Business founding in biotech industry: process and features

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Abstract

Purpose – This paper aims to construct a process model of business founding in the biotech industry.

Design/methodology/approach – An inductive method is used, and five case studies analyzed. Data are coded by applying Gioia's method.

Findings – Aspirant entrepreneurs conduct resource analysis and industry analysis to formulate research and development targets. They perform transactions and networks because they require resources, and they then deploy and coordinate these resources. Such coordination generates activities with social and financial impacts.

Research limitations/implications – The results are specific to the biotech industry. A future study could examine business founding processes in other industries (e.g. entertainment, fashion, public utilities and sport). Additionally, the paper argues that during the founding process entrepreneurs show little concern for knowledge-sharing risk, as they want to collaborate to implement their ideas. Quantitative papers could test the consequences of such behavior.

Practical implications – The process model provides insights into aspirant founders on how to start a business in the biotech industry.

Originality/value – The paper shows: the differences between the founding process in the biotech industry versus other industries; and the shape of the Bower–Burgelman model in the context of biotech business founding. The paper delineates how private companies discover competencies in the public sector; a model of technology transfer from public to private sector; entrepreneurs' absence of risk perceptions regarding knowledge-sharing during founding; and how conferences can serve as vehicles for benchmarking in networking.

Keywords Networking, Technology transfer, Strategic management, Strategy, Process model, Biotech industry, Business founding

Paper type Research paper

Introduction [1]

Business formation can be described as "planning, organizing, and establishing new organizations (Gartner, 1985)" (Shook *et al.*, 2003, p. 380).

Strategy literature has designed several process models that explain how organizational phenomena occur and evolve over time (Bower, 1970; Burgelman, 1983, 1994, 1996; Corley and Gioia, 2004; Gioia and Chittipeddi, 1991).

The entrepreneurship literature has encouraged scholars to develop process theories by applying specific methods by which to represent the entrepreneurial phenomena over a time sequence of events. Entrepreneurs often require a road map that directs their behaviors (Van de Van, 1992). Bhave (1994) delineated the process of business formation through a qualitative study inspired by process model studies in the strategy literature. Nevertheless,

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it has been suggested that "no general laws of business exist. Rather, business success is a 'science of the specific'" (Jacobson, 1992, pp. 803-804). Indeed, Bhave's (1994, p. 238) study recommended "strategic gradations among entrepreneurial ventures, and cautions against comparisons or groupings among firms along conventional dimensions."

The current paper aims to develop a more specific business creation process model tailored to the specific context of the biotech industry. This industry is particularly important because of:

- the significant amount of wealth it creates (Ernst and Young, 2011); and
- the benefits it generates for society in terms of health care.

The importance of the industry justifies research efforts to identify the path followed by entrepreneurs in constructing companies in that particular industry. In addition, my data set on the biotech industry reveled that research centers have accumulated a significant amount of knowledge in the biotech area. Often, the orientation of that knowledge is limited to journal publication, as this is what appears to be of the greatest importance for academics in many schools; however, that knowledge could be better directed toward the market and public to rapidly help healthcare. Thus, an entrepreneurial road map (Bhave, 1994) could be of significant use to scientists who believe that their knowledge could be leveraged to create a business, potentially leading to success in addressing public health problems. Then, the data set can be leveraged to construct a useful process model of biotech business founding.

This paper constructs a process model of business founding in the specific context of the biotech industry. The paper aims to answer the following research question:

RQ1. How do aspirant entrepreneurs construct biotech companies?

The paper highlights similarities and differences between the processes of business founding in the biotech industry compared to that in other industries (Bhave, 1994). It also develops a fine-grained analysis to understand the subprocesses of business formation. In addition, the paper leverages empirical evidence to understand how the stages of the traditional Bower–Burgelman (B-B) model (Bower, 1970; Burgelman, 1983, 1994, 1996) look in the strategy formulation process of the business founding. Finally, the paper leverages the findings to contribute to the literature on social entrepreneurship, technology transfer and knowledge sharing.

Theoretical background

Both theoretical models and empirical models (process models) can be used to understand how organizational phenomena advance chronologically over time.

Theoretical models

According to Eggers and Kaplan (2013), cognition chooses the experiences that are suitable to be transformed into the company's routine. Cognition also defines the target and identifies the organization's aptitudes to reveal which routines should be assembled to form the capabilities. Finally, cognition analyses the compatibility between what happens in the environment and the available capabilities to make the decision to tap into opportunities. Performance depends on this decision. The model is recursive in the sense that performance is evaluated because it constitutes experiences. The analyses of aptitudes and of the target interact because management feeds the latter through the former and changes the former because of the latter; the target inspires the selection of the experience, capabilities define new aptitudes and new interpretations of those aptitudes; and the tension between the environment and the capability affects the target. Ireland *et al.* (2009, pp. 24-25) constructed a

model of entrepreneurial venturing with three levels: "the organization," the top team and the members of the firm. Over those levels some elements act: the "entrepreneurial strategic vision" at the top team level, the "entrepreneurial processes and behaviors" at the members level (these processes and behaviors help to get business opportunities), and, at the organization level, "the pro-entrepreneurship organizational architecture", which connects the first element and the second element to realize the first. The antecedents of corporate entrepreneurship are "the external environmental conditions" at the organization level and the "individual entrepreneurial cognitions" at the level of the firm's members. The corporate entrepreneurship strategy generates "competitive capability" and "strategic repositioning."

Process models

Process models use data to show the origins of organizational phenomena and the mechanisms linking the variables that generate these phenomena. The strategy field offers several examples of process model applications. The B-B process model (Bower, 1970) was the first significant attempt to empirically track important business processes. The model explains the resource allocation process and has been used as a reference to construct other models to track phenomena including venture creation (Bhave, 1994). Adopting the classical B-B process model as a framework, Burgelman (1983) explained internal corporate venturing and the business exit strategy (Burgelman, 1994, 1996). The B-B model helps to explain what a process model is, how it is constructed and why it is useful to understand organizational phenomena. In addition, it identifies the main stages of strategy formulation. Based thereon, the paper delineates what shape these stages take in biotech business founding.

In 2005, Bower clarified the components of the B-B model: *definition* starts the process and the *impetus* follows, they are both affected by the *structural context* and they change the *strategic context*. *Definition* is driven by functional managers, who define the financial and technical aspects of a new project to present it as a candidate to obtain the company's resources. Functional managers have their own perceptions of achievement; these depend on what is required from them at work, as well as on the management control system used to measure the managers' targets, control these targets and eventually recompense mangers. If managers believe that the organizational results they will get do not correspond to the targets they are pursuing or those targets are not sufficient anymore, they seek to create a new strategy. Functional managers have relations with employees, customers, suppliers and all of the company's stakeholders. In addition, they have knowledge of, and control over, the firm's operational activities. They are able to identify difficulties or opportunities and try to solve or take advantage of these, respectively. For instance, a product manager might know that because sales are increasing, the production capacity may be insufficient in the future. The manager can then prepare a proposal for the company to grow.

Impetus is a process that leads to obtaining the resources needed to implement the new project. The top management team focuses on the financial attractiveness of the project and tries to decide whether the assumptions of the plan are correct and forecasts are plausible. In addition, management evaluates the history of the proponent of the project. If the proponent's previous projects were successful, the general manager gets credit for them and the general manager's reputation, in turn, helps to convince the top team to take the new project forward (Bower, 2005). Bower (2005) provided an example of a case at Opel (the car company) when a general manager proposed to implement a plant in a new geographic area, rather than using the usual location, against the advice of the corporate staff. The top team evaluated the reliability of the manager versus the reliability of the corporate staff to decide which recommendation to follow.

The *structural context* influences both the definition and the impetus of the project: managers act based on their targets and cares about the results they will gain because of

their behaviors. The management control system then affects what happens in the two subprocesses (definition and impetus) of the model. For instance, even if demand is rising, a plant manager may not insist on increasing capacity until he/she feels that the capacity itself will be sufficiently used to justify the investment without generating unused excess. Conversely, a sales manager may insist on increasing the capacity to meet customer demand and achieve higher sales targets. The general manager will favor the first position because his/her reward depends on the return on investment (Bower, 2005). Bower (2005, p. 33) explained that the actors of the process are "operating specialists and corporate top managers [. . .] general managers in the middle normally have such titles as division manager, country manager, or group manager."

In sum, front-line workers ideate strategic initiatives (*definition*), middle managers judge those initiatives and identify those that they will promote (*impetus*) and middle managers then try to change the corporate strategy adopted by the top team (*strategic context*) (Noda and Bower, 1996).

As Bower (2005) pointed out, Burgelman contributed significantly to the original model with respect to the evolutionary approach: Burgelman (2005, p. 61) explained that the strongest impact of his studies on the evolutionary viewpoint is "that the internal ecology of strategy making is an emergent property of organizations." On the one hand, the Intel case shows that strategy can come from the top of the organization; on the other hand, the case shows that autonomous initiatives interacting with the environment can drastically change the firm's strategy. The structural context of Intel was such that the research and development (R&D) department made investment decisions in favor of the dynamic random access memory (DRAM) business, while manufacturing adopted a margin maximization criteria and favored the microprocessors business. The policy of the manufacturing department was encouraged by favorable interaction with the external forces of the market, which incentivized microprocessor production. In the microprocessors case, the *definition* came from the autonomous behavior of the manufacturing area – it arose from within the body of the company, rather than at the top. The occurrences inside and outside the company incentivized this autonomous behavior and favored an intended strategy, which accepted the autonomous behavior and changed the *strategic context* whose focus became the microprocessors business rather than the DRAM business (Burgelman, 2005).

Bhave (1994), inspired by Burgelman's (1983) corporate venture model, constructed a process model of venture creation. First, Bhave distinguished between "externally stimulated opportunity recognition" and "internally stimulated opportunity recognition." External recognition is driven by personal conditions that motivate an individual's decision to start a business ("decision to start"). The entrepreneur then searches for opportunities, typically finding many ("opportunities recognized"), and selects the one that best matches their skills and capacities ("opportunity filtration," leading to "opportunity chosen"). Subsequently, the entrepreneur adjusts their idea by examining it from a business perspective ("opportunity refinement" leading to "business concept identified"). Once "the business concept" has been determined, the entrepreneur is ready for the "commitment to physical creation" (Bhave, 1994, pp. 228-230). External opportunity recognition arises when the entrepreneur notices an unmet need, either their own or that of others. The entrepreneur then looks for a way to meet that need. They find it ("need fulfilled") and realize that the solution they found could be a business opportunity ("business opportunity recognized"). The subsequent entrepreneurial path is similar to the previous one, with "refinement" leading to a "business concept" that makes the entrepreneur ready for "commitment to physical creation" (Bhave, 1994, pp. 229-230). The "business concept" can be developed. Once the product is ready, the entrepreneur must test whether their idea of customers' needs

corresponds to reality. They then get feedback from the market to adjust the product to what customers want. In addition, they need to inform customers who are not aware of the product about how it can help them. Providing information is important to generate a new market space. Up to this point, the entrepreneur's efforts have been primarily immaterial; hereafter, the venture creation requires physical effort: the "commitment to physical creation" marks the borderline between the intangible stage (Bhave, 1994, pp. 231-232) and the tangible one, which entails "production technology development" and "organization creation." "Production technology development" consists of attracting resources, including finances, while "organization creation" consists of both developing "the physical structure" by which to organize the resources, and the "organizational processes" that define the business's function. It takes time to formalize roles and practices; this formalization comes from learning by doing, and from interactions with the market, from which feedback is obtained (Bhave, 1994, pp. 232-233). The next action is "product and production development": the energies of the new venture are directed toward concrete realization of the business concept by making the product available. During these efforts the company can still change the product itself. Once production is ready the product may go through another stage, which entails crossing "the supply and demand boundary." At this point, the market sends feedbacks to the venture, and two kinds of signals emerge: strategic signals may push the entrepreneur to change their entire business concept, while operational ones push them to change the operations used to implement the business concept (Bhave, 1994, pp. 233-235).

Another model, proposed by Gioia and Chittipeddi (1991), also contributes to our understanding of strategy formulation by providing a more detailed analysis of the cognition and culture aspects thereof. In this model, strategic changes are seen to stem from a four-stage process that alternates between cognitive phases and actions: *envisioning* allows the chief executive officer (CEO) to visualize the current circumstances within which the company is operating, and thereby formulate a strategy; *signaling* helps the CEO to embed the strategy throughout the organization by transmitting its meaning; *re-visioning* helps stakeholders to comprehend that meaning and elaborate on it; and finally, *energizing* leads to stakeholders' engagement in both strategy execution and modification (Gioia and Chittipeddi, 1991).

In the context of spinoffs, a strategic change occurs that seems to impact an even more profound aspect of a company: its identity. First, certain triggers of identity ambiguity emerge. This ambiguity, in turn, generates a sense giving imperative, creating ideas with precise boundaries. The top team reacts to the desire to generate new meanings and works to define a clearer identity (Corley and Gioia, 2004).

Method

Data collection

The paper uses five case studies to explore the biotech industry. Table 1 details the characteristics of the sample companies (Ciao, 2018b, p. 42; Ciao, 2017a, p. 28). The first organizations were identified by contacting Assobiotec (an association of biotech firms). The author did not provide specific requirements: any company was considered useful to understand the value-creation mechanism in the biotech company. The selection process was quite random. There was no desire to focus on companies with specific characteristics because the research aim was quite general – that is, to understand, from an economic perspective, how biotech companies work to access innovation and generate value. The initial interviewees obtained via this means then provided information and contacts for other companies. Again, no specific requirements were delineated; the author simply got in touch with the management of those new organizations. Data were obtained from six organizations. The information from one in particular firm was very useful in gaining understanding of the

Company	No. of employees	Revenues	Assets value	Year of foundation	Ownership structure
Company A	9 (in 2016)*	€467,290 (in 2016)*	€1,044,836 (in 2016)*	2006**	Private*
Company B	No employees – just collaborative ties***	No financial results yet (in 2016)*	€458,909 (in 2016)*	2008*	Private*
Company C	22 (in 2016)*	€871,326 (in 2016)*	€2,742,481 (in 2016)*	1999*	Private*
Company D	403 (in 2015) *	€109,325,000 (in 2016)*	€418,743,000 (in 2016)*	2002*	Listed*
Company E	14 (in 2016)*	€7,014,559 (in 2016)*	€54,747,324 (in 2016)*	1998*	Listed*

Table 1.
The companies

Notes: Amadeus (database); **Company's website ; ***Interviews
Source: This table is also reported in Ciao (2017a, p. 28) and Ciao (2018b, p. 42, just a few changes in the words without really modifying the content)

biotech industry, but the case differed from the others: it was an industrial park that hosted several organizations. As the aim was to analyze firms, even though the author learned from the park's experience, evidence from the park was not used because of its different nature compared to the other firms. The other five cases seemed sufficient to identify how the biotech business works; that is, it was felt that a good level of saturation was reached (Glaser and Strauss, 1967) and that there was enough evidence to show how the economic mechanisms in an industry so oriented toward innovation worked. From the first round of interviews, the five firms seemed similar: they were all young companies, small (or, in one case, not very large), and still controlled by the founders in terms of strategic decisions. This helped to frame the results within a specific context: small entrepreneurial companies in the biotech industry.

The first round of interviews was conducted in 2011, and the second round in 2016. The interview protocol centered on the innovation process for value creation, the protocol enabled the definition of how companies are constructed in an industry with a high level of innovation. The interviews were unstructured and the interview protocol was applied flexibly in response to the issues already raised or, to considerations regarding whether the questions seemed appropriate at the time. The interview protocol explored four aspects, as shown in Table 2.

To triangulate the data, the author either interviewed a second informant from each company with deep knowledge about the business or, where such an informant was unavailable, performed a document analysis of company publications (Yin, 2003). The author asked questions on important points that came up in the first round. The questions stimulated the discussion on: the decision-making process; new projects or new products; networking; trade; assets; human resources; and operations. The author identified several sentences that confirmed significant points of the founders' narratives; these were transcribed from the interviews or documents. The matches appeared to provide significant evidence of the reliability of the founders' narratives (Ciao, 2017a; Ciao, 2018b).

Table 3 outlines details on the interviewees and the features of the interviews (Ciao, 2018b, p. 43; Ciao, 2017a, p. 29).

Data analysis

Through data analysis, the author sought to reconstruct the path followed by each entrepreneur, adopting a multi-framework perspective to avoid overlooking important

Aspects of the protocol	Details
The mechanism behind the start of the innovation process	The interviewer tried to understand how a new idea is generated; for instance, who formulates the new idea or which part of the organization (top or bottom) generates the idea
The subsequent trajectories of the innovation	The interviewer tried to understand whether the company followed a predefined road map to realize the new idea or whether the process was free and chaotic. The interviewer aimed to explore the competences, to understand whether they come from inside or outside the company; the competences' forms such as licenses; and the fields of the competences applied by the company. The interviewer also investigated the features of the trajectories; for instance, it was deemed interesting to explore whether the path was oriented to a disruptive innovation or to an incremental development
The setting incentivizing the development of new products	It was deemed interesting to examine the organizational design choices, such as the roles present in the company for the development activity or the relations among the different levels of the organization, such as the top team, the R&D managers and the employees. In addition, the interviewer wanted to discover whether the company had adopted any kinds of facilitators for the innovation process
The final outputs of the process	The interviewer tried to identify whether there was an intermediate output such as a license and a spin-off or a final output for customers. The interviewer investigated the features of the target market, as well as whether the company had leveraged knowledge assets developed over time in previous projects

Source: Author's elaboration from Ciao (2017a) and the author's notes

Table 2.
Protocol used in the present study

factors. The framework encompassed entrepreneurship, the resource-based view, transaction cost economics, the value chain and networks (Amit and Zott, 2001). To build a theory, the author codified data from the founders' interviews (Corbin and Strauss, 2008), identified the first-order and second-order codes and then merged these codes into theoretical dimensions (Gioia *et al.*, 2013). The coding process is shown in Table 4. The process aimed to detect common patterns that occurred in all the examined cases (second-order codes), from which general (theoretical) dimensions could be derived to capture the outputs of interactions among the patterns. Those outputs show the products of such interactions. Table 4 also provides quotes from the interviews; these quotes capture the common patterns that arose during the discussions (i.e. the themes or second-order codes).

Based on connections among the second-order codes and the theoretical dimensions, and those among the terms composing the dimensions (Corley and Gioia, 2004; Gioia *et al.*, 2013), a process model was constructed (Burgelman, 1983, 1994, 1996; Clark *et al.*, 2010) to represent how aspirant entrepreneurs ultimately establish their firms in the biotech industry. Certain connections, especially recursive ones, were derived from extant literature, rather than using the linguistic analysis of the codes.

The themes show up in all the cases, instead, it was enough to find a recursive mechanism in one case to insert it into the model. The sequence of the themes starts from resource analysis and industry analysis, which form the R&D target, and continues with the transactions and networking that provide resources. This sequence is defined by what happens in the first case (Firm A). The other part of the sequence is defined by the linguistic

Table 3.
The interviews

Company	Interviewee's role	Background/experience of the interviewee	Scope	Time (minutes and seconds)	Round
Company A	Founder	Scientist/manager	Unstructured interview for data collection	52:36	1
Company A	Founder	Scientist/manager	Focused interview for triangulation	76:32	2
Company B	Founder	Scientist/manager	Unstructured interview for data collection	65:34	1
Company B	Scientific advisor/associate professor	Academic experience	Focused interview for triangulation	29:02	2
Company C	Founder	Scientist	Unstructured interview for data collection	49:57	1
Company C	Data triangulated through website/newspapers/slides	Data triangulated through website/newspapers/slides	Data triangulated through website/ newspapers/slides		
Company D	Founder	Scientist/manager	Unstructured interview for data collection	28:02	1
Company D	Executive director (business development)	Director/manager	Focused interview for triangulation	93:30	2
Company E	Founder	Scientist/manager	Unstructured interview for data collection	32:22	1
Company E	Director of investor relations	Investor relations manager/ chief financial officer (CFO) /investment banking	Focused interview for triangulation	24:20	2

Source: The information is also reported in Ciao (2017a, p. 29, Table 4) and Ciao (2018b, p. 43, Exhibit 2, information reused in Columns 1, 2, 3 and 6 – just a few changes in the words without really modifying the content)

First-order codes	Theme	Quotes	Theoretical development
Evaluation of available recourses Evaluation of external resources	Resources analysis	It has one of the biggest libraries of natural products	R&D target
Medical needs' evaluation Competitive evaluation Scientific review	Industry analysis	No one does research on antibiotics	
Acquisition of resources core for the scientific activity Externalization of resources, which are not core for the scientific activity Sharing mechanisms to get resources	Transactions	A group … of executives … negotiated with Firm Z the possibility of acquiring those products	Resource collection
Partnerships with universities or research centers Scientific networks Partnerships with scientific parks Networking for fundraising Participating at conferences	Networking	Much more on the university side than on the company side … which is a very cost effective way of being able to … have access to experts in the field	
Past scientific background/ experiences Scientific laboratories Scientific tools Knowledge embedded in patents Organic/chemical materials Funds to carry on the projects	Resources	Firm H which, a few years ago, decided to offer spaces to the small biotech firms: spaces, offices, laboratories to continue their business	Capabilities: deployment of resources for a target
Hierarchy for strategy execution in the research teams Key role of researchers/scientists Key role of the research leaders (scientific director, chiefs of the laboratories and research directors) Focus on few activities	Practices	From that top umbrella of the board of directors we have these sub-directional groups that help to … make sure that proper decisions have been made	
Differentiation Public medical needs	Social impact	Since it was born in 1999, Firm E has been a firm which has been characterised in a quite precise way in terms of the therapeutic sector where it invests, where it develops its own drugs	Company end
Discovery Intellectual property Material for other companies	Financial performance	Using license agreements, that is [agreements of] transfer of the development rights or commercialisation rights of those products in exchange for, of course, financial benefits	

Table 4.
Codes and quotes

composition. In the narrative from the other cases, the themes arose after the business founding; this demonstrates that the entrepreneurial processes occurred throughout the life of the company (the model is cyclical).

The following section presents evidence from the case studies that are representative of the common patterns adopted by the scientists' founding of biotech companies.

The following section presents the findings for Firm A, while the findings for other firms are reported in Table 5 [2]; both the following section and Table 5 report findings for the themes or second-order codes (Corley and Gioia, 2004), which are derived from all cases. The theoretical dimensions are identified from the merging of themes (Corley and Gioia, 2004; Gioia *et al.*, 2013). To better explain the content of the theoretical dimensions, the following section also presents findings for theoretical dimensions using the case of Firm A.

Findings

Resources analysis

Founders analyze their available resources to ascertain whether they can use those resources to generate wealth.

The founder had obtained a degree in biology, and at the beginning of her career, she had worked in a big company in the R&D area developing antibiotics. She was employed by one of the most important pharmaceutical companies in Italy. At a certain point, big pharmaceutical companies left the country for economic and political reasons. Some competences remained in the country but they were not used systematically within the hierarchy typical of the big companies. Competences pertaining to antibiotics were appreciated because the biotech industry was becoming increasingly relevant. The founder of Firm A was then employed by a small company, which was a spinoff of a big company that had left the country but had left laboratories available for local managers to acquire. This development was convenient for the local managers because the big company no longer considered the laboratories to be productive. The founder, therefore, obtained her managerial skills in the small biotech company landscape. Following a merger between the small firm and another company, the resulting firm was acquired by a multinational company for a huge amount of money. It was a big acquisition.

The founder mentioned that what she described captures the history of the pharmaceutical industry of the country (or at least an important part of it). She felt that it would be a shame to not leverage what that important path had left in terms of knowledge and experience. As she had been part of the path she wanted to make the most of it and her pharmaceutical research background, along with her business background in the small biotech company. She realized that she could start a venture in a territory where she already had the relevant competences: the field of anti-infectives. This field seemed as though it offered various opportunities. The founder analyzed her own resources and set a target.

Decision-makers' cognitions on the available resources – their "resource schemas" – define how resources are leveraged to change the organization in established companies (Danneels, 2011, p. 21). Resource schemas were also applied in this entrepreneurial process because the founder identified which resources to use to start her business. Table 6 shows why resource analysis was important at this stage, while Table 7 shows why it matters for a company's success (the tables also report this analysis for the other themes in the following stages of business founding).

To generate a successful business idea, resource schemas are not enough; they need to be combined with complementary schemas used to analyze the industry to see whether the

Table 5.
The companies

Themes/ second-order codes	Firm B	Firm C	Firm D	Firm E
Resources analysis	Firm B was founded when a group of immunologists asked the founder to consider several projects, and he realized that they represented good business opportunities. Firm B's founder believes that his background and the research of University U integrate very effectively. Their collective experience exceeds 200 years; he is an expert in pharmaceutical development and can interact with healthcare authorities, while the academic researchers study the mechanisms of the immune system. "This experience cumulated over decades and frequently transferred from one professor to another really represents the wealth". The founder considers this experience embodied within Italian universities to be a source of opportunities. He also considers particularly valuable the immunologists' opportunities to work in both hospitals and laboratories, through which they can identify the specific features of illnesses by testing biological materials from hospital patients in their laboratories	Firm C was spin-off of another organization. It has an organizational structure with two divisions as follows: the service one and the research one. Within the research division the Firm C's management decides on which projects to collaborate; the firm actually receives many requests to collaborate in applications seeking funds from institutions such as the EU. What seems pretty interesting is that they evaluate what they learned from each project and this becomes part of their background. Actually, they use the experience to judge the possible projects. They get engaged just if the projects can help to improve the company. Firm C shows that the top team runs the resource analysis also at the end of the project. The model is recursive. The resource analysis verifies if the project creates knowledge assets to leverage in the future. The analysis generates mental models to evaluate the future projects through the analogy. Only projects which seem to generate learning are considered to be successful. Then, the management invests the organization's time into them	Firm D emerged from the founder's idea to develop a license transferred from the center for nuclear research to the nascent company. While working on the patent, he realized that the laboratory he had built for this purpose could also be used to develop a liquid for positron emission tomography (PET) analysis. The revenues generated by producing this liquid are used to fund R&D activities	Firm E's management realized that the molecule they obtained from a spin-off could be used for another therapeutic aim in the field of nervous system therapy. This is the field within which the company focuses its activity; it does not accept investments outside this field because Firm E does not have enough competences to manage projects in other therapeutic areas such as oncology

(*continued*)

Table 5.

Themes/ second-order codes	Firm B	Firm C	Firm D	Firm E
Industry analysis	The founder of Firm B considers that the researchers of the partner university have a valuable background because they are experts in the immune system, now considered to be the cause of illnesses such as asthma or diabetes. Although these illnesses are localized in specific parts of the body, they are actually rooted in the immune system, the study of which can, therefore, produce useful results to treat illnesses known for a long time in the industry but previously treated as local illnesses	The top management of Firm C considered four factors of the biotech industry. First, there are only a few product entries in the market, as companies discover very few molecules. Second, half of the drugs would be biological by 2020. Third, diagnostic discoveries regularly uncover new illnesses, and many patients do not react positively to current drugs due to specificities of their illnesses. Therefore, it is useful to develop medicines for treating small niches of patients or to improve existing drugs to increase their efficiency in treating specificities. Fourth, in terms of competition, there was just one other Italian company in Firm C's segment. Both companies were authorized to run the same processes The Firm C runs an industry analysis annually. The company has a group dedicated to the market: "two vendors and a temporary marketing and sales." The group analyses the conditions of the market from two perspective: the demand side and the competitive side	Firm D buys intellectual property and biotech companies, and runs both business reviews and scientific reviews. The management has both scientific competences and knowledge about the industry through which to evaluate the effectiveness of the intellectual property they are buying. Often, scientists do not care whether an effective product can actually be sold; the scientists from whom Firm D buys intellectual property often do not face the issue of the market. Firm D fixes this problem through market analysis	The information gleaned from conferences allows Firm E to identify the progress being made by its competitors to meet the same medical needs the company is targeting, enabling the firm to evaluate its prospects of beating the competition. Before investing in a project, the company evaluates the scientific features and the market potentialities of a medical need, which is not yet effectively satisfied

(*continued*)

Table 5.

Themes/ second-order codes	Firm B	Firm C	Firm D	Firm E
Transactions	Firm B took projects from University U, one of which was already embedded in a patent acquired by Firm B in exchange for royalties. Firm B can access an important scientific tool for its research through University U. In fact, the company rents this tool, which differentiates more than 100 populations of lymphocytes. Financial resources were provided by the financial company owned by the Bio-Park G. The company consequently holds 62 per cent of Firm B. In addition, Firm B pays rent to Bio-Park G to use its laboratories and instruments	Firm C recently employed vendors who work to develop the business: they promote the company's products through door-to-door advertising. In 10 years, Firm C was able to construct a plant, which can develop any kind of biological elements such as cellules, proteins or antibodies. This plant was built because of the investments of the family that owns the company. The management decided to externalise the logistics to the Bio-Park G and the finance function to a company owned by a family member. Firm C built a company with three professors of University Y. Firm C holds 50 per cent of that company, whose foundation allowed Firm C to acquire resources from the other partners and produce a diagnostic kit in the field of the growth hormone	After acquiring the first patent from the center for nuclear research, Firm D repeated a similar procedure in the sense that it continued to acquire intellectual property from universities and biotech companies	Firm E was created as a spin-off from a company for which the founder used to work. Based on a patent agreement, the founder acquired a molecule during a turnaround. The molecule was still at the beginning of the discovery process. The company performs many other transactions because it adopted a flexible model within which a research leader designs the clinical studies by coordinating external activities. The majority of Firm E's costs relate to activities contracted out to other companies. When Firm E's management realizes that a project needs more financial resources than are available, the company seeks a partner, as it did for the first molecule, which was transferred to a company in exchange for royalties
Networking	Firm B began operating because of the financial support of Bio-Park G, which was necessary to develop the projects launched collaboratively by a group of researchers and the founder. After	Firm C has huge appeal as a partner for applying for grants because small companies attract funds more easily and this makes attracting funds easier for partners too. Firm C developed a vaccine	To develop the patent it acquired from the center for nuclear research, Firm D's founder sought business angels and found a group of 10 people who collectively invested more than EUR 1,000,000.	For Firm E, conference participation allows the building of relations with the scientific and business worlds. From those relations, Firm E collects information on the advancements

(*continued*)

Table 5.

Themes/ second-order codes	Firm B	Firm C	Firm D	Firm E
	Firm B acquired these projects from University U, the relationship between the two organizations continued, allowing Firm B to access relevant competences on immune system research. Firm B's relations extend beyond Bio-Park G and University U. For instance, the day before being interviewed for this study, Firm B's founder visited Basilea to meet some friends who have good relations with banks, seeking to attract the interest of bankers in Firm B's business. The company needs funds to advance projects it has had to suspend due to financial constraints	with a research center focused on cancer treatments and, at the time of the founder's interview for this study, the management was looking for new partners because it did not want to develop the vaccine further, to avoid clashing with the interests of its service division. The management wants to guarantee to clients of the service division that Firm C will not develop products competing with the clients' own products and use clients' knowledge to generate new products. Then, Firm C runs networking to allow assets to be further developed outside the company	On the one hand, whenever the company requires further investment, the management approaches institutional investors such as banks. This leads to information on the company's need for money being spread throughout the investment community, enabling Firm D to secure sufficient finance to continue operating. On the other hand, universities and hospitals approach Firm D's representatives during conferences or by phone to seek investment	of its fields of dedication and evaluates whether the features of its own discovery processes can secure a good market position
Resources	Firm B's founder worked for 10 years in a large pharmaceutical company, before moving to another company to work as director of clinical research. Although the headquarters were not in Italy, he nonetheless had sufficient power to direct the company's research. When this power was significantly restricted, the founder decided to leave the company, at which he had spent most of his career. He was then	Firm C was created as a spin-off from the cellular biology laboratories belonging to a research center at which the founder was an associate. The spin-off integrated the competences embedded in the founder and the research team. A family member of Firm C highlighted the importance of innovation in the production: Firm C does not use traditional production plants with fermenters,	In Firm D, the financial results from the liquid for PET and the investments from the business angels allowed the creation of 20 laboratories in which 32 people are employed, and many others gravitate around the laboratories	Firm E started with a molecule transferred from a big company at which the founder was employed. Competences such as business development skills were brought to the company. This helped to collect financial resources and, then, to build the research laboratories, which, in turn, allowed the creation of and access to new projects through agreements with other companies

(*continued*)

Table 5.

Themes/ second-order codes	Firm B	Firm C	Firm D	Firm E
	hired to build a team for a company supplying services commissioned by other companies. He found building and growing the team to be interesting, but, as the commissioned services followed rules imposed by clients, there was no opportunity to use his creativity and career background to create scientific advancements. He recognized that such opportunities would be available in an autonomous and entrepreneurial company. As the basis for Firm B's initial activities, the founder acquired two projects from University U, one of which already had a patent. University U still contributes to the developing processes through its immunologists: by directly treating patients, they can use biological analyses to determine the specificities of their illnesses, and then formulate specific tactics for developing drugs able to treat the observed patients' specific illnesses. Bio-Park G allows Firm B to access necessary resources: the park holds instruments, such as refrigerators and centrifuges, which can be used by all	but rather uses plastic bioreactors. These have a huge surface-to-volume ratio and are very compact; they guarantee safety and avoid trans-contamination, making them ideal for the drugs tested by Firm C. According to the founder, the company's key resource is a bundle of knowledge assets that create a general capability: Firm C can grow any biological molecule. Knowledge is embedded in scientists, who are crucial factors for the company. The firm also invested in a sales force even though the market forecasts were not very optimistic: sale people do an important job because they contact clients to enlarge the customer portfolio		

(*continued*)

Table 5.

Themes/ second-order codes	Firm B	Firm C	Firm D	Firm E
	companies gravitating around the park			
Practices	In Firm B, there is an advisory board comprising four of the most famous oncologists in Italy. They encouraged the company to progress to the next stage of the discovery process, but the founder disagreed: because the company treated only four or five patients, no ethical committee would have given the firm permission to move to the next stage. Firm B integrates the university researchers who investigate the immune system and the leadership qualities of the founder, who knows how to develop pharmaceutical discoveries and is able to dialogue with health care authorities. Firm B ran experiments on rats and the first experiments on patients	In Firm C, a project manager, their assistant and a work team are assigned to each project. In a weekly meeting, the project manager updates on progress. The company must also meet specific requirements to be authorized to supply biotech services, including the obligation to define responsibilities. This explains why, despite being an entrepreneurial entity, the company has project managers. Firm C has a production manager, a political operations manager, a quality operations manager and a R&D manager. International Organization for Standardization (ISO) certification requires the company to run continuous training, for which purpose it delivers scientific education to its personnel. In addition, both the CEO and the president learned the principles of teamwork and project management during their experience in large companies. They apply those principles in Firm C: for instance, they run job	Firm D has a scientific committee comprising a marketing director, a research director, a medical director, a clinical director and three physicians with different expertise. Members of the scientific committee have complementary competences. The committee's role is advisory, with the board of directors making decisions on the projects in which the company should invest. R&D was originally controlled by the founder, but this became impractical as the firm grew larger; now, the research director reports to top management about new proposals and the results obtained	Firm E "has a core": the company focuses on designing clinical studies, the execution of which it outsources to research organizations. The research director has the central role of deciding in which projects the company should invest and how to design them. He defines the endpoints and corresponds with the authorities whose permission is required to advance each project. In this business, huge experience of molecule development must be complemented by specific discovery experience of nervous system therapy. Ninety per cent of the company's personnel work in R&D; the rest comprises management and a small group dedicated to administrative activity: because the company is listed, it needs to meet the reporting requirements of the Swiss stock exchange. Firm E developed the competences required to coordinate all the activities contracted out to research organizations

(*continued*)

Table 5.

Themes/ second-order codes	Firm B	Firm C	Firm D	Firm E
		performance reviews to evaluate employees' results and try to improve them over time		
Social impact	Firm B is working on two vaccines as follows: the first is against lupus, which is an illness without a specific therapy, and the second is against prostate carcinoma. The first results of tests of the second vaccine on people show that it increases life expectancy and reduces bone pains	Firm C received authorization to produce many cellules. Actually, the company takes cellules from patients staying in the hospital and modifies the cellules in the laboratory. Then, Firm C brings the cellules back to the hospital and the cellules are deployed to treat the patients with a patient-specific cure based on their own cellules	The idea of Firm D's founder to produce a liquid for PET was successful. PET is used to analyze patients and identify illnesses. Thus, the liquid is beneficial for healthcare purposes	Firm E started with a molecule acquired from the company at which the founder was employed; when Firm E was formed, the project was at the pre-clinical stage. After working on the project for a while, Firm E changed the molecule's therapeutic purpose. The founder pointed out that Firm E does not work on drugs to cure cancer because it lacks the competence to develop them; instead, Firm E only works on projects related to the nervous system
Financial performance	The founder explained that the Firm B was working on two projects as follows: the first was at the stage of experiments on rats, while the second was closer to market-release of the developed drug. The second project had reached the stage of clinical experiments. A small group of patients were treated and the results were successful; therefore, the company was seeking new	Firm C has two divisions, namely, the first is a service supplier and the second is a research division. The service unit develops specific materials used by big companies in their discovery process, assisting clients through the creation of proper elements for both their pre-clinical stage and clinical stage The company adopts three paying methods: "fee for service"; payments that are a function of the	Firm D acquires intellectual property from hospitals and universities, the intellectual property may be at different stages of the discovery process. Firm D can improve intellectual property, starting from any stage of the pharmaceutical value chain. Indeed, at the time of the first interview for this study, the PET liquid was already generating EUR 28,000,000 per year	At the time of his interview, Firm E's founder believed that the first molecule's development was very close to the final stage of the discovery process; he thought that, within one year, it would be possible to commercialize the drug

(*continued*)

Table 5.

Themes/ second-order codes	Firm B	Firm C	Firm D	Firm E
	investments to run experiments on a larger sample. A sample of 100 patients was needed and if the experiments were successful they could appeal to large companies that might be willing to invest in the final part of the discovery process with an even larger sample	main developing targets got by the clients; agreements about the rights on the manufacturing of the future production. They can also mix those formula. For instance, at the time of the interview the founder explained that the company worked for the preparation of a collyrium helping to cure a degenerative illness of the eyes. The company's client ran the tests on patients and got good results. Then, the product was ready for the market and the company would have controlled all the manufacturing because it hold the exclusivity on the production. In the meanwhile, the company got money for the service and also for the milestones reached by the clients		

(*continued*)

Themes/ second-order codes	Firm B	Firm C	Firm D	Firm E
		The second division could clash with the business of the service division, as clients could disapprove of Firm C producing products, which compete with their own because of the potential for Firm C to use knowledge from its clients. The research division aims to generate intellectual property, which is transferred out through spin-offs developing the projects		

Table 5.

Theme	Relevance during a specific stage
Resources analysis	Before starting the company with concrete actions, resource schemas are relevant because the founder needs to develop an understanding of the resources available to manage a certain territory. This understanding is necessary to continue along the entrepreneurial path. The founder needs to understand what they can actually do with their resources, otherwise, they will be discouraged from creating a business
Industry analysis	Before actually constructing the business, the founder must develop an understanding of its feasibility. The founder then needs to develop mental models about competitors, because they want to be confident that they will not be crushed by other firms
Transactions	Following cognitive efforts to define the business, transactions are indispensible to transform ideas into concrete business. They allow the collection of the resources needed to activate the operations
Networking	Resources are important at the stage that transforms the vision into a concrete venture. Ties provide complementary resources to realize the business idea
Resources	After running transactions and networking, resources are available. It is important to keep resources because they are the foundations of the company's operations. Without resources the company cannot start operations – it would remain an idea, nothing more
Practices	Once resources are available, they have to be used. Resources alone are not coordinated; they need practices to create the firm's operations. After collecting resources, biotech companies need to implement practices that enable resources to interact with one another
Social impact	Ultimately, the social impact is important because scientific results that are not promising for public health will discourage the entrepreneurs and the organization from continuing
Financial performance	It is also ultimately relevant to create revenues because these enable the entrepreneur to cover costs and avoid bankruptcy

Table 6.
The relevance of the themes during specific stages

firm can use opportunities from the environment by leveraging capabilities (Eggers and Kaplan, 2013). This process is known as industry analysis (Porter, 1985).

Industry analysis

Founders analyze the industry to verify whether there is room for a new venture. Studies on cognition focus on competition and industry (Narayanan *et al.*, 2011) and show frames oriented toward rivalry (Kaplan, 2011). Firm A analyzed the biotech sector before entering the anti-infective drug market. Anti-infective drugs have been developed in Italy over the past 50-60 years; however, despite this long pharmaceutical tradition, the industry barely exists now, as it is no longer profitable for big companies. In fact, these companies prefer to develop treatments for people with long-term or life-long illnesses, such as diabetes, rather than working on anti-infective drugs that cure patients in a short time. In addition, pharmaceutical companies changed their strategy in the 1990s by adopting an approach based on chemical diversity with a synthetic origin; however, after 10-15 years they found that this approach did not generate successful outputs. The consequences of this were significant because in the meantime their capabilities on alternatives to chemical diversity with a synthetic origin were lost because those methods had not been practiced at all for years. This left an empty competitive space; there were no firms able to compete by

Theme	The relevance for the firm's success
Resources analysis	Without the resource schemas representing which abilities are available to manage the business territory, the founder would formulate a strategy that would be impossible to implement and that would not produce value
Industry analysis	Industry analysis is necessary to imagine a product capable of sustaining competitive pressure and then creating value
Transactions	Transactions enable the entrepreneur to acquire unique resources to differentiate the product of the nascent company and obtain a competitive advantage
Networking	Small and young companies have limited financial resources; and networking allows them to collect resources without sunk costs that could reduce profits and lead to bankruptcy
Resources	Some of the collected resources are unique or uniqueness comes from the integration of several resources. According to the resource-based view (Barney, 1991; Collis and Montgomery, 1995), resources represent the basis for superior performance
Practices	Practices coordinate and valorize resources that would otherwise remain unproductive. They transform resources into products that are useful for the market, and ultimately, into revenues
Social impact	Social impact is the direct source of financial performance; the company will find someone to pay for their results if their results are potentially able to improve public health
Financial performance	The more revenues companies get, the more they can invest in new projects to grow and create more revenues within a virtuous cycle

Table 7. Relevance of the themes for the firm's success

implementing an alternative method. The founder of Firm A had a clear understanding of the competitive dynamic in the pharmaceutical sector based on knowledge of the sector history she had learned from her personal experiences. She had lived that history. The representation of the competitive dynamic generated the understanding that competition in the field was weak, which suggested that there were good business opportunities in the pharmaceutical industry segment defined by the alternative method of chemical diversity with a natural origin. The rivalry was one of the important cognitive constructs (Porac *et al.*, 1989) adopted by the founder to construct her plan for the new company. Another was the market's medical need. According to the founder, infections started to become a public concern again as their evolution rendered existing medicines ineffective in fighting them; that is, with big companies focusing elsewhere, infections had developed resistances against existing anti-infective drugs.

The literature highlights the importance of cognitive models on the competitive dynamics for established firms (Narayanan *et al.*, 2011; Porac *et al.*, 1989; Kaplan, 2011). For their corporate strategy, established companies analyze the actual competitors in the market; instead, Firm A's founder focused on the absence of competition to verify whether there was room for a new venture.

The literature highlights the relevance of mental models on resources and on competitive dynamics by highlighting the relevance of each individual group (Danneels, 2011; Narayanan *et al.*, 2011; Porac *et al.*, 1989; Kaplan, 2011). The founder's process entailed interactions between the resource analysis and the industry analysis with its two constructs (rivalry and medical need). The determination to start a company stemmed from an analysis of the landscape and related factors – that is: the founder's knowledge (i.e. competences on antibiotics); the fact that people needed antibiotics; that there were no organizations meeting this need; that chemical diversity with a synthetic origin was unsuccessful; and that the founder was able to apply

chemical diversity with a natural origin. The combination of these elements and their interactions made the founder believe that she could implement a successful organization.

Interaction between the two groups of mental models is important because resources are valuable only if they help to achieve a defendable position in the competitive environment (Collis and Montgomery, 1995).

Research and development target

The target for Firm A's founder was based on her resource analysis and her industry analysis. The founder was conscious of the fact that she held competences that were of use to the pharmaceutical industry. She had managerial abilities and scientific knowledge and was aware that in the market there was an increasing preoccupation with infections because large companies were no longer addressing these, focusing instead on other kinds of illnesses. In addition, she knew that pharmaceutical companies were adopting the chemical diversity with a synthetic origin, rather than leveraging that with a natural origin. The founder knew she was able to apply the diversity with a natural origin, and that the diversity with a natural origin could have positive scientific results. The resource and industry analyses revealed to the entrepreneur that she could access an opportunity to reconstruct the "research chain" that, in the past, was managed through the "model of the factory." The construction of a firm comprising members with high credibility and extensive networks would have allowed the company to become a good candidate to access a platform of microorganisms (assets) from another company, which had been bought out without the need for the former company's assets. Firm A's founder explained that the "research chain" had two foundations beyond the platform as follows: the scientific competences and the ties among organizations. Firm A's target was thus very general: to construct a "research chain" through a platform of microorganisms, scientific competences on antibiotics and ties. This general target would have generated many other subtargets related to segments of activities pertaining to the lengthy biotech drug development process and the fight against infections. Indeed, Firm A has two types of activities in its portfolio as follows: it provides results that are used by bigger companies and it conducts its own research. Once the company had set its R&D target, the cognitive and intangible stages ended and the material ones began (Bhave, 1994).

Transactions

Founders activate transactions to realize their vision. Firm A built its technological platform by acquiring microorganisms from the large US company that had acquired the biotech company for which the founder worked. This collection of microorganisms had been held by the company until its acquisition but the US company's management did not consider the organic material to be useful for the company's purposes, and so decided to transfer them to Firm A, under an agreement that Firm A would be a non-profit firm (i.e. would re-invest its profits into the company). The transaction was crucial because it provided a central asset. The collection of microorganisms had a long history that began 15 years before the interview was conducted. The collection was saved and new pieces were added to enlarge the collection itself. At the time of the interview the collection comprised 70,000 microorganisms; it was the output of a historical path that was maintained because of the founder's attempt to continue the path and make it productive. The founder believed that the collection was too precious, and they should have not allowed to waste a precious asset. The relevance of the asset pushed the founder to accept the condition that her company be a non-profit. Because of the importance of the asset, the founder thus made sacrifices in terms of the form the company took. The transaction was driven by the asset specificity (Geyskens

et al., 2006), which enabled the firm to create a competitive advantage (Barney, 1991; Collis and Montgomery, 1995).

The asset transaction was not the only process needed to reassemble the "research chain": ties within networks, which are vital for feeding emerging companies with new resources (Hite, 2003), were also needed.

Networking

Founders also use networking to collect the resources they need. Firm A is involved in a network of organizations that includes, in particular, academic institutions. The network spans both Europe and the USA. One especially successful connection is that with a scientific research center of the University of W. The partner holds technological and chemical platforms that are complementary to the organic collection of Firm A, and are applicable to Firm A's microorganisms. The two organizations have collaborated to generate an integrated platform applicable to every kind of therapeutic area. Firm A participates in conferences at which competitors present their work, with the aim to understand the outputs of its direct competitors. If the management realizes that overly strong competition could harm the company, it seeks to form partnerships with competitors. Therein, agreements are developed that define how intellectual property rights will be divided among the collaborating companies.

Two alternative mechanisms feed the ties between Firm A and its partners. They apply for grants from, for instance, the European Community. In this case, they always define the project segment that each organization is supposed to run, because of the contribution this can provide in terms of knowledge. Each organization receives funds based on the contribution it provides. In the alternative case, the organization looks for a specific partner for a specific purpose and defines an agreement depending on the peculiarities of the work.

Networks provide resources, but the relation also goes in the opposite direction; thus, there is a recursive relationship in the sense that different resource needs at different stages of the company's evolution alter the nature by which ties become, for instance, more varied (Hite and Hesterly, 2001). The relation also consists of constraints, because the company's consolidated network defines the resources available to the company itself and excludes opportunities in terms of new resources to leverage (Ciabuschi *et al.*, 2012).

Building ties with partners that have a good reputation increases other opportunities because it improves the reputation of the company itself (Lechner and Dowling, 2003). Firm A was founded with the aim of sending a message: the organization has the competences and the network. The message was crucial to complete the transaction of the microorganisms that provided the foundation of the company. Thus, the case of Firm A depicts a relation between the network and the transactions such that a good network feeds transactions.

Resource collection

Based on a literature review, Gartner (1985) identified resource collection as a typical entrepreneurial activity. Bhave (1994), in constructing a process model by leveraging data analysis, empirically recognized that behavior is an important action in venture creation. The evidence shows that transactions and networks formed the micro-foundations (Foss and Pedersen, 2016) of the resource collection. From the beginning, Firm A was founded to be a good candidate for receiving a microorganism platform left available following a company buy-out. The network of people involved in founding Firm A was considered an important prerequisite for being a good candidate for these microorganisms; without a good network, it would have been more challenging to access these key resources. The original target of creating a "research chain" required a network, and needed the first significant

transaction to be realized. It also required networking to collect additional resources. The founder wanted to reconstruct a "research chain" that had been built thought the "model of the factory" in the past. That model was no longer reproducible, so another model was designed based on scientific excellence and collaborations. Hence, a number of ties were generated, especially with universities. The collaborations provided other important assets that could be integrated with those of Firm A.

Resources

Resources are needed to construct a company. Firm A's founder worked for several years in a big pharmaceutical company, where she developed technical skills. She subsequently moved to a small company where she developed managerial expertise. She then aimed to leverage those different experiences. She founded Firm A in 2005; the company uses a technological platform comprising numerous microorganisms, many of which have not previously been explored or used in experiments, thus creating a competitive advantage.

Companies use strategic alliances to leverage assets complementary to their own. The sum of assets from companies and their partners create a unique and valuable factor creating differentiation (Ireland *et al.*, 2002). Firm A has an organic platform, but alliances are created to access complementary platforms, including one holding chemical materials. The founder explained that the University of W's research center has two different kinds of chemistry: synthetic and combinatorial. It was possible to apply this chemistry to Firm A's platform because the platforms of the two organizations can interact with one another and create an integrated asset that helps in research for many therapeutic targets.

Practices

Entrepreneurs also set organizational processes (Bhave, 1994). Without practices, resources remain unused. Firm A uses agreements to integrate its own resources with those of partners. These agreements seem to be the main practice used to manage external relations. However, what mechanism is used to regulate processes within the firm's boundaries? Ideas come from the top because the top management makes decisions on the areas in which the firm will operate. These activities take place within a segment in which Firm A is able to perform itself; the other segments are run by partners that have the necessary technologies for those segments. Such activities comprise the initial stages of pharmaceutical developments, and Firm A does not engage in the stages that involve experiments on people. Firm A has 20 people who hold at least a university degree, and the company requires them to use their brains rather than only their hands. Employees need to collaborate, and if they have any ideas based on their backgrounds and experiences, they can present these in a weekly meeting. The ideas are evaluated, and must have a solid rationale that cannot only be scientific. In addition, during the weekly meeting the scientists report the results of their activities; these should correspond to the objectives defined by the research director, who assigns them to the heads of three laboratories that each deal with different fields: the first operates in the molecular biology field, the second one is chemistry-based and the third specializes in microbiology. The research heads, in turn, coordinate the activities of the other employees, communicating to them the tasks they need to perform. Firm A entails a hierarchy because, according to the founder, the strategy comes from the very top of the company, while the tactics used come from the scientific director, who directs and teaches the heads of the laboratories that, in turn, direct the scientists. There is thus top-down coordination, but there is also horizontal coordination. The laboratories, with their different knowledge, interact with each other within the same project. Firm A, therefore, has the structure of a small matrix.

Practices generate capabilities by combining resources to get a target (Amit and Schoemaker, 1993).

Capabilities

Firm A produces results that are deployed by other companies or conducts its own research. Firm A focuses on the first part of the drug development process and frequently works with partners to complete its projects. Overall, drug development follows a long path comprising several stages: the "discovery stage" involves selecting, from several candidates, the molecule that can be used for subsequent stages of the development process; scientists then conduct a "preclinical" stage, which includes experiments on animals; "clinical trials" are split into three phases, with each subsequent phase involving a larger sample of people on which the drug is tested; and during "approval" the agencies regulating the drug's development verify that the drug is safe and can be sold on the market (Sabatier *et al.*, 2010, p. 433; Bruni and Verona, 2009, p. 106). Firm A's focus is at the beginning of this long process. Firm A does not involve itself further because the subsequent stages require more investment and more human resources – that is, it does not require suitable capabilities for these stages. As Amit and Schoemaker (1993, p. 35) stated, "firms may build such corporate *capabilities* as highly reliable service, repeated process or product innovations, manufacturing flexibility, responsiveness to market trends, and short product development cycles." While Firm A does not have the capabilities to manage the more advanced stages of drug development, it does create, frequently in partnership, the capabilities to position itself at the beginning of the process.

In Firm A, weekly meetings in which attendees report on their performance reveal the presence of a management control system (Simons, 2014) that aims to push the organization toward meeting its targets. These targets are both financial and social, where social entrepreneurship is oriented toward not only creating profit but also meeting primary needs (Thompson and MacMillan, 2010).

Social impact

Biotech companies target social needs. Firm A was founded using public resources because it aims to develop the first stages of drug discovery, with quite low costs, to meet a public medical need that arose when infections became stronger. The firm was founded and the top team runs it because the founder identified a public need generated by the fact that existing antibiotics were not strong enough to fight dangerous infections.

From the interview with Firm A's founder, an interesting issue emerged. According to the interviewee, the big pharmaceutical companies ceased to develop antibiotics because these drugs kill the infection and cure patients, who then no longer need the drugs because they have recovered. This was not a lucrative scenario for big companies, especially when the antibiotics market is compared to the market pertaining to lifelong illnesses. In this market, the patient needs medicines throughout their lives, and companies can thus make more money by selling drugs for several years, rather than for a few days as in the case of antibiotics. This is why the big companies preferred to invest in research on lifelong illnesses, rather than that on infections; however, people were becoming increasingly concerned as damaging infections became more prevalent. Companies such as Firm A have aimed to repair the poor economic logic by investing in cures for infections.

Entrepreneurship not only can be driven by selfish purposes but also can be driven by the will to make something for other people. Nevertheless, social entrepreneurs also have economic targets (Gruber and MacMillan, 2017; Dacin *et al.*, 2011). Social entrepreneurship always seeks to create social value, but the organizations can have different priories. Companies such as Grameen Bank target social value as the first objective and use their

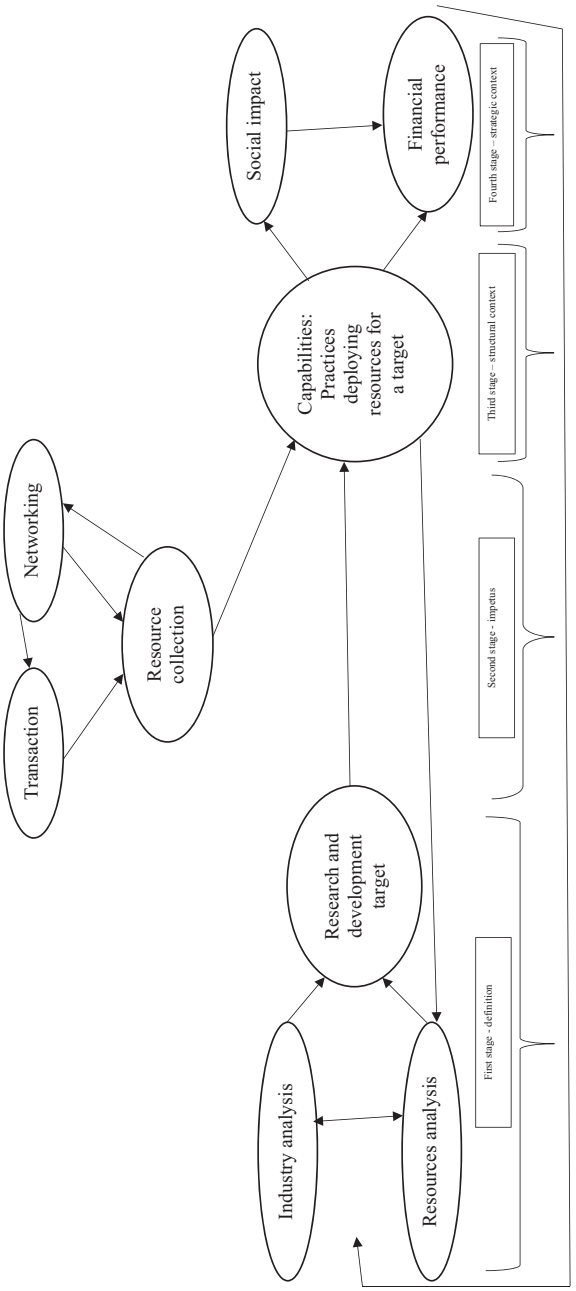

Figure 1.
Biotech business founding process model

profits to survive and pursue this primary target. Companies such as Microsoft, conversely, have financial performance as their first target but are also able to create a positive impact for society (Acs *et al.*, 2013). Founders of small biotech companies desire to create profitable organizations but leverage a social need to do so.

Financial performance

Founders persevere to generate financial returns. Firm A generates intellectual property that is transferred to a for-profit company, which allows Firm A's intellectual property to be developed because it requires a huge amount of resources for the next stages of drug development. For these stages the public funds financing Firm A are not sufficient; however, Firm A cannot attract private funds because it is non-profit, and investors are not interested in non-profit companies because these cannot return profits from the investment. This model allows intellectual property to be developed in the first stage via a few investments in the sense that the majority of funds come from public institutions. It also allows the development of intellectual property through private funds when necessary. In the case of Firm A, the for-profit company and Firm A share profits anyway because the for-profit company returns money to Firm A by means of milestone royalties. In addition, there is a huge overlap between the owners ("industrial partners") of Firm A and the owners of the for-profit company. The latter owners get the economic benefits of Firm A's activity because Firm A gets profits from the for-profit company, which leverages the intellectual property of Firm A.

Firm A reinvests its money into research, which connects financial performance with the initial analysis and makes the model recursive.

Discussion

This paper formulates a process model of firm creation (Bhave, 1994) in the specific context of the biotech industry, encompassing various important variables that could be overlooked by using a single framework (Amit and Zott, 2001). The paper follows the process model tradition started by Bower (1970), who explained resource allocation in large companies. Many other contributions have been made to modeling strategy (Burgelman, 1983, 1994, 1996; Corley and Gioia, 2004; Gioia and Chittipeddi, 1991). Particularly, Burgelman's contribution connected resource allocation to an evolutionary view of the firm (Bower, 2005). Because of the importance of Burgelman's contribution the model of resource allocation is referred to as the B-B model. In turn, Burgelmen's (1983) contribution inspired a significant model in the entrepreneurship field. The model explains venture creation through an inductive study (Bhave, 1994) on the "trade and distribution business," "financial services and management consulting services," "computer-based services" and "electronics and technology-based design and manufacturing" (Bhave, 1994, p. 227). The current paper comprises a further attempt to explain venture creation within the B-B tradition, but moves the focus to a specific context: the modern biotech industry. It does so for two reasons. First, the biotech industry is relevant from an economic perspective (Ernst and Young, 2011) and a public health perspective. Second, moving the focus to specific industries is important because forces impacting business vary across contexts (Bhave, 1994; Jacobson, 1992).

The process model derived in this study is depicted in Figure 1.

Resource analysis (Barney, 1991; Collis and Montgomery, 1995; Wernerfelt, 1984) and industry analysis (Porter, 1985) are conducted to formulate an R&D target. As noted by Bhave (1994, p. 229):

> The decision to start was therefore followed by a search to align the prospective entrepreneurs' knowledge, experience, skills and other resources with market needs [. . .]. Once entrepreneurs

had focused on respective business concepts, they could easily articulate aspects of their ventures that distinguished them from those of others in the same field.

Resource analysis helps with founding because the entrepreneur needs to identify whether they hold the resources necessary to actually build a company. If the entrepreneur is not confident that they have strong resources, they will not continue along the entrepreneurial process because of the risk of failure. From an economic perspective, a resource analysis is an important prerequisite for creating wealth: only the possession of valuable resources can enable the entrepreneur to implement their strategy and be successful. Industry analysis is also important for the entrepreneurial process to continue. Entrepreneurs often feel uncomfortable with an overly high level of competitive pressure, and give up on their entrepreneurial project in the face of this pressure. Entrepreneurs need to represent market rivalry through mental models. Industry analysis is also important for more concrete reasons: a project that is not based on analysis of competitors might face an unsustainable competitive landscape, and therefore, fail to achieve good financial performance in the future.

During the first stage of venture creation, resource analysis and industry analysis interact. The entrepreneur evaluates available resources by thinking about the industry: the resources are valuable only if they help to satisfy market gaps left by competitors (Collis and Montgomery, 1995). During this first stage, the process unfolds along a cognitive dimension (Bhave, 1994). In the second stage, the entrepreneur collects resources (Bhave, 1994; Gartner, 1985) by conducting transactions and networking. This is a central process for implementing the R&D target. The company can only collect resources if it buys them or "borrows" them through ties with other companies. From an economic perspective, transactions allow entrepreneurs to hold resources that are exclusive and differentiate the company's product for a durable competitive advantage. Networking allows entrepreneurs to access assets that may not be affordable otherwise. They may be very expensive and damage the financial performance of the company. This process is recursive: the need for new resources changes the network to make new resources available (Hite and Hesterly, 2001). In addition, networking with partners that have a good reputation creates opportunities (Lechner and Dowling, 2003), including the possibility to acquire resources from the market. Networking thus generates transactions.

Bhave (1994, p. 233) stated:

> Organization creation occurred in parallel with the set-up of production technology for all ventures. Organization creation refers to the building of the physical structure as well as organizational process that surround production technology at the core (Thompson, 1967).

In the third stage, resources are employed via practices to create capabilities (Amit and Schoemaker, 1993): practices combine the resources and enable them to produce operations. Without practices, resources will remain static and will not create revenues. Here, the model is again recursive because capabilities generate a new representation of resources: the process then returns to the resource analysis (Eggers and Kaplan, 2013). As Bhave (1994, p. 238) comments, "this conceptual process is iterative, continues even after a venture is in existence." During the founding process it is crucial to activate learning mechanisms to be successful (Aldrich and Yang, 2014). The fourth stage pertains to the company's social impact and financial performance. Without a social impact, the founders and the organization will not find the incentive they need to continue and grow. In addition, the company will not have revenues because it is not providing products that meet public medical needs (interaction between the social impact and financial performance). Financial performance is also important because companies can only survive if revenues are larger than costs (Acs *et al.*, 2013). Moreover, profits can be reinvested into the company for new

entrepreneurial projects, again via a recursive mechanism. In addition, the cognitive function is iterative because it is conducted by management once the firm obtains a concrete form (Bhave, 1994). Another recursive mechanism may stem from the end of each project. Here, entrepreneurs may evaluate the project to identify whether they have learned from it, and develop mental models (on the developed resources) that are used to judge future projects; on the bases of analogy with previous projects, they become engaged only in projects that help to develop the firm's competences.

The B-B model has four stages, namely, definition, impetus, structural context and strategic context (Noda and Bower, 1996). The model helps to better frame the empirical themes captured by the data analysis – that is, resources analysis, industry analysis, transactions, networking, resources, practices, social impact and financial performance. In turn, this enables delineation of the shape of the B-B model's stages in the case of biotech business founding. The bottom of Figure 1 shows how the empirical themes are located within the stages of the B-B model. In biotech business founding *definition* often comes from the operational work of specialists who identify a business opportunity. Working for established companies in the life science sector, scientists have the chance to identify valuable resources that they may be able to make productive via a new venture. In addition, they already understand the industry and have insight as to whether the available resources can generate a business opportunity with a sufficient market space. In biotech venture formation, the *impetus* stage arises when the entrepreneurs need to find resources; they do not ask top managers for these resources, as in Bower's (2005) model, but instead involve other organizations in transactions and networking to collect what they need. In Bower's (2005) model the impetus comprises an analytical process: top managers analyze the assumptions of the project and the credibility of the middle managers proposing the project (Bower, 2005). In biotech venture creation the impetus is based on the ability to strengthen connections with other organizations with the aim of networking and conducting transactions to access resources. In the Bower's model there is a selection between different projects (Bower, 2005), in the biotech business founding there is no selection: entrepreneurs collect resources to continue with their single entrepreneurial project. Following the impetus stage, in biotech venture formation the structural context arises from generating practices – that is, roles, targets, hierarchy and control mechanisms. In Bower's (2005) model, the existing structural context affects definition and impetus. In biotech business founding the company's ultimate target of making a social impact defines what the company is; this aligns with the strategic context of the B-B model.

Burgelman (2005) explains that the strategic context can be modified through an evolutionary path. Biotech entrepreneurs set R&D targets: the venture formation does not seem that evolutionary. Decision-makers lead business formation based on intentional behavior. This also occurs in other industries (Bhave, 1994).

In Gioia and Chittipeddi's (1991) model, which was created for a large public university, there is not only a top-down flow of communication but also the intervention of stakeholders in strategy change. Conversely, in the biotech entrepreneurial process, the strategy formulation seems to be driven by the top team, without intervention from stakeholders.

Bhave's (1994, p. 227) venture creation model was built on an analysis conducted on industries including "trade and distribution," "financial services and management consulting services," "computer-based services" and "electronics and technology-based design and manufacturing." In Bhave's (1994) model, entrepreneurs identify opportunities and filter them in relation to their knowledge and skills; subsequently, entrepreneurs develop business concepts with reference to market needs. The process goes from the opportunity to resources and from the industry to the business concept (Bhave, 1994).

Conversely, in the biotech industry the process appears to run in the opposite direction: from available resources and industry analysis to R&D targets. Entrepreneurs first focus on the available resources and industry analysis to identify whether these resources can be used to occupy interesting market spaces. In particular, entrepreneurs look for what they can do in relation to available resources, but do not necessarily eliminate opportunities based on abilities they lack. In Bhave's (1994) model entrepreneurs clarify their business idea by highlighting the differences between their idea and what competitors already provide on the market. Conversely, in the biotech model industry analysis appears to test entrepreneurial opportunities, and entrepreneurs then decide whether the opportunities are compatible with the reality of the industry – that is, what competitors provide and what customers need. In Bhave's (1994) model the passage from business concept to physical commitment corresponds to a shift from an immaterial and conceptual process to a physical one; this is also true in the biotech model, wherein the cognitive process of the first stage finishes and a concrete process starts. Likewise, in Bhave's (1994) model resources are collected, and this is also the case in the biotech industry. The current study, in an attempt to provide a fine-grained analysis, also shows that in the biotech industry resource collection occurs through transactions and networking. Specifically, the findings reveal that biotech companies leverage external processes. In addition, it shows that some resources can become part of the company's "physical structure" (Bhave, 1994) through transactions, while other resources are provided flexibly by networks, without becoming a constant and rigid part of the company's "physical structure." The biotech industry exhibits not only the construction of internal assets and the internal formalization of tasks (Bhave, 1994) but also external resources from ties, where these ties also feed practices from outside by providing resources deployed through practices. In the biotech model "organizational processes" (Bhave, 1994) are also present, but the biotech model specifies that practices deploy resources for a target, which defines what the company is able to do – that is, its capabilities. In addition, in Bhave's (1994) model it seems that "production technology" and "organization creation" are built to facilitate series production of a previously developed product; in the biotech industry the majority of effort often goes toward accessing resources and creating practices that are oriented to creating a complex new product. In Bhave's (1994) model entrepreneurs get feedback from the market to improve and to change the business concept before starting production, and once production begins (Bhave, 1994); in the pharmaceutical industry, at least during the preclinical stage, processes are driven by R&D people without interactions with marketing people, who do know what consumers need (Bruni and Verona, 2009). In the present study it seems that, often, when biotech companies are developing their products, they are focused on technical aspects and effective execution from a technical point of view, without seeking feedback from the market. Once development is complete, if the companies do not obtain good results they often do not have much opportunity to change the original R&D target; thus, they must start again with a new R&D target. Often there is no feedback from the market to modify the original target, but significant recursive mechanisms can come from the financial performance feeding new projects and from learning processes: at the end of a project manager can analyze the project itself, therefore, they can change the mental models used to evaluate the opportunity to invest in future projects.

Bhave's (1994) model emphasizes the relevance of the first sale because it provides a concrete market response to the business concept. That is, the first sale generates feedback for the company. In the biotech industry, the relevance of the first sale seems less evident. Companies can develop the first stages of a drug and can sell the results thereof, based on which the drug may be developed further by other companies; sell the drug to another company for production; provide tailored services to other companies and focus on differ

services later on; or develop health care devices and leverage the revenues therefrom to develop new molecules. Thus, they do not necessarily run a series production; their activities can be chaotic, with multiple market segments. The outputs of their activities are also not necessarily linked to subsequent outputs; thus, the first sale does not necessarily affect what happens next.

Another important model is the model developed by Corley and Gioia (2004). In a spinoff of a Fortune 100 firm, identity modification seemed to be a crucial element, and the top team made great efforts to create a new identity (Corley and Gioia, 2004). On the other hand, in the entrepreneurial process, the most significant aspect for the top team is the implementation of a clear entrepreneurial project.

In corporate venturing, resources and capabilities are part of the "pro-entrepreneurship organizational architecture" proposed by Ireland *et al.* (2009, pp. 24-25). In established companies, the selection of routines and assembling of capabilities are fundamental processes to foster renewal (Eggers and Kaplan, 2013). For founders, of key importance is external resources. These can be bought or borrowed from partners; in start-ups, the focus is on the transactions and networks applied to construct resources that are unavailable.

Social entrepreneurs have developed initiatives in many fields such as nutrition for animals, nutrition for people, medical systems, training for employability (Thompson and MacMillan, 2010), credit systems, software (Acs *et al.*, 2013) and wages for underdeveloped areas (Corner and Ho, 2010). In all such business fields companies have specific targets, in the sense that they want to meet social needs through their own activities; however, in the biotech industry companies often target an intermediate social aim, conducting the first stages of a drug development process that will hopefully then be furthered by clients of their companies. These initial stages are distant from the market and are less desirable for companies who are more oriented toward profit. Small biotech companies try to help the public because they want to create results that are interesting to big companies, which, in turn, see in the small companies' results opportunities that can be leveraged; thus, small companies' results allow large companies to grow. The large companies' drugs might be useful for improving public health and would have gone undiscovered without efforts from these small biotech companies.

Social entrepreneurship is oriented toward selling products on the market in a particular field (Acs *et al.*, 2013; Corner and Ho, 2010; Thompson and MacMillan, 2010). Often, biotech companies do not sell the product on the market, but rather aim to sell intellectual properties for royalties on future revenues or future developments. The reason for this is that they do not seek to create a final product, as the creation of final products incorporating their results might be unsuccessful. They thus settle for royalties rather than immediate profit because they have to share the risk within future development stages, which could lead to success or to failure.

Contribution to the literature on technology transfer and knowledge sharing

According to Radosevich and Lombana (1993), universities should conduct more applied research to better help the private sector. Evidence from the cases in this research also shows that in public–private sector relations efforts move in the opposite direction. Private initiatives help to further develop scientific results from the public sector and push them toward the market. They also provide managerial competences to make public investments productive. Academic research is oriented toward publications and does not have an inclination toward the market results that can be obtained with the private sector's intervention. Evidence also shows that private entrepreneurship helps to identify and discover scientific competences cumulated over decades in academic systems. These competences might have been lost without private sector partnership or might not have been oriented to the market's needs for social impact. Potential and current entrepreneurs in biotech should analyze the competences present in the academic world and provide the managerial support necessary to orient these competences toward patients' needs.

There are four models of universities' technology transfer in the literature as follows:

(1) an established company acquires the technology from the university laboratory that developed the technology;

(2) a venture capitalist acquires the university's technology;

(3) a company creates technology and leverages the university's competences to improve the work already done (Harmon *et al.*, 1997); and

(4) a spin-out company is created (Harmon *et al.*, 1997; Lockett *et al.*, 2003).

This work's findings show a slightly different form of technology transfer: a private company is created to further develop the university's projects. The university gets royalties on the future results of the technology development, royalties represent the price that the private company pays for the project. Nevertheless, its relations with the university continue, and the partnership remains a central driver of the project's development. This form has two advantages: the technology can be developed because of private funds, but the company still leverages competences from the universities.

This work's findings also show interesting elements of networking. The literature considers knowledge and its features as a central factor to explain the boundaries of the firm. Depending on the knowledge features, the company can choose (Grant, 1996; Liebeskind *et al.*, 1996; Smith and Zeithaml, 1996) either "the internalization within the firm, market contracts, [or] relation contracts" (Grant, 1996, p. 383). Networks for accessing knowledge not only define the boundaries of the company but also define the creation of the company. Networking enables more efficient transfer of competences (Grant, 1996), affects firm performance (Dyer and Nobeoka, 2000) and defines the chances that a company has to survive (Uzzi, 1996) but primarily helps to implement entrepreneurial projects.

Social capital is an important antecedent to the acquisition of knowledge assets (Inkpen and Tsang, 2005; Mu *et al.*, 2008) for the founding of a company. Biotech entrepreneurs construct their knowledge assets portfolios because of their social relations from past experiences (Ciao, 2018b).

Mu *et al.* (2008, p. 86) stated:

> Through interactions with other firms and partners; firms can achieve a better understanding of industry benchmarks and competitive trends. Firm interactions are also sources of knowledge (Nahapiet and Ghoshal, 1998).

The biotech cases confirm the relevance of networking to accessing information and performing benchmarking; of particular importance in testing competitors' advancements in the networking conducted at conferences, where it is possible to identify whether competitors are pulling ahead of the focal company. If competitors seem too strong, the evidence shows that top management aims to instigate collaborations and turn a dangerous competitive relation into a partnership (Ciao, 2018b).

Knowledge sharing generates concerns because the knowledge that companies lose might be more significant than that obtained from their ties (Spencer, 2000). Biotech entrepreneurs do not seem to have particular concerns about networking and are very open to partnerships. Sharing with partners appears to be key because it is very challenging for biotech startups to access resources alone. They look for collaborations without placing too much concern on the risks of losing their knowledge. What really matters seems to be the generation of opportunities by means of assembling knowledge assets, rather than protecting those assets.

Limitations and suggestions for further research

This paper contributes to the literature on process models (Burgelman, 1983, 1994, 1996; Corley and Gioia, 2004; Gioia and Chittipeddi, 1991). It shows how founders construct their companies (Bhave, 1994), but does so based on the biotech industry, as there have been calls for management studies on specific contexts (Bhave, 1994; Jacobson, 1992). As an extension of this research, it would be interesting to construct process models to specifically delineate how companies are created in other industries.

The paper also contributes to the knowledge sharing literature. It argues that entrepreneurs are not overly concerned with transferring opportunities along with knowledge; instead, they concentrate on fostering collaboration because this is the only way to implement new business ideas. Indeed, it is the implementation of these ideas that entrepreneurs really care about. It would be interesting to conduct quantitative studies in the future to evaluate the adverse effects of knowledge sharing conducted during the founding stage.

Notes

1. An early version (Ciao, 2018a) of this paper was included in the 2018 United States Association for Small Business and Entrepreneurship (USASBE) annual conference proceedings, which were published in January 2018. The proceedings were posted on the USASBE website in January 2018. 2018 USASBE Annual Conference's Call for Engagement (USASBE, 2017, p. 1): "Deadline for all sessions is October 15, 2017", "Deadline for all Proceedings is December 15, 2017".

2. This paper is one output of the author's analysis of a qualitative data set, which was constructed to inductively capture the dynamics of the biotech industry in a context populated by entrepreneurial companies (Ciao, 2011, 2012a, 2012b, 2012c, 2012d, 2014a, 2014b, 2017a, 2017b,2018a). For this paper, the author reanalyzed the texts of interviews conducted previously, and recoded them using a different method. In particular, the author shifted from Miles and Huberman's (1994) approach, which was used in a paper published in the *Journal of Global Business and Organizational Excellence* (early versions: 2017 International Forum on Knowledge Asset Dynamic (IFKAD) proceedings and 2017 European Academy of Management (EURAM) annual conference proceedings), to that of Gioia *et al.* (2013) in codifying the data. The latter approach allows first-order codes to be merged into second-order codes, which can, in turn, be merged into theoretical dimensions. In addition, Gioia *et al.* (2013) method enables the identification of links among the words of the dimensions, making it especially useful for building a process model (Corley and Gioia, 2004). Nevertheless, the first-order codes from Gioia *et al.* (2013) method and the results of the meta-matrix based on Miles and Huberman's (1994) approach (Ciao, 2017a, 2017b; 2018b); almost coincide. The latter were previously used to gain an understanding of the value drivers in the biotech industry (Ciao, 2017a; 2017b; 2018b); the former are used here to explore the main steps of the process model. In addition, some dimensions and second-order codes from Gioia *et al.* (2013) method had already been identified by interacting data with the literature in the present author's previous works. In particular, those works highlighted the relevance of transactions and networking for collecting resources, along with the importance of practices.

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