

Organizational survival of technology-based enterprises after incubation: a qualitative comparative explanation

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Abstract

Purpose – To analyze the configurations of legitimacy, dynamic capabilities, and business resources consistent with the survival of post-incubated companies.

Theoretical framework – “Liability of newness” highlights that nascent companies suffer from factors that hinder their survival. However, business incubators help to develop nascent businesses. This paper seeks to show how different configurations between legitimacy, dynamic capabilities, and resources can form a strategic orientation for survival.

Design/methodology/approach – The strategy of multiple case studies was applied to 90 companies and the techniques of fuzzy set qualitative comparative analysis (fsQCA) were used.

Findings – The results present two configurations of technology-based companies with high perceptions of legitimacy, resources, and dynamic capabilities that differ by size and satisfaction. A third configuration of technology-based companies has high perceptions of legitimacy and resources. A fourth configuration involves technology-based companies with high perceptions of legitimacy, a larger size, and satisfaction with the incubator.

Practical & social implications of research – For managers, the results make it possible to create an incubation environment that is able to identify and fill the individual gaps of the enterprises. In addition, they indicate that business incubator managers and/or funders should focus their efforts on the incubation of technology-based companies.

Originality/value – The first is to reinforce the central role of legitimacy for survival. The second is to show that the interrelationship between legitimacy, resources, and dynamic capabilities forms resilient organizational configurations in different ways.

Keywords: Liability of newness, enterprise configuration, post-incubation, organizational survival, fsQCA.

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I Introduction

The central assumption of “liability of newness” (LoN) is associated with the high failure rate of enterprises in the early stages of their creation (Stinchcombe, 1965) for internal reasons, such as the need to learn new skills, functions, and routines, and also for external reasons, such as the lack of links and legitimacy with stakeholders (Wiklund et al., 2010).

The literature shows that LoN affects enterprises through both internal and external factors. Among the internal factors, the absence of operational routines and the need to establish new roles and organizational learning stand out. On the other hand, external factors include the difficulty of accessing critical resources and establishing links, as well as low knowledge of norms and laws (Abatecola et al., 2012; Stinchcombe, 1965).

To overcome LoN, entrepreneurs must first attract, integrate, and transform resources to create an organizational capability that allows them to exploit an opportunity and subsequently establish their own legitimacy as founders, as well as that of their new venture, in order to access the resources they lack, such as funding, employees, supplies, customer demand, and government approvals (Pereira, 2022; Zhang & White, 2016).

In this sense, incubators can be strategic and important means to achieve these objectives (Grilli & Marzano, 2023). Business incubators are organizations that support the creation and growth of new enterprises, which can be technology-based or traditional, by providing tangible resources such as physical space, equipment, and administrative services, as well as intangible resources, such as knowledge and access to their social capital and networks (Hausberg & Korreck, 2020), in order to mitigate the impacts of LoN (Breivik-Meyer et al., 2020).

The impact of incubator performance has been the subject of recent research. A study by Grilli and Marzano (2023) showed that incubators are key elements in the formation of social capital and legitimacy in technology-based enterprises, which favors company success. However, they found significant differences between academic and public incubator approaches. On the other hand, the work of Ocampo et al. (2019) showed that the strengths related to incubators for technology-based enterprises involve innovation projects for the design of new products, investment plans in research and development, the exchange of know-how, and the use of technological capacity, while the weaknesses involve low performance in the application

of procedures to study market opportunities and identify points of improvement in the offer (Ocampo et al., 2019). These findings have shown that incubators have a relevant, but still improvable, role in dealing with firms’ LoN.

This study seeks to make a configurational contribution to the literature on the importance of incubators in the development of new firms, adding to studies that have analyzed the survival of post-incubated firms (Grilli & Marzano, 2023; Mas-Verdú et al., 2015; Oliveira et al., 2019; Schwartz, 2009; Schwartz, 2013; Tumelero et al., 2016).

The originality of the configurational approach is justified because previous works identified in the literature review have focused on analyzing the direct and/or indirect contributions of incubators, but not the combinations of organizational configurations that would lead to the success of the firm in a post-incubation context. For example, Schwartz (2009) found evidence that enterprises that went through the incubation process faced a high-risk period in the first three years after graduation. On the other hand, Tumelero et al. (2016) demonstrated the existence of a relationship between the resources provided in the incubation process and the survival of the enterprises. Oliveira et al. (2019) demonstrated the importance of learning in terms of formalizing work processes in incubated enterprises.

However, no proposals were found to analyze the possible configurations in relation to post-incubated technology-based enterprises. Given such assumptions from previous studies on the contribution of incubators to nascent businesses, for the purposes of this article we assume that the post-incubation period may represent a differentiated “early” stage, in which theoretical issues related to LoN can be revisited and reinterpreted in search of comparisons and strategic insights, given the specificities of immersion in incubation environments prior to final market insertion (Oliveira et al., 2019; Tumelero et al., 2016).

Given the theoretical limitations in explaining the organizational configurations consistent with the survival of post-incubated firms, we intend to answer the following question: *How can the contingency factors of post-incubated firms be configured with legitimacy, dynamic capabilities, and resources to generate protection against liability of newness?*

To this end, the objective was to analyze the configurations of legitimacy, dynamic capabilities, business resources, and contingency factors (being technology-based, satisfaction with the incubator, and size of the firm) consistent with the survival of post-incubated enterprises. Technology-based enterprises (TBEs) are characterized by higher technological risks (Tumelero et al., 2018), differentiating

them from traditional enterprises. Depending on the sector in which they operate, TBEs require a greater contribution of financial capital from their investors (Tumelero et al., 2016). The higher risk and capital requirements mean that TBEs derive critical and specific benefits that may not be realized in the incubation of traditional enterprises.

Therefore, this research is aligned with the configurational approach of strategy studies (Mintzberg et al., 2009) and adopts a specific focus on the post-incubation period. The interest of this research is to contribute to the literature by proposing that different configurations between legitimacy, dynamic capabilities, and resources, aligned with contingency aspects such as being technology-based, satisfaction with the incubator, and size of the firm, can provide post-incubated enterprises with a strategic orientation capable of assisting in the development of protection against LoN.

The originality of this research lies in the advancement around the theoretical modeling of strategy for organizational survival, explaining the overcoming of LoN through the construction of legitimacy and access to resources. In addition, it adds the adaptive perspective of dynamic capabilities to (re)structure organizational configurations capable of creating business protection for the enterprise in the early stages. Furthermore, this research intends to present different ways to achieve survival, taking advantage of the equifinality characteristic of configurational methods that employ fuzzy set qualitative comparative analysis (fsQCA).

It also aims to contribute to the managerial activities of both incubators and incubated enterprises. For incubators, it reinforces the importance of promoting the development of legitimacy and capabilities during the incubation process, already identified in the literature by Borges and Bueno (2020). For incubated enterprises, it presents different configurations in which they can organize themselves to achieve competitiveness after incubation and keep their ventures active.

2 A configurational approach to post-incubation survival

Configurational approaches are based on the fundamental premise that attribute patterns have different characteristics and lead to different outcomes depending on how they are organized (Fiss, 2007). In this sense, organizations can be viewed from the perspective of theoretical and configurational multiplicity. Theoretical multiplicity refers to a situation in which the phenomenon under study is best understood from more than one

perspective. Configurational multiplicity refers to a situation in which, even within a theoretical perspective, different configurations capable of achieving the desired result can coexist (Park et al., 2020a).

Configurational theory proposes a break from the linear paradigm by assuming complex causality and nonlinear relationships in which the causal variables related in one configuration may be unrelated or inversely related in another (Fiss, 2007). A set-theoretic approach is uniquely suited to analyzing this type of complex configurational relationship, as it explicitly focuses on combinations of attributes and enables a sophisticated analysis of causal relationships (Frambach et al., 2016; Mintzberg et al., 2009; Ragin, 2000, 2008).

Due to its multidimensional nature, the configurational approach is particularly relevant to the study of strategic management (Fiss, 2007) and has been applied in recent studies on start-ups (Carraro et al., 2019). Miller (1996) states that strategy is concerned with how enterprises can achieve a correspondence between structures, activities, and the environment, suggesting that configuration is the very essence of strategy. Thus, the theoretical model presented is based on configurational theory (Miller, 1996) and contingency adjustment (Drazin & Van de Ven, 1985).

Miller (1996) proposes that post-incubated enterprises need to promote the legitimacy of their business, access different types of resources, and modify their processes and resource base through their dynamic capabilities in order to overcome the difficulties imposed by the environment. Thus, legitimacy, resources, and dynamic capabilities, aligned with the contingency aspects of size, satisfaction, and technological innovation, would theoretically constitute, in an interdependent way, organizational configurations that would lead to the survival of the enterprise in the long term, as shown in Figure 1.

According to Barney (1991), organizational performance is built through the acquisition and organization of resources and capabilities, which are configured in valuable and unique ways and are heterogeneously distributed across organizations. Some scholars argue that resources and capabilities are intertwined, although they are distinct concepts (Amit & Schoemaker, 1993; Hoopes et al., 2003). Capabilities refer to the ability of a firm to employ resources, usually in combination, using organizational processes to affect a desired outcome (Amit & Schoemaker, 1993). While resources are negotiable, non-firm specific, and have no effect without organizational processes, capabilities are deeply embedded in organizational

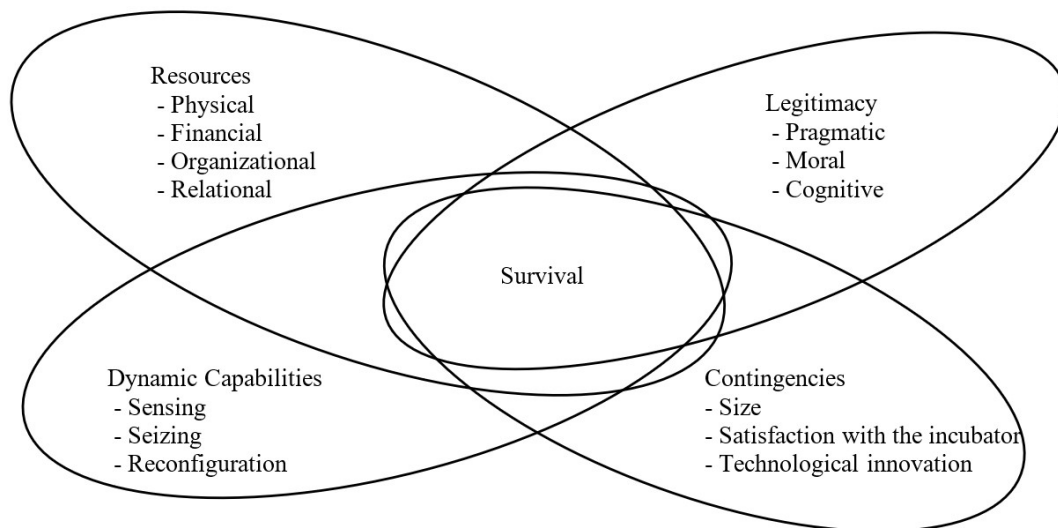


Figure 1. Proposal of factors for the survival of post-incubated enterprises

Source: Prepared by the authors

processes, and ownership of a capability cannot be easily transferred from firm to firm (Hoopes et al., 2003).

Dynamic capabilities and its micro-foundations (Teece, 2007) become a source of competitive advantage not as independent individual elements but as configurations of organizational resources, technologies, and competencies (El Sawy et al., 2010; Teece et al., 1997). Thus, a configurational approach better supports this view of organizational strategic competitiveness by explaining how organizational and environmental elements combine in settings to form the outcome of interest (Park et al., 2017).

Legitimacy, on the other hand, has been recognized as a central construct in the strategic management literature and is essential for obtaining the necessary resources for the survival and growth of organizations, particularly new ventures and entrepreneurial organizations (Alexiou & Wiggins, 2019). For the purposes of this research, legitimacy is understood as the congruence between the values, norms, and expectations of society and the activities and results of the organization, a condition that reflects alignment, support, and consistency with relevant rules and laws (Zimmerman & Zeitz, 2002).

Previous studies have examined the effect of size at the beginning of the firm's life cycle on firm survival (Agarwal & Audretsch, 2001; Mas-Verdú et al., 2015). Larger start-up ventures are more likely to grow than small start-ups, thus establishing a minimum size at which firms are likely to survive (Fritsch et al., 2006). Park et al. (2020b) used the number of employees to measure firm

size in configurational studies. They used the size of the company at the end of the incubation period, measured by the number of employees, as a contingency factor.

Some studies show that ventures do not make the most of incubator resources, which could partially explain the mortality of some enterprises during the incubation period (Van Weele et al., 2017). For example, while incubators organize training and coaching programs for entrepreneurs to acquire the necessary knowledge, participation in these sessions tends to be low (Patton, 2014). Similarly, incubators allow entrepreneurs to network with peers and external actors, but many entrepreneurs do not engage in these networking activities (Hausberg & Korreck, 2020). These training deficits can lead to the failure of enterprises in the first few years after graduation, resulting in the LoN phenomenon. The alignment between the entrepreneur's needs and the services offered by the incubator increases the entrepreneur's satisfaction with the incubator. Thus, satisfaction with the incubator is treated here as a contingency aspect.

Public policies to promote entrepreneurship are broad in scope, but there is an emphasis on the development of new technology-based businesses. In Brazil, policies to foster innovation and technological development include the promotion of technology-based enterprises (TBEs), especially when placed in an incubator environment (Iacono et al., 2011).

By promoting creative destruction, TBEs become important triggers for technological innovation

(Tumelero et al., 2016). The innovation capability of enterprises, immersed in a global competitive environment, can be considered one of the key factors in the search for competitive advantage and organizational survival (Oliveira et al., 2016). Thus, technological innovation is treated here as a contingency factor that differentiates technology-based enterprises from non-technology-based ones, as proposed by Del Sarto et al. (2020).

In the light of the theory that highlights the contributions of legitimacy, dynamic capabilities, and resources to the survival of organizations, and considering the relevance of innovation driven by technology-based enterprises in the post-incubation context, the following proposition can be developed:

Proposition: Combinations of contingency factors - being technology-based, satisfaction with the incubator, and size of the firm - associated with legitimacy, resources, and dynamic capabilities can result in organizational configurations with greater protection against liability of newness in post-incubated ventures.

3 Data and empirical strategy

The data collection instrument was developed to capture the perceptions of managers and/or business owners who have gone through the incubation process regarding legitimacy, dynamic capabilities, and business resources.

The legitimacy construct had as its starting point the initial items of the scale of individual perceptions of pragmatic, moral, and cognitive legitimacy proposed by Alexiou and Wiggins (2019). The dynamic capabilities construct had as its starting point the initial items of the measurement proposal elaborated by Garrido et al. (2020). For the resources construct, the items of the instrument were based on the study by Borges and Bueno (2020). The construction of the items was also supported by works such as those of Bayon and Aguilera (2020), Paradkar et al. (2015) and Van Weele et al. (2017).

Initially, the proposal by Alexiou and Wiggins (2019) went through the process of double translation by two PhD holders in the field of administration with fluency in English. Subsequently, the translated items were listed together with the dynamic capabilities and resources items and a reflective analysis was performed with the

aim of grouping the items with semantic similarities to reduce the amount, which resulted in 29 items.

Then, an instrument was developed and submitted to a pre-test with five PhD holders in the field of administration, in order to perform a semantic analysis and identify possible difficulties in understanding. After making the proposed corrections and adjustments, the instrument was submitted to an analysis by experts or judges (Pasquali, 2011).

To select the judges who participated in the analysis, a search was conducted on the Scientific Periodicals Electronic Library (SPELL)[®] platform for the most cited articles in the field of strategy and entrepreneurship. Authors with a PhD were selected for the sample. The 29 items were then randomly listed and the experts were asked to judge the relevance of each item to the legitimacy, dynamic capabilities, and resources constructs. A total of 11 responses were obtained.

After identifying the disagreements among the experts, a semantic-reflexive analysis was performed on each item to identify the words and/or excerpts that may have led the experts to disagree and/or show low agreement in associating each item with a construct. This semantic-reflexive analysis resulted in 16 items, of which five were related to legitimacy, six to dynamic capabilities, and four to resources.

The 16 items were grouped (see Appendix A. Supplementary Data 1 – Questionnaire) on a 5-point Likert scale, along with 15 questions related to the enterprise profile and the Free and Informed Consent Form (FICF), which was submitted as a pre-test to the analysis of six entrepreneurs who had incubated projects and one incubator manager. After adjusting the items according to the pre-test considerations, the instrument was finalized.

In order to build a model applicable to graduated enterprises, a selection of public academic incubators located in the Southeast and Midwest regions was first carried out. This identified 15 incubators that had graduated enterprises for at least five years, so it was possible to find both active and inactive enterprises.

After listing all the enterprises graduated by these incubators and their respective contacts (website, e-mail, and telephone), a search was carried out in the National Registry of Legal Entities (CNPJ in Portuguese) to verify the current situation of the enterprises (active or inactive). In this search, the names of the people who made up the corporate structure of the enterprise were

included in the contact information. For active enterprises, a contact e-mail was sent introducing the researcher and the purpose of the research.

Those who agreed to participate in the survey were sent the link to the. If the e-mail was invalid and/or no response was obtained, a telephone contact was made, again institutionally introducing the researcher and the purpose of the research and inviting the enterprise to participate in the study. For those who agreed, the link to the questionnaire was sent.

Finally, for inactive enterprises whose contact information (website, e-mail, and telephone) was outdated and made communication impossible, an Internet search was carried out to obtain the personal contact information of their partners, and then the previous steps were carried out with these contacts in hand. This process took place from December 2020 to February 2021.

Following telephone contact, 174 partners and/or directors agreed to participate in the survey. Of these, 93 completed the questionnaire, a response rate of 53.4%. However, for three different enterprises, there were responses from two different managers. For these enterprises, the information from the first respondent was used, resulting in 90 valid cases (see Appendix A. Supplementary Data 2 – Questionnaire Responses).

4 Results

Regarding the socio-demographic variables, the majority of the enterprises included in the study are located in the state of Minas Gerais (51.1%), followed by São Paulo (17.0%), Rio de Janeiro (11.4%), Goiás (9.1%), Distrito Federal (8.0%), and Mato Grosso do Sul (3.4%). Among the incubators from which the enterprises graduated, the following stand out: CENTEV/UFV Incubator (14.4%), INCIT/UNIFEI (13.3%), CEI/UFMG (10.0%), INOVA/UFMG (10.0%), Multincubator/UnB (8.9%), and INCAMP/UNICAMP (8.9%). The enterprises surveyed are mainly active in education (13.3%), software development (12.2%), health and well-being (11.1%), information and communication technology (11.1%), agribusiness (10.0%), and architecture and engineering (8.9%). The companies primarily develop their business models through service provision (17.8%), sales (16.7%), and software as a service (SaaS) (13.3%). Of the 90 enterprises that responded, 72 (80%) were in business at the time of the survey and 18 (20%) had ceased operations.

4.1 Construct formation

Confirmatory factor analysis (CFA) was performed using the lavaan package in R (Rosseel, 2012) to form the legitimacy, dynamic capabilities, and resources constructs. One of the advantages of CFA is its ability to assess construct validity, which is the extent to which the observed variables reflect the latent theoretical construct of a proposed theory (Hair et al., 2014).

Standardized factor loadings were analyzed for convergent validity. Items that are indicators of a particular construct must converge or share a high proportion of common variance. Hair et al. (2014) propose that standardized factor loadings should be greater than 0.5, ideally greater than 0.7. As shown in Table 1, all standardized factor loadings are greater than 0.5, and 11 of them are greater than 0.7, in line with the proposal.

In addition, Hair et al. (2014) recommend high reliability with an indicator greater than 0.7. Cronbach's alpha and construct reliability (CR) indicators were used.

For each construct, the weighting coefficient in Table 1 was used to calculate the raw values related to legitimacy, dynamic capabilities, and resources for each case. The weighting coefficients represent the ratio of each standardized loading to the sum of these loadings within each factor. In addition to the constructs, the following variables were included: incubation time, satisfaction with the services offered by the incubator, and number of employees at the end of the incubation process.

4.2 Data calibration for fuzzy sets

The initial analyses showed that the values of the constructs and contingency variables are asymmetric. In addition, they do not have a normal distribution. To deal with these aspects, we opted to use fuzzy sets. In this way, we proceeded with the calibration process of the raw values into fuzzy set adherence scores. To this end, we used the constructs of dynamic capabilities (DC), legitimacy (LEG), and resources (RES), in addition to the contingency variables of satisfaction with the incubator (S_INC), size at the end of incubation (T_INC), and technological innovation (TEC).

The raw data (see Appendix A. Supplementary Data 3 – Raw Data) were then grouped into a spreadsheet and imported into the R software. The purpose of calibration is to convert the original values into a fuzzy set. For the result (survival), a dichotomous variable was used with a value of "1" for active enterprises and "0" for inactive

Table 1
Factor loadings and coefficients for weighted mean

Construct	Variable	Factor loading	Weighting coefficient	Cronbach's alpha	Construct reliability
Legitimacy	LEG1	0.78	0.16	0.91	0.96
	LEG2	0.77	0.15		
	LEG3	0.91	0.18		
	LEG4	0.83	0.17		
	LEG5	0.87	0.17		
	LEG6	0.82	0.17		
Dynamic Capabilities	DC1	0.76	0.18	0.86	0.87
	DC2	0.68	0.16		
	DC3	0.65	0.16		
	DC4	0.75	0.18		
	DC5	0.84	0.20		
	DC6	0.50	0.12		
Resources	RES1	0.51	0.20	0.71	0.70
	RES2	0.50	0.20		
	RES3	0.71	0.29		
	RES4	0.78	0.31		

Source: Survey data.

ones. The qualitative anchors used in the calibration process are detailed in Table 2.

Following the procedures proposed by Linton and Kask (2017), a relative scale was used to define the qualitative anchors, with the 10th percentile as the point of non-adhesion (fuzzy value equal to 0), the median as the crossing point (fuzzy value equal to 0.5), and the 90th percentile as the point of full adhesion (fuzzy value equal to 1). Finally, for the differentiation of technology-based enterprises (TBEs), the procedures of Mas-Verdú et al. (2015) were adopted, in which a dichotomous variable assumes a value of “0” for non-technology-based enterprises and a value of “1” for technology-based enterprises. For this analysis, information related to segmentation was used, as well as consultation of each company’s website. Fuzzy data formed the input object for comparative qualitative analysis (see Appendix A. Supplementary Data 4 – Fuzzy Data).

4.3 Fuzzy set qualitative comparative analysis (fsQCA)

To carry out the fsQCA analyses, we followed the following script: 1) build a table with fuzzy data; 2) build a “truth table”; 3) perform Boolean minimization; 4) present the results of parsimonious, intermediate, and complex solutions; and 5) interpret the results. The construction of the truth table was limited to configurations with at

Table 2
Qualitative anchors for calibration

Construct	Calibration Rule	
	Raw Data	Fuzzy Value
Dynamic Capabilities	DC ≥ 4,893	1
	DC = 4,145	0.5
	DC ≤ 3,037	0
Legitimacy	LEG ≥ 5,000	1
	LEG = 4.835	0.5
	LEG ≤ 4,000	0
Resources	RES ≥ 4,613	1
	RES = 3.992	0.5
	RES ≤ 2,604	0
Satisfaction with the Incubator	S_INC ≥ 5,000	1
	S_INC = 4,000	0.5
	S_INC ≤ 2,900	0
Size at the end of Incubation	T_INC ≥ 10,000	1
	T_INC = 5,000	0.5
	T_INC ≤ 1,000	0
Technological Innovation	TEC = Technology-based	1
	TEC = Non-technology-based	0

Source: Survey data.

least two cases, and the results were considered positive (survival) for consistency scores (incl) greater than 0.9.



Next, the necessary condition analysis was conducted. This analysis sought to answer whether the presence or absence of a condition, in isolation, could be considered necessary to lead to the outcome (survival) or its absence (failure). To this end, the consistency and coverage indicators were calculated, as shown in Table 3.

In order for the presence of a condition (or its absence), in isolation, to be considered necessary to lead to the outcome (or its absence), its consistency must be greater than 0.9. Thus, it was perceived that no condition (or its absence), in isolation, could be considered necessary to lead to the outcome (survival) or its absence (failure). Based on these results, we sought to answer the question of what combinations of conditions (or lack thereof) can consistently lead a post-incubated enterprise to survival.

Next, the truth table was constructed (see Appendix A. Supplementary Data 5 – Truth Table) and the minimization function within the QCA package (Duşa, 2018) of the R software was used to find parsimonious, intermediate, and complex solutions. Minimization uses

Boolean algebra to search for a simpler but equivalent expression that is consistent in achieving the result. For the parsimonious solution presented in Table 4, the algorithm uses the “easy” and “difficult” counterfactuals in the minimization process.

The parsimonious solution is composed of only one path formed by technology-based enterprises with high perceptions of legitimacy, finding empirical evidence in 22 cases. This solution has a consistency of 0.935, indicating that post-incubated technology-based enterprises with high perceptions of legitimacy will consistently survive. The coverage of the solution is 0.388, indicating the proportion of belonging to the group of surviving enterprises that is explained by the solution.

For the intermediate solution shown in Table 5, the minimization algorithm uses only the “easy” counterfactuals. The intermediate solution is made up of two paths that consistently lead enterprises to survival.

The first path is composed of a group of technology-based enterprises that have a high perception of

Table 3
Necessary condition analysis

Conditions	Outcome		Outcome Negation	
	Consistency	Coverage	Consistency	Coverage
DC	0.540	0.851	0.379	0.149
LEG	0.545	0.816	0.493	0.184
RES	0.545	0.865	0.339	0.135
S_INC	0.515	0.849	0.367	0.151
T_INC	0.487	0.852	0.339	0.148
TEC	0.694	0.893	0.333	0.107
~DC	0.460	0.748	0.621	0.252
~LEG	0.455	0.782	0.507	0.218
~RES	0.455	0.734	0.661	0.266
~S_INC	0.485	0.754	0.633	0.246
~T_INC	0.513	0.756	0.661	0.244
~TEC	0.306	0.647	0.667	0.353

Source: Survey data.

Legend: The ~ symbol represents the absence of the condition.

Table 4
Parsimonious solution

Path	Recipe	Raw Coverage	Unique Coverage	Consistency
1	LEG*TEC	0.388	-	0.935
	Solution Coverage	0.388		
	Solution Consistency	0.935		

Source: Survey data.

Table 5
Intermediate Solutions

Path	Recipe	Raw Coverage	Unique Coverage	Consistency
1	LEG*RES*TEC	0.289	0.152	0.939
2	LEG*S_INC*T_INC*TEC	0.173	0.035	0.960
	Solution Coverage	0.324		
	Solution Consistency	0.944		

Source: Survey data.

Table 6
Complex solutions

Path	Recipe	Raw Coverage	Unique Coverage	Consistency
1	DC*LEG*RES*S_INC*TEC	0.182	0.048	0.983
2	DC*LEG*RES*T_INC*TEC	0.190	0.039	0.971
3	-DC*LEG*RES*-S_INC*-T_INC*TEC	0.077	0.020	0.908
4	-DC*LEG*-RES*S_INC*T_INC*TEC	0.096	0.024	0.929
	Solution Coverage	0.284		
	Solution Consistency	0.966		

Source: Survey data.

legitimacy and have or can easily access business resources, finding empirical evidence in 18 cases. This path had a consistency of 0.939, a raw coverage of 0.289, and a unique coverage of 0.152. The second path is composed of a group of technology-based enterprises that, at the end of the incubation process, presented a larger size, finding empirical evidence in 12 cases. These enterprises considered the services offered by the incubator to be satisfactory and have a high perception of legitimacy. This path has a consistency of 0.960, a raw coverage of 0.173, and a unique coverage of 0.035.

Overall, the intermediate solution had a consistency of 0.944 and a coverage of 0.324. The coverage indicated that 32.4% of the group of surviving enterprises could be explained by the paths presented in the intermediate solution.

Finally, the complex minimization was performed, as shown in Table 6. The complex minimization uses only the five configurations with a consistency greater than 0.9 and a minimum of two cases per configuration. By using fewer configurations, the minimization process becomes more complex, resulting in four different paths.

The first path is composed of technology-based enterprises that considered the services offered by their incubator to be satisfactory, finding empirical evidence in 13 cases. These enterprises showed a high perception

of legitimacy, aspects of dynamic capabilities, and own or can easily access business resources. This path had a consistency of 0.983, raw coverage of 0.182, and unique coverage of 0.048.

The second path is composed of technology-based enterprises that had a larger size at the end of the incubation process, finding empirical evidence in 11 cases. These enterprises showed a high perception of legitimacy, aspects of dynamic capabilities, and own or can easily access business resources. This path had a consistency of 0.971, a raw coverage of 0.190, and a unique coverage of 0.039.

The third path is composed of technology-based enterprises that, at the end of the incubation process, presented a smaller size and that did not consider the services offered by the incubator to be satisfactory, finding empirical evidence in two cases. These enterprises showed a high perception of legitimacy and have or can easily access business resources, but they do not have aspects of dynamic capabilities. This path had a consistency of 0.908, a raw coverage of 0.077, and a unique coverage of 0.020.

The fourth path is composed of technology-based enterprises that, at the end of the incubation process, presented a larger size and that considered the services offered by the incubator to be satisfactory, finding empirical evidence in four cases. These enterprises showed a high perception of legitimacy, but they do not present aspects of



dynamic capabilities and do not own or have easy access to business resources. This path had a consistency of 0.929, a raw coverage of 0.096, and a unique coverage of 0.024.

When comparing the parsimonious and intermediate solutions, it was found that being a technology-based company and presenting high perceptions of legitimacy are present in both solutions. Thus, the presence of these conditions is considered central, i.e., conditions that need to be present in the configuration in order to consistently lead enterprises to survival. The other conditions (dynamic capabilities, resources, satisfaction with the incubator, and size at the end of the incubation process) were considered peripheral conditions, as proposed by Fiss (2011). Based on these results, Figure 2 was elaborated, which presents the organizational configurations that lead post-incubated enterprises to survival.

In Figure 2, the large circles represent the central conditions, while the small circles represent the peripheral conditions. Filled circles indicate the presence of the condition, while empty circles indicate its absence. Blank spaces indicate that the presence or absence of the condition is indifferent to the result.

5 Discussion and implications

First, based on the analysis in Table 3, it can be seen that none of the conditions alone allows post-incubated enterprises to survive. These results corroborate the proposition that the greatest protection against LoN in

post-incubated ventures is the result of the configurations obtained through the combination of contingency factors – being technology-based, satisfaction with the incubator, and size of the firm – associated with legitimacy, resources, and dynamic capabilities.

The first two configurations explain the highest proportion of belonging to the result, represented by their raw coverage of 0.192, and can therefore be considered the most important. The first interpretation involves the C1 and C2 configurations. Both configurations represent a set of technology-based enterprises that have high perceptions of legitimacy, dynamic capabilities dimensions, and own or can easily access business resources. The configurations differ in the presence of a peripheral condition linked to contingency aspects.

The two configurations simultaneously presented legitimacy, resources, and dynamic capabilities, which form the core of the research proposal. Legitimacy, seen as a strategic resource that strengthens relationships with stakeholders, helps enterprises to access other resources necessary for their development (Nagy et al., 2017; Zimmerman & Zeitz, 2002). Although the research is not deductive in nature, it can induce the proposition that “the legitimacy of a technology-based enterprise is the *sine qua non* structuring condition for its post-incubation success.” These findings suggest an archetypal proposal of a hierarchy of strategic attributes in which the arrangement between resources, dynamic capabilities, being technology-based, presenting satisfaction with

Conditions	C1	C2	C3	C4
Dynamic capabilities	●	●	○	○
Legitimacy	●●●	●●●	●●●	●●●
Resources	●	●	●	○
Satisfaction with the incubator	●		○	●
Size at the end of incubation		●	○	●
Technology-based	●●●	●●●	●●●	●●●

Figure 2. Configurations that lead to the survival of post-incubated enterprises

Source: Survey data

the incubator, and size at the end of incubation must necessarily be associated with legitimacy.

Although configurations C1 and C2 present the same constitution as the constructs proposed in this research, they differ in contingency aspects. While the first configuration is composed of a group of enterprises that considered themselves satisfied with the services of the incubator, the second configuration is composed of a group of enterprises that presented a larger size at the end of the incubation process. It should be noted that in the first configuration, the size of the company at the end of the incubation process is indifferent, that is, the enterprises will reduce the risk of vulnerability regardless of their size.

On the other hand, in the second configuration, the satisfaction with the services of the incubator is indifferent, that is, the enterprises will survive regardless of whether they consider themselves satisfied or not with the services offered by the incubator. This indifference between the presence or absence of these contingency aspects causes the two configurations to share eight empirical cases out of a total of 13 cases for C1 and 11 cases for C2. Thus, the contribution of each contingency aspect to the reduction of the LoN of the enterprises is highlighted separately.

Such findings challenge the results found by Grilli and Marzano (2023), who suggest that incubators are an important policy mechanism to nurture the creation and growth of successful entrepreneurial initiatives. According to these authors, incubators can act as an effective tool to increase the social capital and legitimacy of businesses, so as to increase the likelihood of alliances between enterprises and key stakeholders. The authors called this movement the “bridging effect.”

The findings of this research also suggest that satisfaction with the incubator, despite being an important vector of legitimacy formation, does not seem to be a factor that alone would determine the firm’s survival. One of the possible causes would be precisely the lack of focus or points of connection between the incubator’s services and the formation of the firm’s legitimacy. In other words, the focus of the incubator may not be directed towards the formation of legitimacy through networking between entrepreneurs and key actors. Such an explanation would be in line with the authors’ proposal that academic incubators (such as those used in this study) are considered more useful for the development of innovation and entrepreneurial skills than for legitimacy, while public

incubators, which are common in other countries, are more focused on networking (Grilli & Marzano, 2023).

Satisfaction with the incubator, in turn, shows that there was misalignment between the services offered by the incubator and managers’ perceptions of the potential contribution of these resources to the enterprise’s competitiveness. Recent studies show that this misalignment may partially explain the mortality of some enterprises (Bayon & Aguilera, 2020; Van Weele et al., 2017).

Such reflections lead us to two suggestions: a) the first is that the issue of building legitimacy for incubated businesses should be a point of fundamental attention for incubators, especially through networking with key actors; (b) the second is that taking advantage of the opportunities generated by the incubator to develop relationships with stakeholders, increasing their perception of legitimacy, aligned with the good use of available resources, forms more resilient enterprises that are better able to withstand market challenges.

In line with previous studies (Agarwal & Audretsch, 2001; Mas-Verdú et al., 2015), the results indicated that the size of the company can be considered as a contingent factor for the survival of the enterprise. It is worth noting that size was measured by the number of employees at the end of the incubation process. Ventures often start their incubation period even before they are set up as companies. In some cases, these ventures are initially formed by a single entrepreneur or a small group of partners. Hiring employees during the incubation process and thus increasing its size indicates that the enterprise has developed and is better prepared to reduce LoN after graduation, which is in line with Fritsch et al.’s (2006) perspective that there is a minimum size at which enterprises are likely to survive.

By analyzing the two main configurations in the light of the theory, highlighting the central role of legitimacy and the presence of the constructs of resources and dynamic capabilities proposed in this research, it can be verified, supported by the findings of this research, that they are in line with the proposition previously presented.

The second interpretation involves the third configuration, which explains a 7.9% share of belonging to the result, represented by its raw coverage. This configuration is made up of the set of technology-based enterprises that have a high perception of legitimacy and own or can easily access business resources. These enterprises did not present micro-foundations of dynamic capabilities, did not consider themselves satisfied with the

incubation process, and presented a smaller size at the end of the incubation process.

As in the first two configurations, legitimacy, seen as a strategic resource that strengthens relationships with stakeholders, helps enterprises to access other resources necessary for their development (Nagy et al., 2017; Zimmerman & Zeitz, 2002). In this sense, the findings suggest that enterprises that are seen as legitimate can constitute a resource base that can keep their operations competitive. However, since they do not present aspects of dynamic capabilities, it can be inferred that these enterprises operate in more stable environments where the restructuring of their technologies and/or resources was not necessary for them to continue operating competitively. Thus, it can be inferred that for small technology-based enterprises that have high perceptions of legitimacy and operate in more stable environments, the presence of and/or easy access to resources provides greater protection against LoN.

The third interpretation involves the fourth configuration, which explains a share of belonging to the result of 10.4%, represented by its raw coverage. This configuration is composed of technology-based enterprises that considered the services offered by the incubator satisfactory and presented a larger size at the end of the incubation process. These enterprises had a high perception of legitimacy and did not have micro-foundations of dynamic capabilities and do not own or have easy access to business resources.

As previously described, satisfaction with the incubator's services and size are contingency aspects that provide enterprises with a reduction in the risk of LoN. This configuration is the only one that presents the existence of these two aspects simultaneously. Enterprises that presented this configuration were able to develop throughout the incubation process by hiring more employees for their business. This may indicate an early entry into the market and a possible establishment of more stable business relationships and partnerships. In addition, the satisfaction with the services shows that these enterprises knew how to take advantage of the resources offered by the incubator as well as the relationships established during the process. These two aspects, aligned with the high perception of legitimacy, imply that these enterprises do not need to have and/or easily access new business resources and, consequently, have not developed the micro-foundations of dynamic capabilities. Thus, it can be inferred from the findings

that technology-based enterprises with high a perception of legitimacy, which are able to align their needs with the services offered by the incubator, and have a larger size at the end of the incubation process, develop greater protection against LoN.

The third configuration involves enterprises that presented a smaller size at the end of the incubation process, the presence of resources, and the absence of dynamic capabilities. In addition, in this configuration, the enterprises do not consider themselves satisfied with the services offered by the incubator. The fourth and last configuration does not present the presence of resources and dynamic capabilities and involves enterprises that presented a larger size at the end of the incubation process and that considered themselves satisfied with the services offered by the incubator.

5.1 Limitations, contributions, and recommendations

The first limitation relates to the choice of cases. The selection sought to cover all graduated enterprises from incubators linked to public higher education institutions in the Southeast and Midwest regions with more than five years of experience. However, some incubators did not provide contact information for the graduated enterprises, and for some incubators there was a lot of outdated information. Also with regard to the choice of cases, it was very difficult to locate those responsible for the enterprises that had already ceased their activities. In most cases, the telephone, e-mail, and website contacts were corporate and therefore did not remain in operation after the firm was closed. Despite these limitations, a total of 18 inactive enterprises were identified, representing 20% of the sample.

A second limitation is the use of self-perception of legitimacy. Legitimacy is a perception external to the organization by its stakeholders. However, capturing the external perception of the legitimacy of organizations requires a great deal of research, which in a way limits the number of cases to be studied. In this sense, the self-perception of legitimacy scale proposed by Alexiou and Wiggins (2019) provides an application to a greater number of cases.

Despite the limitations, it was possible to overcome the adversities and find results that contribute both to the literature and to management practices. Regarding the theoretical contributions, this research

ratifies the central role of the construction of legitimacy for the survival of new enterprises. However, the main contribution is related to the fact that the interrelationship between legitimacy, resources, and dynamic capabilities, in certain configurations, leads, through different paths, to the survival of post-incubated enterprises.

Regarding management practices, this research contributes both to business incubator managers and/or funders and to entrepreneurs who intend to start new businesses. For managers, the results obtained make it possible to create an incubation environment that, in addition to offering resources at affordable prices, is capable of identifying and filling the individual gaps of the enterprises. In this way, there will be greater interaction between entrepreneurs and the incubator, increasing the satisfaction of the entrepreneurs and enabling initial development. In addition, the fact that being a technology-based company is characterized as a key condition for the survival of post-incubated enterprises indicates that business incubator managers and/or funders should focus their efforts on the incubation of these ventures.

For entrepreneurs, this research contributes by presenting four different ways in which they can configure their enterprises in order to create a more resilient structure to the challenges of the liability of newness. Despite these multiple options, the research reinforces the central role of building legitimacy, which should be intensified during the incubation period to increase the probability of survival of new businesses.

Telephone contact with entrepreneurs of inactive enterprises provided an additional insight beyond the scope of this research. Most of the entrepreneurs who closed their ventures were already involved in a new business, in some cases at an advanced stage of development. As this study selected only incubators linked to public educational institutions, the investor in these ventures is the government. The resources invested in incubators are justified by the fact that new businesses generate employment and income, thus returning to society the investment previously made.

However, as the main indicator is the survival of the incubated enterprises, enterprise failure is a negative reflection of the management of the incubator. In this sense, this research contributes in an additional way by launching a reflection on what incubators actually form. Is it the ventures that graduate during the incubation or the entrepreneurs? The entrepreneurial trajectory of the people who had incubated businesses can indicate an

additional gain, as these entrepreneurs were trained and were able to start a new venture, even after failing.

Regarding the scope and universality of the research findings, it is important to reiterate that this research is limited by the fact that it considers as the research universe only enterprises that have graduated from academic incubators. In addition, the configurations found in this study were affected by the calibration strategy adopted by the authors. Although the findings and the analysis of the results found robustness in the data, the research does not have a deductive and universalizing character *per se*. On the other hand, it is also important to recognize the breadth of the findings, since the issue of survival, despite being an important point in relation to the entrepreneurial phenomenon, is not the only factor that constitutes the basis of the success of an enterprise. Other perspectives, such as profitability and growth, the business environment, the ability to cooperate, the volume of innovations, internationalization, and strategic leadership, can complement the approach adopted.

Thus, as a suggestion for future research, we recommend including these perspectives in configurational studies. We also recommend analyzing the efficiency of academic incubators in relation to their capacity to form legitimacy. The findings suggest that incubators have a positive potential to contribute to firms in their early stages, but that there is still room for improvement.

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APPENDIX A. Supplementary Material

Supplementary material accompanies this paper.

Supplementary Data 1 – Questionnaire

Supplementary Data 2 – Questionnaire Responses

Supplementary Data 3 – Raw Data

Supplementary Data 4 – Fuzzy Data

Supplementary Data 5 – Truth Table

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