizations and new ventures less productive, minimizing the chances of success (SELIG; GASSER; BALTES, 2018).

The interest of researchers in business incubation has intensified recently (HAUSBERG; KORRECK, 2020). Notwithstanding, Albort-Morant and Ribeiro-Soriano (2016) and Pauwels et al. (2016) claim that this increasing body of literature on business incubation lacks methodological rigor, excludes the startups' perspectives, and remains prescriptive. Other authors add that the existing research still deals with the business incubation phenomenon as homogeneous, failing to address the idiosyncratic nature of the interaction between established companies and startups (BECKER; GASSMANN, 2006b; BARBERO et al., 2014; KÖTTING, 2020).

The collaboration between startups and large companies does not always work as expected. Previous research has focused specifically on startups' dissatisfaction with interactions with corporations (GIONES et al., 2021). Although organizations know that it is important to leverage the collaboration with startups, Dooley, Kenny and Cronin (2016) found that the majority of firms are not engaging in collaborative innovation. The authors draw attention to the importance of large firms to develop core strategies, such as purposefully engaging in external networks, if they want to innovate. In addition, Groote and Backmann (2020) point out the pronounced lack of research on the partnerships between incumbents and startups. Bagno et al. (2020) explains that the research dedicated to understanding the collaboration between large companies and startups is still in its early days. According to the authors, most studies on corporate engagement with startups neglects the complexity of internal organizational factors drawing upon an oversimplification of a "maverik champion", who is responsible for interacting with the startups. In this sense, Selig, Gasser and Baltes (2018) had already drawn attention to the lack of research on the internal aspects of open innovation, since most studies are concentrated on external sources of innovation.

This research intends to fill these gaps, including in the analysis of the perceptions of the incubated ventures and the large companies in relation to specific aspects of the collaboration process. The objective of this paper is to understand how the critical factors that facilitate or

constrain the collaboration between startups and established companies are perceived by them, in the context of corporate incubation programs. We interviewed incubatees and managers from the established companies to understand the factors that hinder or facilitate the collaboration between them. We also run short questionnaires to rank these factors and compare the perspectives.

Kötting (2020) posits that the main reason incubator programs fail is because they do not meet the objectives of the established companies. The author asks for future research to understand how corporate incubation programs can align the interests of startups and established companies. According to Hausberg and Korreck (2020), the literature on business incubation is in the theory-creation phase, in which research is still fragmented and isolated. The authors argue that further research is necessary to address many open questions, such as existing differences involving incubatees and established companies' interests. Therefore, the main contribution of this study is to offer empirical comprehension about how startups perceive the critical factors of incubation programs in comparison to the established companies' perspectives. To practitioners, this research offers empirical results that can guide decision-making related to planning and managing corporate incubation programs.

2. Corporate incubation

Incubation programs can take many forms (HOCHBERG, 2016). The established corporation can outsource the incubation program to an independent for-profit incubator or can associate with other corporations to run several incubation programs with different independent for-profit incubators. The established company can also create a new business unit as a business incubator to support new ventures, generate innovation, and transfer the knowledge into the parent company (KÖTTING, 2020). This is the case for Motorola Ventures by Motorola, Next47 in India by Siemens, and Novartis

Biome by Novartis. Finally, large companies can also run an incubation program by themselves as an internal process.

The trend is toward large companies outsourcing the incubation program to experienced and independent incubators (RADOJEVICH-KELLEY; HOFFMAN, 2012). The advantages include the high speed of updating innovation and direct contact with the culture of innovation (WOLCOTT; LIPPITZ, 2007). Other advantages are economy, know-how, and visibility. By associating with independent renowned incubators, large companies do not need to create a new business unit, and they take advantage of their best practices. Moreover, established corporations gain visibility by marketing their brand with business innovation (CHU; ANDREASSI, 2011).

Regardless of the form of incubation, corporate incubation programs sponsored by established companies are designed to last a predetermined time. The incubator itself or the parent company scans the processes and products to find gaps that can be filled by new technologies. The selection process of startups is open and focuses on small teams, not on individual entrepreneurs (KANBACH; STUBNER, 2016; KOHLER, 2016). Startups are then selected based on their technology and capability to develop solutions (BECKER; GASSMANN, 2006a; MARQUES et al., 2019). The incubatees stay under the same roof, where they are exposed to an energetic environment surrounded by creativity, motivation, collaboration, and purpose (KAMBIL; ESELIUS; MONTEIRO, 2000).

In addition to office space, incubation programs offer various types of support, ranging from legal services and accountancy to training, mentoring, and networking (COHEN, 2013; BAUER; OBWEGESER; AVDAGIC, 2016). Some programs also offer investment capital for startups and connections with potential investors, such as angel investors and venture capitalists (COHEN, 2013; HOCHBERG, 2016). However, the most valuable service is contact with corporate executives and experienced entrepreneurs in the form of mentorship (HAUSBERG; KORRECK, 2020). The mentors are carefully selected,

and their participation in the program is well planned to maintain quality and prestige (PAUWELS et al., 2016).

However, the alliance between established companies and startups brings not only advantages but also conflicts. Kim, Bae and Bruton (2012) point out that conflict may arise from the interaction and collaborative nature of the activities threatening the incubation program. The established company culture can be too rigid to deal with a startup in its internal routine, even in the form of a short time program. Moreover, large companies tend to protect their internal resources and customers from other organizations, making it hard to open innovation.

2.1 Critical factors in the collaboration between startups and established companies

The collaboration between established companies and new ventures in the context of corporate incubation programs relies on some critical factors. The success of an incubation program depends on how well these factors are managed since they can enhance the interaction between startups and established companies on the one hand or raise barriers that can prevent the development of new technologies on the other hand (BECKER; GASSMANN, 2006a).

Şimşek and Yildirim (2016) have found that the main constraints on open innovation are the cultural and organizational distances between established companies and startups. Selig, Gasser and Baltes (2018) explain that tensions can arise because of different working models, such as the speed of decision making. The authors point out that creating an informal and friendly environment can help large corporations overcome bureaucratic routines and be more agile. In this direction, Cajuela and Galina (2020) found that startups are influenced by the organizational culture of large corporations, especially those that encourage cross-functional thinking. On the other hand, established companies that work together with startups have the chance to foster a culture for innovation (BAGNO et al., 2020).

Corporate incubation programs sponsored by an established company are carefully planned by both the incubator management team and the designated employees of the large company. They make strategic decisions, such as goals, duration, problems to be solved, type of technology to be developed, number of participants, preferred startups' profile, teams of mentors, etc. Therefore, the critical factors that facilitate or constrain the interaction between startups and established companies fall under the umbrella of either the level of business units' involvement or the corporate incubator's steering.

2.1.1 Involvement of business units

The involvement of business units is related to the level of dedication to the incubation program, which is translated into who is involved, how much time is dedicated to the program, and the quality of the interaction. Other factors may also reflect the level of business units' involvement, such as autonomy and flow of knowledge inside of the established company.

Dedication to the incubation program is by far the most important factor identified in the literature. Kohler (2016) found that executives' commitment and involvement with the startups were identified as a remarkable component of the incubatees' experience, specifically when the CEO became involved. The author adds that having the right employees of the parent company to interact and support the startups is a critical factor. Before that, Rice (2002) had already found that business units' commitment is crucial for the success of the incubation process because the interaction between managers and startups facilitates coproduction.

However, actively engaging managers in the incubation program routine is a challenge. Traditional corporations put too much pressure on managers to improve and maintain performance. Then, managers have to deal with their daily existing demands, while at the same time they need to find energy and time to take care of startups and new technology development (KAMBIL; ESELIUS; MONTEIRO, 2000).

The study of Gonthier and Chirita (2019) concluded that a major constraint to achieving tangible outcomes through incubation is the lack of legitimacy when leaders are not involved.

Business units' involvement goes from the planning phase of a corporate incubation program until the end of the process, which may finish with the transfer of the technology developed by the startups into the established company. In this sense, Chen and Kannan-Narasimhan (2015) found that parent companies' engagement is fundamental to successfully transferring the developed technology, and the way key executives became more involved in the program was to set this activity as a new project in their daily routines.

Another critical factor refers to the level of autonomy established companies hand to the incubation program. At the startup level, Kambil, Eselius and Monteiro (2000) argue that the sponsored company must give substantial autonomy to encourage creativity, which refers to the freedom that incubators and startups enjoy to set the pace of the processes, allocate resources, and even pivot if necessary. However, the authors claim that autonomy will lead to positive outcomes when the goal of the program is clearly stated and every actor knows their roles and responsibilities.

On another level, Kötting (2020) adds to this discussion the complexity of giving too much autonomy to the incubation program, drawing attention to the tradeoff between autonomy and closeness. On one hand, more autonomy leads to speed and can promote innovation detached from the core business, but the distance also makes knowledge transfer to the business units more difficult. On the other hand, less autonomy means that innovation will be less disruptive but easier to incorporate into the business unit.

Corporate incubation programs also allow startups to develop specific capabilities to absorb knowledge through mentorship networks and specialized training (CAJUELA; GALINA, 2020). However, one of the great challenges of corporate acceleration programs is the institutionalization of knowledge (BAGNO et al., 2020). Most of these programs take place outside organizational structures, which

can compromise the integration and consolidation of technology or knowledge generated within the program. Şimşek and Yildirim (2016) state that knowledge transfer can be problematic due to cultural and organizational distances, drawing attention to the 'not invented here' (NIH) syndrome. The NIH syndrome is a resistant behavior to anything developed outside the walls of the organization, in which the lack of internal commitment compromises knowledge transfer.

Knowledge transfer is a two-way process in the incubation program. Startups may learn from parent companies and from incubators to be able to deliver the innovation. During the incubation program, startups have the opportunity to develop behavioral skills and receive technical information and valuable feedback from highly qualified mentors. The capability of new ventures to absorb knowledge is critical to incubation program outcomes as well (MIRANDA; BORGES, 2019). Gonthier and Chirita (2019) found that the interaction between incubatees and employees of the sponsored corporation is an effective mechanism that enables organizations to absorb the entrepreneurial mindset and foster innovation.

However, knowledge flow from the new venture to the established company is more complex. Becker and Gassmann (2006a) argue that one of the main causes of this complexity is the process of internalizing the innovation in the sponsored company. How well the established company embeds the innovation depends on the objective of the incubation program. If the developed technology is related to the core business of the parent company, knowledge transfer may flow directly from the startup to the business units, bypassing the corporate incubator (BRANSTAD, 2010). In this case, the ability of corporate business units to absorb the outside-in innovation is crucial.

2.1.2 Steering by the incubation program

Corporate incubators have to manage important aspects of the incubation program during the implementation phase and even in the planning stage. While designing the program, the incubators must

discuss with the sponsored corporation questions regarding incentives and information protection so that the program can attract promising entrepreneurs.

New ventures are attracted by the incentives of the incubation program because they expect to strengthen their weakness and enhance their chances of survival by assessing incubators' services and strategies, knowledge structure, and networking and collaboration (AHMAD; THORNBERRY, 2018). Motivations and incentives include access to key resources, gaining expertise with highly qualified executives, developing specific capabilities, testing their ideas, and reaching customers. Since the expectations are broad, to be successful, the incubation program has to align the incentives offered in each program to the needs of the candidates (KAMBIL; ESELIUS; MONTEIRO, 2000; CRICHTON, 2014).

Conflicts can also arise when established companies and incubatees compete between themselves to secure resources and protect their customers (KIM; BAE; BRUTON, 2012). For example, Chesbrough and Brunswicker (2014) found that protecting critical internal know-how and the effectiveness of intellectual property (IP) protection are barriers that limit the collaboration between large companies and startups. Some corporations take the so-called industrial espionage very seriously, so they tend to secure key processes and resources from new ventures, even in collaborative programs.

From the critical factors identified in the literature, it seems that cultural difference is a major problem corporate incubators have to address (CHESBROUGH; BRUNSWICKER, 2014; WEIBLEN; CHESBROUGH, 2015). Fernández and Valle (2018) analyzed how established corporations face disruptive technologies, drawing attention to the role that organizational routine plays in constraining innovation. For large companies, it is difficult to change how processes and practices are executed because they were built on successful strategies that worked well enough in the past (CORSI; PRENCIPE; CAPRIOTTI, 2019). The structure, processes, and culture of the established company may be so rigid and bureaucratic that it makes it difficult to innovate

(FRANCISCHETO; NEIVA, 2019). The interviews of Kim, Bae and Bruton (2012) revealed that some executives of established companies themselves admitted that incubation programs run internally, without the interface of external incubators, are more likely to fail because of their cultural rigidness.

According to Kohler (2016), some effective strategies that corporate incubation programs adopt to facilitate cooperation between established companies and startups are defining clear objectives, aligning expectations and goals, offering attractive incentives, and setting the IP agreement in advance. Moreover, to overcome cultural barriers, incubation programs can count on experienced professionals, including internal employees for support and monitoring, and on external mentors to mediate conflicts when they appear (RADOJEVICH-KELLEY; HOFFMAN, 2012; COHEN, 2013). To succeed, corporate business programs need to pay special attention to the critical factors related to cultural differences and how the sponsored companies engage in the program, specifically at the level of business units.

Therefore, the reviewed literature indicates that the factors that may enhance or constrain the collaboration between startups and established companies can be categorized into two dimensions. The first represents the attributes related to the level of involvement of business units, which are dedication to the program, autonomy, and knowledge flow. The second dimension refers to the features steered by the incubation program, such as motivations and incentives, IP protection, and cultural differences.

3. Methodology

To analyze the critical factors identified in the literature review, we interviewed incubatees and employees of established companies and all participants in corporate incubation programs. First, we examined business incubators from the southeastern region of Brazil. The southeastern region of Brazil is composed of the states

of São Paulo, Rio de Janeiro, Minas Gerais, and Espírito Santo, which represent 55% of the country's gross domestic product (GDP) (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA, 2020). It also concentrates 36% of the incubators, with more than 4,500 startups incubated, generating revenues of 406 million US dollars (ASSOCIAÇÃO NACIONAL DE ENTIDADES PROMOTORAS DE EMPREENDIMENTOS INOVADORES, 2019).

The initial screening resulted in 132 incubators located in the region. We then contacted these incubators searching for those that had recently completed or were in the final phase of corporate incubation programs with more than two sponsored companies. We also checked their willingness to support this research by providing information regarding the incubatees and established corporations. Finally, we compared the corporate incubation programs of those incubators that agreed to collaborate, ranking them by the number of sponsored companies and incubated startups, type of technology, industry, reputation, and overall relevance of the program. The selected incubator is an independent private organization that was founded in 2012. It is known for its collaboration with large companies, supporting more than 400 startups through incubation programs. Established companies associate with this incubator to launch corporate incubation programs, in which we were granted access to three of them. These programs were selected based on their advanced stage (toward the final phase) and relevance. Therefore, the participants were selected by their accessibility. Borges et al. (2020) explain that in qualitative research, the researcher should select cases/respondents based on their importance to the investigation and potential to uncover specific issues related to the research question.

The three incubation programs analyzed were sponsored by one large company each. These programs were designed to meet specific demands by finding innovative solutions for internal problems in the form of challenges. Thus, the startups were selected based on their ability to meet these challenges. The first program was sponsored by a large company from the mining sector (named in this research as

Company M). This company has more than 18 thousand employees in 20 countries. In Brazil, Company M has six units spread in the four southeastern states. Four startups that work with technology, energy, nanotechnology, and environmental solutions were selected to address the proposed challenges.

A large company from the metallurgical industry, called Company V in this research, sponsored the second program. Company V has more than six thousand employees and 13 units in four countries. The challenges identified by Company V refer to industrial automation, digitalization, and process productivity, in which three startups were selected to participate. The third program was sponsored by Company F from the cellulose industry. This company has more than 18 thousand employees and six units, of which three are factories. One startup was selected to work with a very specific challenge related to nanotechnology.

According to Patton (2002), in qualitative analysis, the observations are intentional (or by judgment) when the participants are selected because they present the relevant characteristics of the population. To assure the population representativeness, Thiry-Cherques (2009) adds that the interviews should be run separately in a private and isolated format, so the respondents do not know each other's answers. In addition, the question must contain coherent subjects circumscribed by the respondents' knowledge and experience.

3.1 Data collection

The incubator manager first asked the participants for permission before sending us the contact information of the established companies and startups. Then, we contacted the sponsored companies and the startups by phone, explaining the objective of this research and the voluntary nature of the participation. We assured them of their anonymity and informed them that this research is autonomous, in which no data would be available to the incubator or the participants. To protect the startups from being identified, this research reports the overall results for the three programs as a whole. We scheduled interviews with employees

of the established companies who were responsible for the program and startup entrepreneurs who directly interacted with the sponsored company. Participants were interviewed individually in their workplace. The interviews happened on different days, lasted approximately 40 minutes each, and were recorded after the participant's consent. Table 1 shows the participants' position and area of work, assigning the correspondence between sponsored companies and startups.

TABLE 1
Participants' positions and areas of work

Sponsored company	Participant	Employee position	Startup	Area of work
Company F	PC1a	Innovation Manager	PS1	Nanotechnology
	PC1b	Leader of the program		
Company V	PC2a	Leader of the program	PS2	Technology
	PC2b	Innovation Analyst	PS3	Technology
	PC2c	Innovation Analyst	PS4	Technology
Company M	PC3a	Leader of the program	PS5a	Technology
	PC3b	Innovation Analyst	PS5b	
	PC3c	Leader of the program	PS6a	Energy
	PC3d	Innovation Analyst	PS6b	
	PC3e	Leader of the program	PS7	Nanotechnology
			PS8	Environmental

Source: Research data.

The primary data source is the interviews with 10 employees of the established companies and 10 startup entrepreneurs. The saturation point is the most common method to indicate that the semistructured interviews with open responses gathered enough information (BORGES et al., 2020). Thiry-Cherques (2009) found evidence that a minimum of eight observations is necessary to indicate that the saturation point was reached, meaning that the first six offer relevant information and the last two of them fail to offer new data. The advantage of interviews is to capture the complexity of

the situation to obtain relevant information about the phenomenon being studied (EISENHARDT; GRAEBNER, 2007; CRESWELL; CLARK, 2017). We also used archival data from several sources to complement the interviews, such as companies' websites, media reports, annual reports, and incubator documents.

In the interviews, we asked the respondents how they perceived the critical factors in the cooperation between startups and established companies that can facilitate or constrain the incubation programs. These factors are represented by six categories: dedication to the program, autonomy, knowledge flow, motivation and incentives, IP protection, and cultural differences. Table 2 defines each category divided into two dimensions—involvement of business units and steering by the incubation program.

TABLE 2
Categories of critical factors

Dimension	Category	Definition
Involvement of business units	Dedication to the program	Involvement, interaction, time commitment, and importance that established companies attribute to the startups. How key employees (managers, leaders, and CEOs) actively engage in the program.
	Autonomy	Independence startups and incubators enjoy to make strategic decisions, set the pace, allocate resources, and pivot.
	Knowledge flow	Capability established companies have to absorb knowledge and offer the appropriate communication system to interact with startups.
Steering by the incubation program	Motivation and incentives	How startups perceive participation in the incubation program brings benefits and real gains to their business.
	IP protection	Security of key information established organizations hold from the startups, risking the incubation program. Security and transparency of the IP involved in the program.
	Cultural differences	The divergence between established companies and startups regarding routines and formal procedures related to the incubation program, as well as beliefs and behaviors towards collaboration.

Source: Research data.

The semistructured interviews were guided by a general script. Appendix A shows the questions of the interviews. During the semi structured interviews, we also run a short questionnaire to assess the six critical factors identified in the literature. We asked the participants to think about how each factor developed during the incubation programs. For example, regarding autonomy, we asked questions about the freedom startups and the incubator had to make strategic decisions and pivots to obtain better results. We also asked the same participants how they considered each factor to be critical to the incubation program. The respondents indicated whether the factor facilitated or constrained the collaboration between the established company and the startup with a 'yes' or 'no' response.

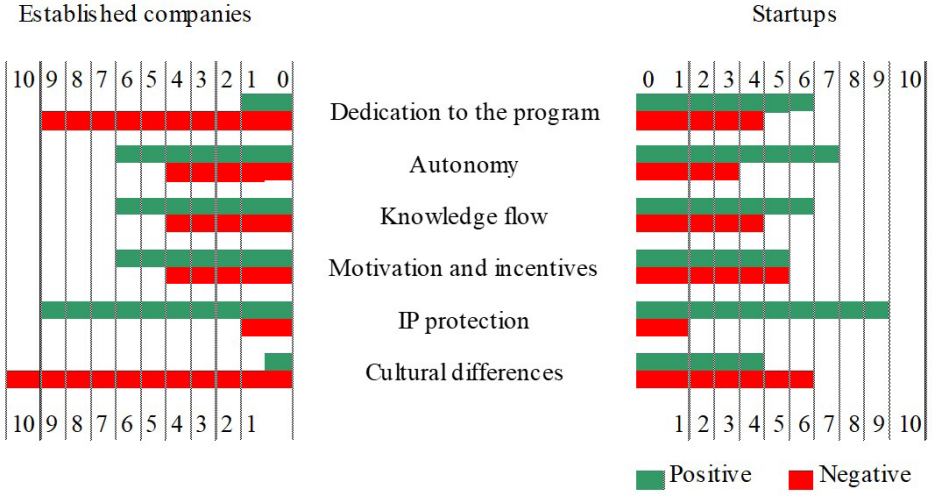
We used SPSS 11.0 for Windows to tabulate and process the data and later run the descriptive statistics, such as frequency and mean. The transcriptions of the interviews and secondary data were analyzed through discourse analysis. Discourse analysis is a systematic analysis of the characteristics of messages to explore and identify the meaning of verbal and nonverbal behaviors as an effort to understand the phenomenon of the research (GEE, 2014). Therefore, we employed descriptive statistics to identify how the participants perceived the six critical factors identified in the literature in terms of facilitation or barriers. Concomitantly, we analyzed the semistructured interviews running the qualitative data along with the descriptive findings.

4. Findings

The results indicate the presence in the researched incubation programs of all the critical factors identified in the literature review. The answers vary in different ways for each factor. Major differences in the perspective of startups and established companies are observed concerning the dedication to the program and cultural differences. Responses regarding autonomy and motivation and incentives are

slightly different in the comparison of companies and startups. No difference was observed in knowledge flow and IP protection. The data are presented in two ways. The first way is the results of the interviews and qualitative analysis, in which we transcribe parts of the answers to exemplify the conclusions. The second format is the result of the descriptive analysis for each category, in which the data were obtained through the short questionnaire. In this questionnaire, the participants evaluated the six categories specifying whether they constrained or facilitated the collaboration between established companies and startups. The participants answered a simple yes or no question. Therefore, the descriptive data are the frequency analysis of the number of respondents who think that the factor facilitates or constrains the collaboration. Figure 1 shows how startups and established companies perceive the critical factors in the corporate incubation program, in which the green line represents the 'facilitate' response (the factor facilitates the collaboration) and the red line represents the 'constraint' response (the factor is a barrier to the collaboration).

FIGURE 1
Results of the critical factors in the incubation program.



Source: Research data.

4.1 Different perceptions

The established companies' and startups' responses diverge when asked about dedication to the program. The incubatees answered that in half of the cases, established companies failed to dedicate and be involved in the program. On the other hand, established companies admitted that in 90% of the cases, they failed to commit and dedicate to the collaboration. The respondents explained that although the established companies were initially committed to the program, over time, the processes fled from planning. One innovation leader said that "the involvement of the company was planned from the beginning. […] All the startups knew this, and we were all expecting this level of involvement." However, during the program, "things got complicated because the company is too rigid […], it is conservative and afraid of taking risks in the relationship with the startups." Two other leaders attributed the difficulties to the novelty of the incubation program. One innovation analyst admitted that "the innovation department is very lean and the demand is high […], we are overloaded." Other analysts argued that they "reached positive outcomes for a pilot project because people are dedicating to the program without previous protocols. We are working hard."

Incubatees were sympathetic to the established companies' employees, as they observed that "the analysts and leaders were out of their lead to help, they did everything they could to help us. We had to contact them to make things run internally, as they facilitate the internal processes." However, the overall perception of the startups was that "the support was very complicated and did not attend us easily. The established companies have to understand that we are a startup and we have our troubles to deal with." In general, incubates interviews revealed that most of the difficulties could be overcome if key managers and directors were actively involved in the program, as one incubatee explained: "I realized that there wasn't enough involvement. For example, when analysts approve the solution, they forward it to directors. They asked to wait. In the end, we lost opportunities because

it took so long for the answer to come." The results show that both groups think the level of involvement, time committed, and importance established companies attributed to the startups was insufficient, thereby constraining the incubation program.

The cultural differences also led to mismatched perceptions between established companies and startups. Employees of the established companies felt that in the totality of the cases, there were significant differences in the procedures, routines, beliefs, and behaviors that constrained the program. Innovation analysts and leaders pointed out that differences occurred at different levels, from working hours to mindset, as they explain: "There is a big difference regarding working hours, bureaucracy, and culture. At the beginning of the program, we run a culture alignment with the startups […], but they are very fast. The main difference is the mindset. The startups have a fast and lean way of thinking." Other respondents claimed that "startups are so fast that we had to change our process to adapt. We demand them to send us daily reports, so they also had to adapt."

On the other hand, 60% of the incubatees revealed that cultural differences were critical to the program constraining cooperation. Curiously, the time frame was the major issue because "it is vicious of big companies to think they don't have time. We are small and different. […] There is a culture in the big companies that things have to happen in a very short time." Startups also felt pressured because of the established companies' high expectations regarding cultural differences: "they think that because we can work on any business model, we have to adapt to their routines and bureaucracies. They have internal processes that we don't, so we have to adapt." The startups that perceived cultural differences positively justified that they "already know how to deal with universities for a long time, so we learned. We have a maturity that makes cultural differences less important. […] The language we have with them is very smooth."

4.2 No difference

The results indicate that startups and established companies perceive knowledge flow and IP protection the same way. Both

respondents argued that knowledge flow was well managed in 60% of the cases. Most of the employees of the established companies asserted that "communication runs as usual, top-down, and it was effectively disseminated," and others added that "there is communication, but we can do better. I think it was not employed in the best way, but it happened." The startups agree that "communication needs to improve because this model of open innovation is relatively new to big companies." However, in most cases, startups recognized that "there was a good internal and external overall communication." Regarding the capability of established companies to absorb knowledge, both startups and employees claim that it depends on the employee involved, in the sense that "employees at the managerial level, who are older, have more resistance to absorb this type of knowledge, […] but the employees from the departments that directly interact with the program have the skills to absorb the knowledge." Startups explain that "big companies have improved their corporate incubation programs. […] Therefore, each year has to be better than the year before, because it is designed based on the lessons learned. To answer this question, companies have developed the capacity to absorb this knowledge."

The 40% who answered that established companies do not have the capabilities to absorb knowledge justify that they "don't have this capability yet, that is why [we] need startups." The startups blame the operational area and the lack of motivation of the employees to interact and absorb the necessary knowledge to transfer the technology.

Established companies and startups perceive IP protection as positive and well managed by the program. They agree that "there is a huge concern about intellectual property protection […] there is a specific contract to assure we are all on the same page." The managers explained that because "it is an open innovation program, we did not ask for exclusivity, but we positioned ourselves as a big client." The only cooperation that was evaluated negatively occurred due to the exclusivity and confidentiality agreements, in which in the "confidentiality agreement there was only specifics about the company's protection

and nothing was written about the startup protection." Therefore, in this case, both sides perceived the relationship was unbalanced from the beginning.

4.3 Slightly different perceptions

Concerning the critical factors autonomy and motivation and incentives, the answers of the established companies and startups were slightly different. In general, the perceptions of the startups are positive, in the sense that startups enjoyed some freedom "by the time solutions are approved. Until the proof of concept, we had full autonomy." The startup and incubator members have the independence to make strategic decisions, allocate resources, and pivot if necessary. The employees reported that "in general, there was autonomy. The program was designed in advance, so everyone knew their responsibility." Two of the startups asserted that "we were free to pivot, and we did it once", whereas others reported that "during the development of the solution we could pivot, even though it was not necessary."

In four cases, employees of the established companies said that because they are large companies, "there are many departments involved in the program, so the strategic decision has to be centralized […] the teams cannot change the program. This is a job for the managers who report to the directors." However, due to the incubator experience and the time spent in the design phase, the employees found that the program "was smooth […] and the incubator was responsible to intermediate the interaction and deal with changes in the program." Therefore, in general, the participants did not perceive autonomy as a constraint, even though the nuances of their perceptions were somewhat different.

The slight difference regarding motivation and incentives is in the direction that half of the startups found the program brought real gains to their business, whereas the perception of the established companies was slightly higher (60%). Both sides recognized that the interaction with established companies and feedback of highly skilled professionals

were the major gains of the program, as innovation managers and analysts pointed out: "The co creation with large companies is the main advantage for the startups because we can share resources and many other things than just a big company can offer. […] They have financial support to develop solutions that can be employed in other companies as well. […] In addition to having a potential client, the startups have the opportunity to discuss internally in a high-level vision with qualified professionals in our company." The startups add that "there are many things that motivate us. The large company has a lot of information available, and information, specifically market information, is very rich. […] If we can make the case with a large company, many doors will open."

On the other hand, dissatisfaction with the motivation and incentives emerged from the lack of specification at the beginning of the program. The startups realized that "some benefits appeared only during the program, but they were not mapped at the beginning, such as connections and travel expenses. […] We had no idea how big this program could be. We did not know the amount of investment the company had to run this program." The innovation managers observed that the motivations and incentives "should be specified in the application process because the startups were blind in this process." They explained that startups applied to the incubation programs for the possibility to work with established companies, failing to give deep thinking to other aspects. One manager reminded me that in previous programs, one startup gave up at the beginning of the program because "they were not seeing benefits. So it is important to make clear in the call for applications what the benefits and the motivators are."

In general, the results draw attention to two critical factors as potential barriers to corporate incubation programs: insufficient dedication to the program and cultural differences. IP protection is perceived as important and well managed by the incubation programs researched. Regarding knowledge flow, the lack of difference in the responses of startups and companies does not mean that there is no room for improvement. Our findings suggest that the incubation

programs still need to align motivations and incentives and autonomy in the collaboration between startups and established companies.

5. Discussion and implications

This research sought to understand how the critical factors that can facilitate or constrain corporate incubation programs are perceived by established companies and startups. The first implication of our findings is related to the involvement of business units, since dedication to the incubation program draws attention as the most critical element that may constrain the incubation program. The findings indicate that both sides have different perceptions about the level of dedication to the program. Employees from the sponsored companies felt frustrated because they wanted to dedicate more time to interact with the startups and the incubation project. They also think that the degree of engagement and commitment was not enough across all hierarchical levels. On the other hand, incubatees think the dedication to the program is not a constraint but a facilitator.

Previous research that found companies' involvement and commitment with startups to be a highly critical factor in incubation programs (RICE, 2002; CHEN; KANNAN-NARASIMHAN, 2015; KOHLER, 2016). Kohler (2016) asserts that key employees should become involved in the program before it starts, getting ready in the planning phase. Therefore, our results are in the opposite direction. It seems that despite the advantages for large corporations to collaborate with startups, in practice, managers do not encourage their employees to engage in innovative efforts from incubation programs. As Dooley et al. (2016) suggest, this problem sheds light on how organizations' strategy fails to include an innovative mindset and behaviors as their core element. The authors add that it is important for large firms to develop outside innovation networks, such as interaction with startups, to promote open innovation and consequently complement internal capabilities.

Our findings contrast with corporate incubation programs' basic assumption intended to add strategic value to the parent company by working together with startups (BECKER; GASSMANN, 2006a; HAUSBERG; KORRECK, 2020). The difference in perceptions offers the established companies a golden opportunity to work on the problem without compromising the collaboration process. Managers may restructure internal routines, values, and processes to put into practice organizational strategic decisions to engage in open innovation. Corporate incubation programs sponsored by large corporations need to pay closer attention to how these corporations run the program internally. The allocation of dedicated and motivated employees is equally important as encouraging and valuing the interaction with startups across all hierarchical levels.

The second implication comes from the factors steering by the incubation programs. Cultural difference is by far the major problem envisioned by the respondents. On the one hand, established companies recognize that startups are fast and flexible, in contrast to large corporations that face rigid and bureaucratic routines. On the other hand, startups complain that large companies mistake speed with hurry, demanding unimportant tasks (like reports) in a short time frame, overloading them. The cultural difference emerged in our research as the major constraint factor steering by the incubation program, thereby supporting previous research (CHESBROUGH; BRUNSWICKER, 2014; WEIBLEN; CHESBROUGH, 2015; FERNÁNDEZ; VALLE, 2018). Recent research suggests that both actors need to learn how to deal with such differences, as the rigidity of organizations positively affects the implementation of product innovation (TEIXEIRA et al., 2021).

The lack of alignment between established companies and startups is a result of differences in organizational cultures and structures but is also due to their asymmetric goals. The differences lay in a broad range of factors, such as financial resources, capabilities, learning processes, and desired outcomes. Groote and Backmann (2020) explain that previous research shows that differences in objectives and asymmetry between established companies and startups pose severe risks and

challenges to the collaboration program. The literature on organizational entrepreneurship has pointed out several organizational strategies to promote innovation that vary from developing functional, unsupported, and cross-functional teams until creating ambidextrous organizations (O'REILLY; TUSHMAN, 2004). Ambidextrous organizations are characterized by creating a new business unit, usually an emerging business, apart from the core business, which allows the new venture to develop independent routines, processes, and culture. Shankar and Shepherd (2019) propose that nurturing entrepreneurial ventures is an appropriate strategy that large corporations may adopt to overcome differences in culture, goals, and general asymmetries.

The third implication of this study is related to knowledge flow. Our results suggest that the sponsored companies are engaging in open innovation initiatives to develop specialized knowledge related to their core activity. In this sense, the corporate incubation program tends to count on managerial knowledge and experienced employees to take advantage of the startups' flexibility and creativity, gaining access to new technologies as part of open innovation (WEIBLEN; CHESBROUGH, 2015). The researched companies are from the mining, metallurgical, and cellulose industries, which are very process oriented and highly dependent on technology to improve their business. Our guess is that other corporate incubation programs may vary in relation to the absorbing capacity, in the direction that highly specialized programs will tend to present high levels of absorbing capacity, whereas flexible, general, and nonspecific programs might experience difficulties in internalizing the new technology. Both incubatees and employees agree that established companies are experienced and capable of absorbing the technology developed by startups. This capability was mainly acquired from previous incubation programs sponsored by the companies. As Malvestiti, Esteves and Dandolini (2021) concluded, organizational success depends on the experiences and skills acquired by their employees, which draws special attention to absorptive capacity in the context of innovation. Established companies that have developed high levels of absorptive capacity usually benefit more from

collaboration with startups because they are able to acquire, assimilate, and explore new knowledge (GROOTE; BACKMANN, 2020).

Other implications include autonomy, IP protection, and incentives. The slight difference observed in the level of autonomy contributes to the discussion of Kötting (2020) about the tradeoff between autonomy and closeness. Our results suggest that startups had enough autonomy to create and test solutions until a specific stage of the program. As soon as they reached a solution, decision-making started to depend on managers' approval. The findings suggest that incubators and large corporations pay special attention to IP protection because both sides revealed that the incubation programs had specific contracts to assure the rights of the developed technologies and protect critical information. Finally, our findings confirm the literature that claims the main incentives and motivations for startups participating in incubation programs is the possibility of collaborating with large corporations by gaining access to highly qualified professionals (KAMBIL; ESELIUS; MONTEIRO, 2000; CRICHTON, 2014; AHMAD; THORNBERRY, 2018). However, the results indicate that this factor may restrict the incubation process because the programs failed to show startups the advantages from the beginning. Only after the program developed and the collaboration matured were incubatees able to realize the real gains.

This research presents some limitations. The first limitation is related to industry research. The three established companies are from the mining, metallurgical, and cellulose sectors, which are known as highly stable in relation to their processes, routines, and technological dynamism. The findings of this research must be interpreted with caution in other sectors, especially those characterized by dynamism and flexibility. Future research can overcome this possible bias by investigating whether these findings hold for large corporations from other industries. The second limitation refers to the qualitative approach, which prevents the generalizability of the results. Future research may use surveys to investigate the critical factors in large samples. The third limitation is related to the geographic profile. Other studies can investigate whether critical factors hold across different

regions and cultures. As pointed out by Kim, Bae and Bruton (2012), it seems that in developing economies, critical factors may differ from mature cultures. Future research may also compare different contexts to investigate this assumption. The fourth limitation refers to the analysis of one single incubator distributed in three incubation programs. We think that our findings, specifically those related to the factors steering by the incubation program, may hold across other incubators. Nevertheless, future research is needed to answer this question.

To practitioners, our research offers empirical data about how the critical factors that may hinder or facilitate collaboration in a corporate incubation program are perceived by both sides. This study draws attention to two major issues. First, the perceptions of startups and employees directly linked to the incubation program are to some extent different. Managers need to address these differences to reduce misunderstandings in all phases of the program. Second, special attention needs to be paid to two critical factors—dedication to the program and cultural differences. These factors were identified due to their potential to compromise the corporate incubation program.

6. Conclusion

The major contribution of this research is to compare the perceptions of established companies and startups in relation to the business incubation program. Differences and perceptions are critical indicators of whether startups and established companies are on the same page during the incubation program. Our results revealed that the sponsored company does not dedicate enough to the program, suggesting that open innovation initiatives, such as incubation programs, may be a strategic value that still does not translate into organizational practices. Our findings also indicate that cultural differences are by far the major problem in incubation programs, deserving special attention from both sides.

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Authors' contribution

A. Literature review and theoretic analysis: Renata Simões Guimarães e Borges and Gilvan Augusto Silva

B. Data collection and statistical analysis: Renata Simões Guimarães e Borges and Gilvan Augusto Silva

C. Figures and tables: Renata Simões Guimarães e Borges and Gilvan Augusto Silva

D. Manuscript development: Renata Simões Guimarães e Borges and Gilvan Augusto Silva

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APPENDIX A
Script of the semi-structured interviews

Categories and questions:
Dedication to the program:
Are the designated employees of the Company X actively engaged in the corporation incubation program?
Do you think that having the designated employees engaged in the incubation program facilitates, constraints, or does not interfere in the program?
Are key employees of the Company X (leaders, managers, CEO) committed to the corporation incubation program?
Do you think that having key employees committed to the program facilitates, constraints, or does not interfere in the incubation program?
Autonomy:
Do the teams involved in the corporate incubation program have the autonomy to make strategic decisions?
Do you think that these teams having the autonomy to make strategic decisions facilitates, constraints, or does not interfere in the corporate incubation program?
Do the startups have the freedom to pivot and set the pace in the incubation program?
Do you think that startups having the freedom to pivot and set the pace of work facilitate, constraint, or do not interfere in the corporate incubation program?
Knowledge flow:
Are the employees of the Company X able to absorb knowledge and skills generated by the startup and the incubation program?
Do you think that employees of the Company X being able to absorb knowledge and skills generated by the startup facilitate, constraint, or do not interfere in the corporate incubation program?
Is there a communication system in Company X to interact with startups?
Do you think that having a communication system to interact with startups facilitates, constraints, or does not interfere in the corporate incubation program?
Motivation and incentives:
Were the motivation and incentives offered to startups specified at the beginning of the corporate incubation program?
Do you think that specifying the advantages and incentives for the startups facilitate, constraint, or do not interfere with the corporate incubation program?
Are there motivations and incentives that bring real gains for startups to participate in the corporate incubation program?
Do you think that startups having real motivations and incentives facilitate, constraint, or do not interfere with the corporate acceleration program?
IP protection:
The IP protection involved in the incubation program is secure and transparent?
Do you think that the security and transparency of the IP protection facilitate, constraint, or do not interfere in the corporate incubation program?
Did Company X make it difficult for the startup to access important information and processes for the incubation program?
Do you think that granting the startup access to key information and processes facilitate, constraint, or do not interfere with the corporate incubation program?
Cultural differences:
Are there differences in beliefs and behaviors in the collaboration between Company X and the startup?
Do you think that these cultural differences of beliefs and behaviors facilitate, constraint, or do not interfere in the corporate incubation program?
Are there differences in the work routines, practices, and formal processes between Company X and the startup?
Do you think that these differences in work routines, practices, and formal processes facilitate, constraint, or do not interfere in the corporate incubation program?

Source: Research data.