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RESEARCH PAPER

Are the resources provided by Business Incubators suitable to the needs of their customers? A methodology proposal to assess customer satisfaction in Business Incubators

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ABSTRACT

Highlights: Studies on business incubation reveal that little is known about what incubatees really want and need. What are their challenges? Are the available resources adequate to meet them? This work attempts to find methods to assist in answering these questions.

Goal: The present study investigates the suitability of resources supplied by incubators to the needs of incubated firms with the goal of proposing a methodology to assess resources' customer satisfaction and identify opportunities for satisfaction enhancement.

Design/Methodology/Approach: The methodology integrates the research on Models and Typologies of incubators with the Resource-Based View and adopts a comparative customer-supplier framework aiming to enable a systemic approach to customer satisfaction. For validation purposes, empirical investigation was conducted in an incubator located in the metropolitan region of Rio de Janeiro, Brazil. Field investigation adopted mixed methods through semi-structured interviews and convenience sample selection.

Results: The empirical testing shows the methodology meets its purposes. Findings on customer satisfaction indicate three clear opportunities towards its enhancement.

Limitations of the investigation: The methodology was validated in one incubator with small population and sample.

Practical Implications: The methodology applied to a single incubator provides in-house reference to satisfaction enhancement. Aiming further-reaching initiatives, the methodology should be evaluated on larger samples and tailored to address cross-incubator comparison.

Originality/ Value: The method combines two stablished theoretical strands on incubation with a comparative customer-supplier approach. The resultant framework enables a systemic approach to customer satisfaction grounded in a set of field survey-collected information.

Keywords: Business Incubators; Methodology; Models and Typologies; Resource Based View; Entrepreneurship; Customer Satisfaction Assessment.

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INTRODUCTION

Based on the analysis of academic research on incubation raised in the literature review, several studies on the phenomenon of incubation highlight the importance of both quality and complexity of the resource mix offered by business incubators. This importance can be understood under two perspectives. From the incubators' point of view, it is by means of their resource portfolio, defined by their business objectives, that an incubator sets up its strategy to attract potential customers to their incubation programs (Smilor and Gill, 1986; Hansen et al., 2000; McAdam and Marlow, 2007; Bergek and Norrman, 2008; Wang et al., 2008; Gerlach and Brem, 2015; Hong and Lu, 2016; Mian et al., 2016; Hausberg and Korreck, 2021). From the perspective of the emerging entrepreneurs, the decision to incubate should take into account the incubator whose mix of resources and support services best suited to their business objectives (Smilor and Gill, 1986; Hackett and Dilts, 2004; McAdam and Marlow, 2007; Bergek and Norrman, 2008; Wang et al., 2008; Hansen et al., 2000; Gerlach and Brem, 2015; Hong and Lu, 2016; Mian et al., 2016; Hausberg and Korreck, 2021). Moreover, from the perspective of small and medium-sized entrepreneurs - potential clients of an incubator -, the incubator presents itself as a strategic alternative to complement their usually fragile and incomplete resource bases (McAdam and Marlow, 2007; Ammetller et al., 2014; Lose and Tengeh, 2016; Van Weele et al., 2017).

Alongside, academic research on incubation indicates that few studies have investigated

what incubated firms need and demand to succeed in their business goals, in particular those that privilege the perspective of incubated companies on their wants and needs

(Theodorakopoulos et al., 2017; Albort-Morant and Ribeiro-Soriano, 2016; Lose and Tengeh, 2016; Pauwels et al., 2016). What are their main challenges? What resources do they need to overcome them? Are the incubator's resources adequate to overcome their challenges and achieve their objectives? In that regard, Pauwels et al. (2016) highlight that the biggest challenge for incubators lies in understanding the different profiles and characteristics of incubated firms so that the mix of resource offerings can be useful to emerging firms. Likewise, Lose and Tengeh (2016) stress out the need for incubators to understand the motivations behind the involvement of entrepreneurs in their programs, so that they can, thus, provide resources that simultaneously meet the needs and guarantee the satisfaction of incubated firms.

Therefore, a gap was found between the proclaimed importance of both complexity and quality of resources offered by incubators and the scarcity of studies that reveal the perspective of incubated companies regarding what they really want and need as customers.

Aiming to contribute to fill this gap, this study proposes to investigate the adequacy of an incubator's supply of resources to the needs of its incubated firms with the objective of developing a methodology to assess customer satisfaction and identify opportunities for satisfaction enhancement in a business incubator.

To fulfill this objective, the methodology proposes a comparative approach between the incubated firms' perspective on their main challenges and resource demands seeking to succeed in their targeted markets – the customers' view - and the incubator's perspective regarding the composition of its resource portfolio and the relative importance of resources, in order to attract potential customers and provide effective support for incubated firms – the supplier's view.

Such an approach allows the identification of eventual gaps between supply and demand, indicating eventual satisfaction improvement opportunities.

Aiming at the empirical testing and validation of the proposed methodology, a university incubator affiliated to a public university and located in the metropolitan region of Rio de Janeiro was selected.

The main motivations to the development of the methodology are: to lie over established and reliable theoretical foundation; encompass the perspectives of both incubated firms and incubator; be applicable to any type or model of incubator; have ease and agility on its empirical applications.

METHODOLOGY

Methodology structure

The proposed methodology is composed by two distinct sections, each one related to its respective theoretical strand: (1) the first section has the purpose of distinguishing the core characteristics of any incubator under analysis, and thus collaborate to the understanding of its nature and vocation to address the demands of their potential customers. Similarly, emerging firms who are in search of a business incubation program should understand their key features to select the incubator which has the best set of resources to meet their expectations and needs.

Based on the literature review, the analytical framework developed by Grimaldi and Grandi

(2005) was elected as the most suitable to build one aspect of the proposed methodology. This framework enables the identification of both model and type of any researched incubator; (2) the second module of the proposed methodology found in the Resource Based View the comprehension of the strategical role resources play either to a business incubator - when searching for potential customers - or to an emerging ventures - when seeking for an incubation program which will better support the achievement of their business goals. Based on the bibliographic review, the comprehensive set of strategical resources most adequate to the business incubation industry was found in Van Weele et al. (2017).

Finally, the proposed methodology adopts a comparative approach between the perspectives of the incubated firms and the incubator. Therefore, the research instrument must embody both Grimaldi and Grandi's analytical framework and Van Weele's proposed set of resources, as well as encompass both customer and supplier's perspectives.

Figure 1 shows the structure of the research methodology, clarifying the relationship between theory, framework and its materialization in the research instruments to be used in its empirical application.

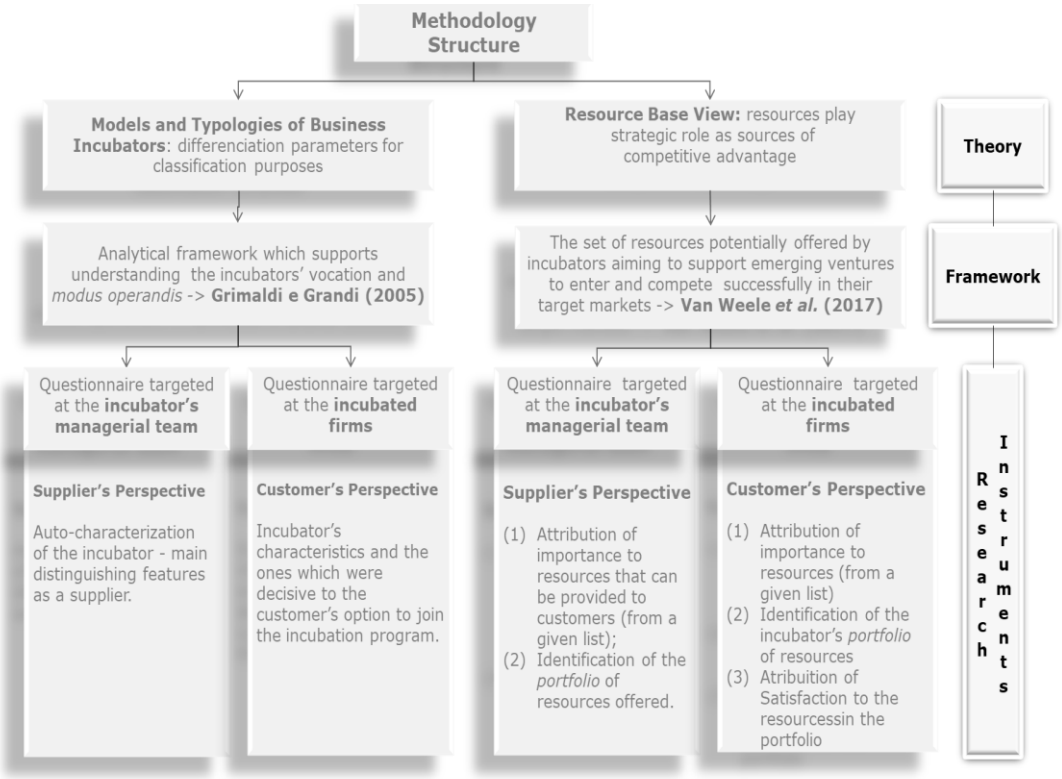

Figure 1 - Research Methodology Structure: relationship between theory, chosen analytical framework and research instrument.
Source: The authors themselves.

The questionnaire was adopted as a research instrument for field data collection. Two questionnaires were developed, one for each targeted audience – supplier and customers - each questionnaire consisting of three parts, the first with the purpose of collecting general information about the incubator or the incubated firms, the second for characterizing the incubator under both perspectives, and the third for ranking resources' importance under both perspectives, and finally, the incubated firm's customer satisfaction assessment with the incubator's resource portfolio.

The main sources used for the development of the questionnaires were:

- regarding the classification of the incubators into models and types, the paradigm presented in Grimaldi and Grandi (2005).
- regarding the understanding the list of resources offered by business incubators and demanded by potential incubator's customers (see Table 2) and for the questionnaire, that was used as reference and adapted for this study, Van Weele et al. (2017).

Figure 2 and Figure 3 illustrate the structures of the research instruments, two questionnaires, each one designed to its targeted audience.

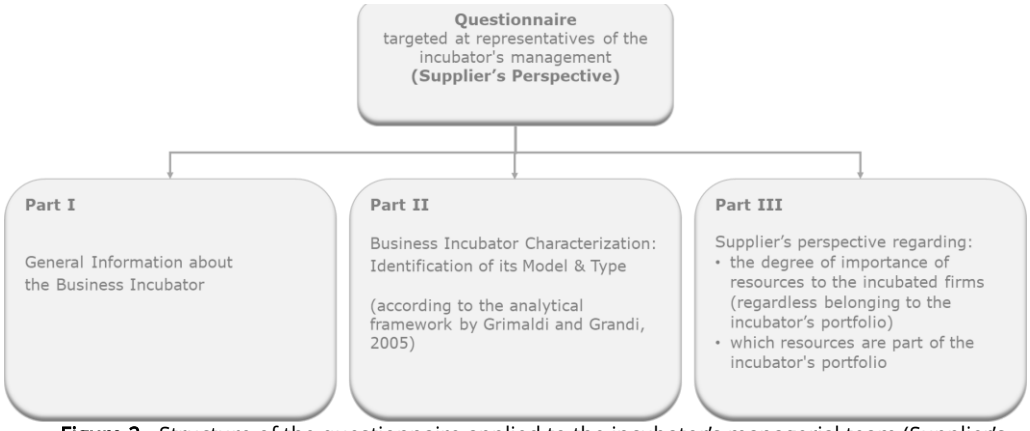

Figure 2 - Structure of the questionnaire applied to the incubator's managerial team (Supplier's Perspective).
Source: The authors themselves.

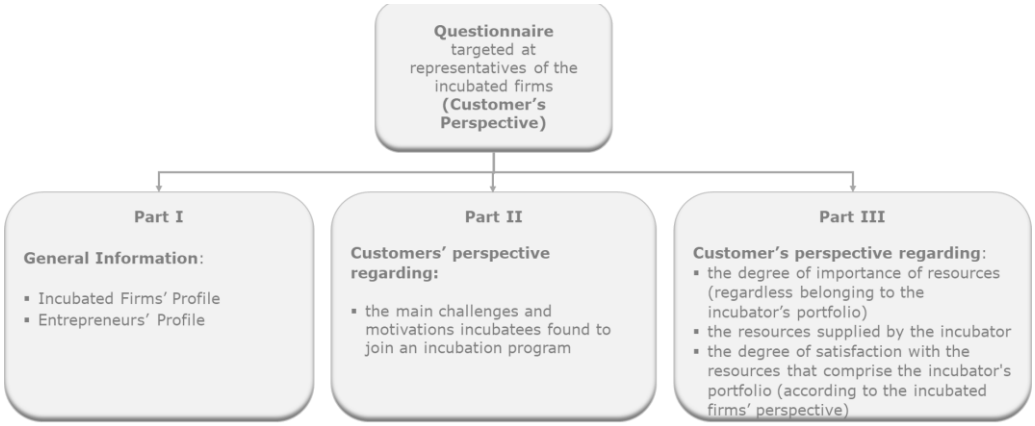

Figure 3 - Structure of the questionnaire applied to the Incubated Firms (Customers' Perspective).
Source: The authors themselves.

Procedures of the empirical research

The empirical research was realized in a university incubator affiliated to a public university located in the metropolitan region of Rio de Janeiro, between October the 5th and October the 25th, 2017.

The research adopted a mixed method, combining quantitative and qualitative approaches and was implemented through semi-structured interviews by telephone. The interviews had as target audience the small entrepreneurs, leaders of the incubated firms – representing the customers' perspective –, and representative(s) of the incubator management team – representing the supplier's perspective. The interviews were guided by two questionnaires, each one designed for its audience, containing closed questions, when possible (selection of items from given lists, importance rates or satisfaction levels, etc.) - bringing more ease and agility to the interviews -, as well as some opened questions (main challenges faced, motivations to incubate, etc.), with the purpose of deepening understanding on specific themes and to serve as backup to the understanding of answers to the closed questions.

The incubated firms were selected through a convenience sampling, with voluntary adhesion of the respondents. Among the twelve elements of the population – eleven registered firms and the incubator manager – seven incubated firms and the incubator's manager agreed to participate in the research, adding up 8 interviews.

Respondents were contacted by email and invited to expose their incubation experience through telephone interviews on pre-scheduled dates. Everyone who agreed to answer to the interview received the questionnaire by e-mail before.

THEORETICAL REFERENCES

Procedures for systematic literature review

Systematic literature reviews are intended to support the reunion of evidence, in a

comprehensive and extensive manner, that serves as a basis for addressing a specific research question (Higgins and Green, 2011).

The theoretical support for the present study was obtained through systematic review in the Web of Science database, consulted between May and November 2017. The search string was created according to the guidelines found in Chart 1. After applying the initial filters (languages, document types, databases, and knowledge areas), the search resulted in 19 documents. Next, a screening through titles and abstracts was performed, selecting 12 documents out of 19. Articles raised in the exploratory phase and those collected from references were added to those resultants from the systematic review, totaling 43 documents in the original research. For the purposes of this article, 28 out of 43 were selected.

Chart 1 - Search guidelines based on the acronym PICO and search string.

Acronym		Definition	Search Terms
P	Population	What is the object of study? What is the population to be investigated?	Business Incubators, University Business Incubators.
I	Intervention	What is the nature of the phenomenon to be observed within this population?	In the present study, the set of incubator offerings: Categories or Types of Services, List or Portfolio of Services (e.g., infrastructure, training, coaching, mentoring, networking, advising, consulting, access to funding, legacy), Resources.
C	Comparison	Applies for comparison between protocols.	Not applicable to the present study (generally applicable only for health sciences).
O	Outcome	Which are the outputs, the expected results?	In the present study, methods and tools for evaluation and satisfaction from the users' perspective: questionnaires, methods, models, methodologies or processes on evaluation, effectiveness or satisfaction.
Total String=TS=(("business incubat*" OR "academic incubator*" OR "university incubat*" OR "university technology incubator*" OR "university business technology incubator*") AND (service* OR "service* portfolio*" OR "service* typolog*" OR "type* of service*" OR "service* categor*" OR "service* offer*" OR "service* list*" OR "service* package*" OR "business support services" OR resources) AND (((evaluation OR effectiveness OR satisfaction) AND (questionnaire OR method* OR model* OR process*)) OR ((user* OR user-centered OR customer* OR entrepreneur* OR "incubated business*" OR incubatee* OR "incubated SME*" OR "incubated entrepreneur*" OR "incubated firm*" OR "tenant* business*" OR "tenant*" OR "start-up firm*") NEAR (perspective* OR satisfaction OR approach* OR need* OR demand* OR requirement* OR motivation* OR assessment*))))			

Business incubators Models and Typologies

Incubation models can be understood as the mechanisms by which an incubator delivers support services to emerging companies (Bergek and Norrman, 2008; Pauwels et al., 2016; Messeghem et al., 2017) and typologies as business classification exercises. incubators from characterization variables (Pauwels et al., 2016; Messeghem et al., 2017; Hausberg and Korreck, 2021).

The modification of the needs and requirements of companies from the second half of the 1990s, largely due to changes in their business models caused by the evolution of the internet, also changed the rules of the incubator industry (Grimaldi and Grandi, 2005). Changes, such as the need to increase the speed of launching new products and access to capital, increase synergy through the establishment of partnerships between complementary companies, among others, triggered the need to readjust the services offered by incubators (Chinsomboon, 2000; Grimaldi and Grandi, 2005).

This context resulted in the emergence of new incubator models and stimulated the

development of several theories on incubator models and typologies (Pauwels et al., 2016; Messeghem et al., 2017). Based on the consolidation efforts developed by Messeghem et al. (2017), Barbero et al. (2013) and on the typologies proposed by Bruneel et al. (2012), Grimaldi and Grandi (2005), Becker and Gassmann (2006), Carayannis and von Zedtwitz (2005) and Bergek and Norrman (2008). Table 1 organizes, by author, the criteria used to characterize different models of incubators and their resulting typologies.

Table 1 Typologies of Business Incubators – Differentiating Parameters by Author.

Differentiating parameters	Authors	Types of incubators
Value added sources Primary objective Secondary objective	Allen and McCluskey (1990)	For-profit property development Not-for-Profit development corporation Academic For-profit seed capital Hybrid
Main philosofy Main objective Secondary objective Industry sectors involved	Aernoudt (2004)	Corporate Mixed Regional Development Technology Social Basic Research
Competitive focus Strategic objective	Carayannis and Von Zedtwitz (2005)	Regional Business University Virtual Independent Company Internal
Institutional mission Industrial sectors Location Origin of ideas Phase of intervention Incubation period Sources of revenue Services Management team	Grimaldi and Grandi (2005)	Business Innovation Centers University Business Incubators Corporate Private Incubators Independent Private Incubators
Graduation	Bruneel, Clarysse e Groen (2012)	Low selective Model Supportive Model Incubator Model
Mission Type of technology	Becker e Gassmann (2006)	Fast-profit-incubators Market-incubators Leveraging-incubators Insourcing-incubators
Selection strategy Business support Mediation	Bergek e Norrman (2008)	16 possible types of Incubators (4x2x2): - 4 selection strategies - 2 kinds of bussiness support - 2 kinds of mediation

Source: Designed from the sources: Messeghem et al., 2017; Barbero et al., 2013, Bruneel et al., 2012; Grimaldi and Grandi, 2005; Becker and Gassmann, 2006; Carayannis e Von Zedtwitz, 2005.

The importance of integrating the theory of Models and Typologies into the proposed methodology lies in the fact that in one hand - the provider's perspective - the main characteristics that distinguish an incubator and highlight its nature and vocation, influence its offer of resources and the way they are delivered with views to attracting potential clients. On the other hand - the customer's perspective - the vocation and nature of an incubator supports the decision of an emerging venture to join a specific incubation program seeking to complement its base of resources and thus to pursue their business goals.

Amongst studies on models and types of business incubators, the analytical framework designed in Grimaldi and Grandi (2005) was elected to support the objectives of the proposed methodology, for the following reasons:

(a) Grimaldi and Grandi (2005) adopt the perspective that the differences between incubators and the evolution of incubation models, as well as the corresponding offerings of support services are determined by the needs and requirements of companies. Therefore, the differentiation variables proposed by these authors carry the client perspective which the proposed methodology aims to represent.

(b) The authors understand that the categorization of incubators into two models (and four types) is a simplification of a much more complex reality. For this reason, they incorporate nine characterization variables into the paradigm, indicating that their theoretical model feeds into practice, which equally suits the proposed methodology.

(c) The authors relate the evolution of the models of incubation to the historical and technological evolution and its consequences on the demand of companies that apply for an incubation program. Therefore, they reinforce the customer's perspective as the conductor of the analysis.

In Grimaldi and Grandi (2005), the support mechanism of an incubator is identified through the contrast between two models that can be considered as conceptual opposites. Model 1 is represented by public, non-profit incubators, which usually serve traditional segments and offer tangible resources. Model 2 is represented by private, for-profit incubators, which offer intangible and high-valued resources and are focused on high-tech companies. Additionally, they usually play active roles in connecting their incubated firms to well-structured internal and external networks and have strong involvement with the incubatees' entrepreneurial activities In order to provide a deeper analysis, the authors add nine characterization variables to the paradigm - institutional mission; industrial / technology sector; incubator location; market; origin of ideas; intervention phase; average incubation period; revenue sources; nature of the services offered; characteristics of the management team –, resulting in four types of incubators: business incubation centers; corporate private incubators; independent private incubators and university business incubators.

The main authors and works that emphasized the importance of this topic and were addressed in this study are: Pauwels et al. (2016), Mian et al. (2016), Messeghem et al. (2017), Barbero et al. (2013), Bruneel et al. (2012), Becker and Gassmann (2006), Carayannis and von Zedtwitz (2005), Bergek and Norrman (2008), and, as the main reference, Grimaldi and Grandi (2005).

Resource-Based View

The second theoretical strand comes from the field of Strategic Administration studies, which is dedicated to the understanding of the strategic use and management of resources as a source of competitive advantage for companies in their markets. According to the Resource Based View (RBV), firms can achieve sustainable competitive advantages in the markets in which they operate through the planning, management, use and control of their strategic resources (Barney, 1991; 2001; Barney and Arikan, 2017). Therefore, from the RBV perspective, incubators can be understood as providers of a set of strategic resources – tangible and intangible – with the objective of mitigating the risks inherent to new ventures.

From the point of view of small and medium entrepreneurs – potential clients of an incubator – , the incubator presents itself as a strategic alternative for complementing their resource bases, either directly or through its network (McAdam and Marlow, 2007; Ammetller, Rodriguez-Ardurab and Llados-Masllorens, 2014; Lose and Tengeh, 2016; Van Weele et al., 2017).

The incorporation of RBV into the proposed methodology is due to the relevance of examining the categories and types of resources, which, on the one hand, are offered by incubators, aiming to support the development of emerging enterprises, and, on the other hand, are necessary for emerging companies to complement their usually fragile resource base and thus design and implement strategies to successfully compete in their target markets.

The proposed methodology adopts the set of resources according to the Resource-Based View presented in Van Weele et al. (2017) and listed in Table 2. It joins both the resources offered by incubators willing to attract potential clients and satisfy existent customers and the resources demanded by emerging companies.

Table 2 - Incubatees' Resource Needs and related Incubators' Resource Offerings.

Resource Needs	Resource Offerings
a. Physical Resources	a.1 Basic: office space, administrative services
	a.2 Specialized: laboratories, libraries
b. Financial Resources	b.1 Access to investors
	b.2 Access to loans
c. Human Resources	c.1 Training, lectures and others in the technical area
	c.2 Training, lectures and others in the business area
d. Knowledge	d.1. Business (consulting/mentoring)
	d.2 Scientific / Technical knowledge
e. Social Capital	e.1 Networking
	e.2 External Networking (activities aimed at integrating the different participants of the incubation/ innovation system)
f. Legitimacy	f. Benefits related to the association with a renowned incubator

Source: Designed from Van Weele et al. (2017).

The main references on RBV used in this study are the works of (Barney 1991; 2001), and, concerning the use of RBV to the topic of incubation, the works of Ammetller, Rodriguez-Ardurab and Llados-Masllorens (2014); Ghobril et al. (2019); Borges and Bueno (2020), and, as main reference, the work of Van Weele et al. (2017).

RESULTS

Model and Type Identification - Characterization of the Incubator

Grimaldi and Grandi's paradigm (2005), elected for the purpose of characterizing the incubator, was embodied in the questionnaire and used as a guide during the interviews with the representatives of both the business incubator and incubated firms.

First, the interviewer requested the incubator's rep to select from Grimaldi and Grandi's model (2005) the parameters that better described the business incubator. Then, starting from the subset of variables chosen by the incubator's rep., the interviewer demanded the incubated firms to select the variables which were important to their decision to join this specific incubation program. Both incubator and incubated firms' reps were also encouraged to make free comments on the characteristics of the incubator and on the variables presented. In general, both considered the presented model relevant to the characterization of the incubator.

Based on the information collected in the empirical research, the incubator was classified as a hybrid between models 1 and 2 described in the theoretical framework, having characteristics of each model. Among the four types of incubators described in the analytical framework, it was classified as a University Business Incubator.

Figure 4 summarizes the information collected during the interviews and which supports the identification of the type and model of the incubator.

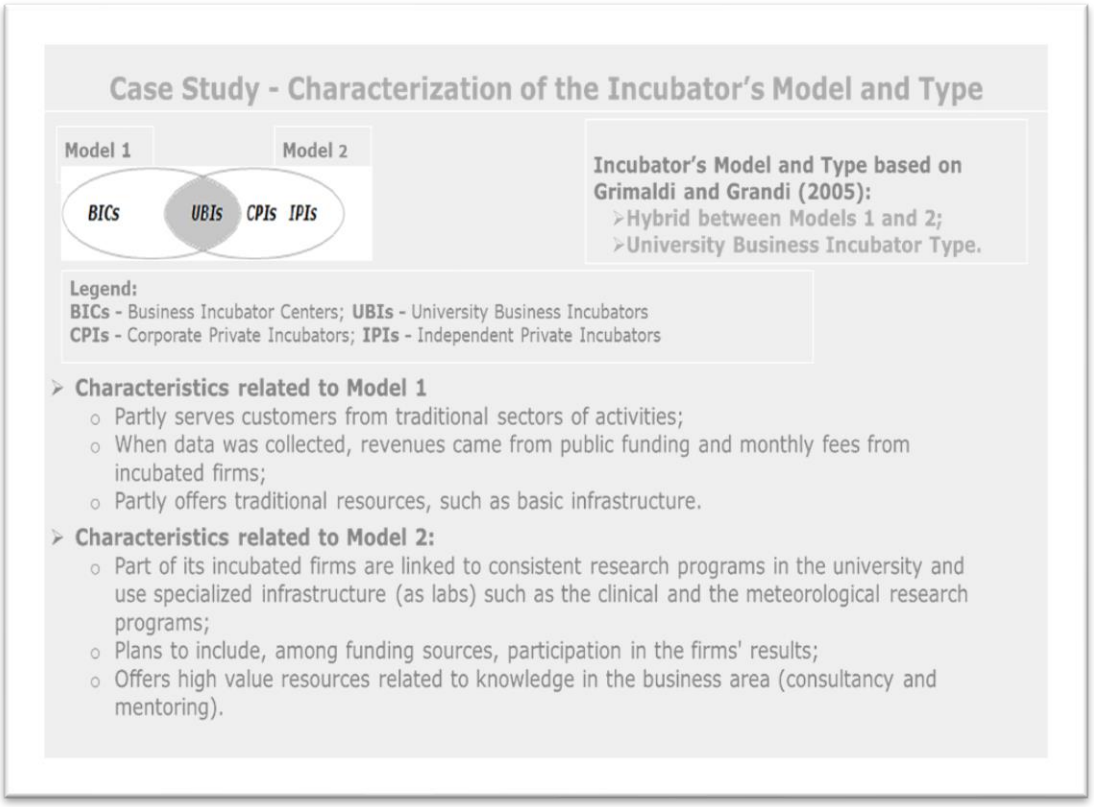

Figure 4 - Characterization of the incubator according to the analytical framework designed by Grimaldi and Grandi (2005).
Source: The authors themselves.

This hybrid nature showed not to fully meet the customers' expectations, who were attracted by the resources of a University Business Incubator or presumed other high value intangible resources would be supplied. This issue will be addressed further on.

Incubated firms' needs and Customer Satisfaction Assessment

A group of findings support the understanding about the incubated firms' needs, under their own perspective. Table 4 presents an extract taken from the answers to exploratory questions, given by the incubated firms themselves, in quotes. The interviewer asked what challenges were they facing before incubating and what were their main motivations to join an incubation program, and, specifically, the program under analysis.

Table 3 - Incubated firms' main challenges before incubating and motivations to incubate.

Incubated Firms Main challenges before incubating and Motivations for joining the university incubation program (answers to exploratory questions)			
Incubated Firm	**Main Challenges (before incubating)**	**Main motivations to join any incubation program**	**Main motivations to join this incubator in particular**
A	'"Transform an idea, a concept, into a business."	"To facilitate the transmission of knowledge and technology from research to the company."	According to previous items
	"Formalize the company, considering the various bureaucratic steps and obstacles."		
B	"To obtain support to formalize the company that uses research resources and the university's laboratory."	According to challenges	According to challenges
	"To address the legal issues associated with the fact that the entrepreneur is linked to		

	the university through an exclusive dedication contract."		
C	"Add differentiation to the product"	"Associate experience as an entrepreneur with university research programs"	According to previous items
	"Incorporate innovation into the company's production process."		
		"Open doors for obtaining resources, funding, and grants for process research through the university's "brand"."	
D		Improve the production process through research at the university	According to previous items
	"The need for product quality certification."	"Obtain product certification through the university (similar to quality validation)."	
		"Get Marketing and Business Support."	
E	"Transform an idea, a concept into a business."	"Get knowledge and support in the business area."	"Incubator's convenient location"
		"Enjoy the experience of other entrepreneurs."	
F	"Lack of financial resources to subsidize product development."	"Have access to server infrastructure for product development."	- Alternatively to the provision of servers, deduct the incubator's monthly fee to use this expense for server rental.
	"Market analysis support"		
	"External networking support."		
	Access and guidance for obtaining investors.		
G	"Transform an idea, a concept into a business."	"Access to multidisciplinary teams."	"Incubator's convenient location"
	"Management consulting."		
	"Access to physical infrastructure."		

Source: The authors themselves.

Under a consolidated perspective, Table 4 shows that the incubated firms differ with respect to the incubation phase as well as in the maturity and experience as entrepreneurs, as it can be seen in the nature of challenges faced by each firm before joining the incubation program. As an example, this contrast can be observed in challenges such as “transforming ideas into business” or related to product differentiation or quality certification.

More important, the firms’ motivation to join an incubation program suggest a pattern towards the concentration of customer “wants and needs” in a small group of resources:

- access to university-based knowledge, as imply the answers from firms A, B, C, D and F.
- interest on business knowledge, in the case of firms A, B, D, E, F G.
- access to investors or funding declared by firms C and F.
- access to networking resources, mentioned by firms F and G.

Table 5, presented in the next subsection also displays information about customer's needs, expressed by the importance rate attributed by incubated firms to each resource. The same resources of interest in table 4 scored the highest average importance according to incubated firms:

- training in the business area (c.2) and access to business knowledge (consulting and mentoring) (d.1)
- access to technical and scientific knowledge linked to the university (d.2)
- access to investors (b.1)
- access to internal and external networking (e.1 and e.2).

Customer Satisfaction Assessment and Satisfaction Improvement Opportunities

For the purposes of this study, the assessment of the incubatees' satisfaction with the resources offered by the business incubator is not restricted to the resource satisfaction rate declared by the incubatees and displayed in Table 5. The declared resource satisfaction rate is one of the items to be considered in the customer satisfaction assessment.

To understand the adequacy of the resources provided by incubators to the needs of their incubated companies, this study proposes a systemic approach to assess the incubated firms' satisfaction, which involves a combined analysis of a set of variables.

This systemic approach is expressed in the methodology structure as presented in **Figure 1**, which displays how the two bodies of theory - Types and Models of Business Incubators and the Resource Base View - and the customer-supplier comparative approach contribute to build the analytical framework which is embodied in the questionnaire that guides the empirical data collection of the above-mentioned set of variables.

Table 5 presents the last set of information that, together with Figure 4 and Table 4, support the incubatees' satisfaction assessment. Table 5 summarizes answers to closed questions about the strategic resources, based on the theoretical support of the Resource Based View.

Table 4 - Synthesis of objective data on resources collected in the empirical research.

RESOURCES: IMPORTANCE & CUSTOMER SATISFACTION ASSESSMENTS AND CUSTOMER AND SUPPLIER´S COMPARATIVE PERSPECTIVES ON RESOURCE AVAILABILITY X RESOURCE IMPORTANCE													
THEMES	PERSPECTIVE	RESOURCES											
		a. Physical Resources		b. Financial Resources (Access to)		c. Human Resources (trainning, lectures, etc)		d. Knowledge		e. Social Capital		f. Legitimacy
		a.1 Basic	a.2 Specialized	b.1 Investors	b.2 Loans	c.1 TecHnical	c.2 Business	d.1 Business	d.2 Tecnical / Scientific	e.1 Networking	e.2 External Networking	
Resource belongs to Portfolio?	INCUBATOR	X		X		X	X	X		X		X
	INCUBATED FIRMS (number of firms that declare the resource belongs to the incubator's portfolio)	7	1	3	1	1	4	4	1	4	3	7
IMPORTANCE RATE (1 to 5)	INCUBATOR	1	5	3	1	3	4	5	5	5	5	5
	INCUBATED FIRMS (AVERAGE)	3,1	2,7	4,9	3,4	2,7	4,8	4,7	4,9	4,4	4,4	4,7
SATISFACTION RATE :	INCUBATED FIRMS (AVERAGE)	3,0	N/A	3,0	N/A	N/A	4,3	3,8	N/A	3,0	2,7	4,0
INCUBATED FIRMS AVERAGE GAP (IMPORTANCE RATE - SATISFACTION RATE)		0,1	-	1,9	-	-	0,6	1,0	-	1,4	1,8	0,7
IMPORTANCE RATE	INCUBATEDFIRMS A	5	5	5	3	4	5	5	5	4	5	5
	B	4	1	5	1	1	5	5	5	5	5	5
	C	3	4	5	5	3	4	4	5	5	5	5
	D	2	5	5	5	-	-	4	5	3	5	3
	E	2	2	5	5	5	5	5	5	5	5	5
	F	1	1	5	1	1	5	5	4	5	5	5
	G	5	1	4	4	2	5	5	5	4	1	5
	NUMBER OF ANSWERS	7	7	7	7	6	6	7	7	7	7	7
SATISFACTION RATE	INCUBATED FIRMS A	5	N/A	3	N/A	N/A	4	4	N/A	4	4	5
	B	3	N/A	N/A	N/A	N/A	3	3	N/A	N/A	N/A	3
	C	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3
	D	1	N/A	N/A	N/A	-	-	-	N/A	1	1	2
	E	2	2	N/A	N/A	1	-	-	N/A	N/A	N/A	5
	F	3	N/A	1	N/A	N/A	5	3	N/A	3	3	5
	G	5	N/A	5	5	N/A	5	5	5	4	N/A	5
	NUMBER OF ANSWERS	7	1	3	1	1	4	3,8	1	4	3	7

Source: The authors themselves.

Legend:

Importance and Satisfaction rate scales: From 1 to 5, where 5 is the highest rate.
N/A (Not Applicable) - When more than 3 incubated firms report the resource does not belong to the portfolio, satisfaction rate = "Not Applicable" (N/A).
Information in dark grey show resources with the biggest gaps between importance and satisfaction, which mean lower overall satisfaction and, thus, must have customer satisfaction improvement priority.
Information in light grey show resources which have smallest gaps between importance and satisfaction rates, which mean highest overall satisfaction

Therefore, according to the proposed methodology, customer satisfaction evaluation for a given resource must consider the combined analysis of the following information.

- Displayed in Table 5:

1. the importance rate of each resource to fulfill their business objectives as well as their satisfaction rates with these resources (as well as the resultant gap).
2. the eventual differences between the perspectives of incubated firms and incubator.

- Displayed in Figure 4:

3. the evidence related to the characterization of the incubator, which defines its Model and Type and brings understanding about its vocation as a resource provider and about the characteristics and resources that motivated the incubated firms to join this business incubator. Displayed in Table 4:
4. the incubatees´ perception about their main challenges to succeed in their markets and which resources were critical to overcome them.

Closing this section, Figure 5 concludes the methodology's empirical validation and confirms the achievement of the objectives of this research, which are to design a method to evaluate resources' customer satisfaction and to identify opportunities for satisfaction enhancement. Figure 5 displays the result of the combined analysis of the four groups of information above listed and focus in presenting the incubatees' satisfaction assessment of the resources least suited to the needs of the incubated companies and, therefore, with the biggest opportunities for improving the customer satisfaction level.

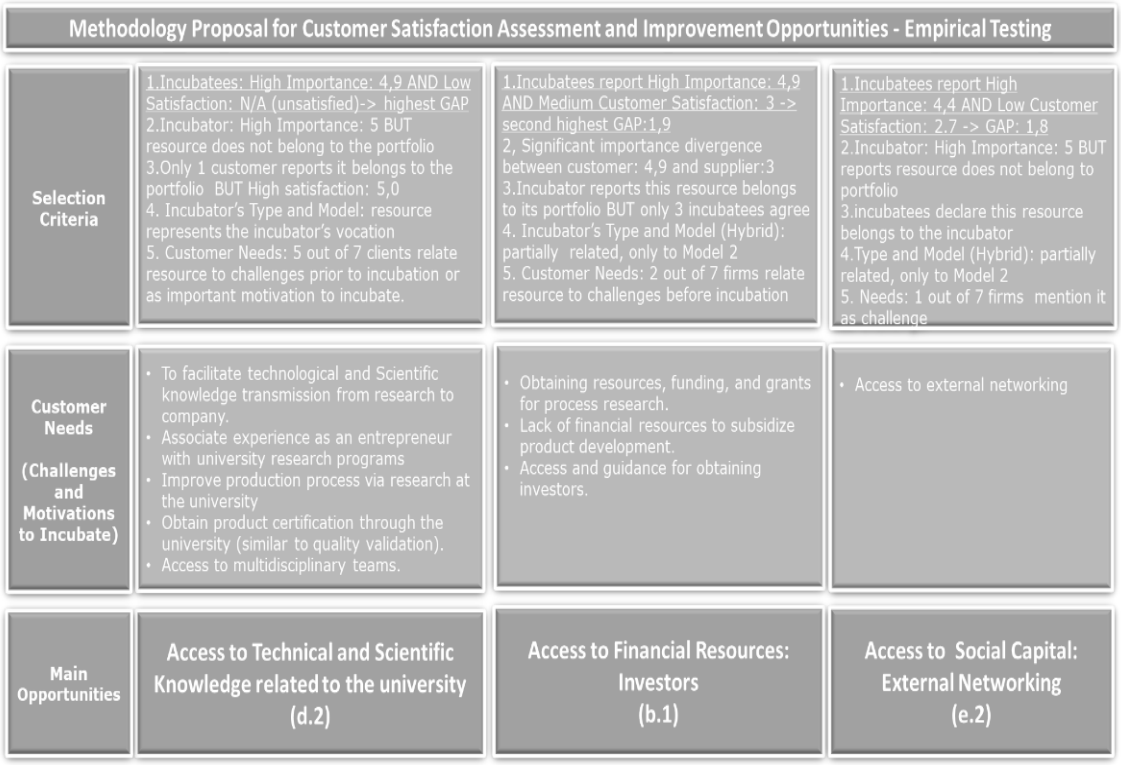

Figure 5 - Methodology Proposal – Empirical Validation.
Source: The authors themselves.

Applying the combined information analysis as proposed by this methodology, the "Access to University's Technical and Scientific Knowledge (d.2)" was identified as the most important opportunity for resource and general satisfaction improvement and will serve as an example to resource satisfaction assessment. The following list of variables is a guide to perform a resource customer satisfaction assessment :

a) Rate of customer satisfaction
b) Resource importance level (customer's perspective)
c) Gap size (B – A)
d) Resource importance level (supplier's perspective)
e) Divergent/Convergent customer-supplier perspectives on the resource importance level
f) Resource is part of the incubator's portfolio? (customer's perspective)
g) Resource is part of the incubator's portfolio? (supplier's perspective)
h) Divergent/Convergent customer-supplier perspectives about the resource belonging to portfolio
i) Incubator's Type and Model: is the resource a fit to this incubator or does it represent the incubators' vocation as resource provider?
j) Is the resource related to the main customer motivations to join the incubation program under analysis?

The succeeding analysis makes use of average rates, aiming to support actions to improve resource satisfaction for all incubated firms:

Incubatees assign to resource (d.2) a high average importance (4,9), and a low average satisfaction (N/A, which means unsatisfaction) resulting in the highest gap between importance and satisfaction. The above information indicates a significant trend towards a low resource satisfaction evaluation. In addition, the incubator representative assigns high importance to d.2 (5,0) in agreement with the incubatees rating. But, reenforcing the trend towards a low resource satisfaction, both incubator and incubatees agree that this highly important resource does not belong to the incubator's portfolio (except for one incubated firm that reports the resource not only integrates the incubator's portfolio but also assigns the highest satisfaction rate to d.2, equal to 5,0). This apparent contradiction will be detailed subsequently.

Concerning the incubator's Type and Model - according to Grimaldi and Grandi's paradigm, it was classified as a hybrid model between a technology-based incubator and a traditional incubator and of the type University Business Incubator – resource d.2 represents the incubator's vocation and 5 out of 7 incubatees understand that resource d.2 addresses an important business challenge – the need for innovation and differentiation - and that resource d.2 figures as a very important motivation to incubate.

Indeed, companies that envision using scientific research as support to the creation of innovative products, processes or services are inclined to expect easy access to research groups of excellence through their incubator, in contrast to companies that intend to operate in traditional segments where knowledge is of public domain (Eschholz et al., 2018). Therefore, the incubated firms interpret the university's research units as their own RandD departments, and therefore as their main source of innovation. However, the prevalence of RandD as the main inducer of innovation has been questioned by theoretical and empirical academic studies that point out the diversity of innovation types - of product, process, business model, logistics, among others - and the recognition of different areas and types of professionals that also generate innovations, the so called hidden innovators (Baptista Narcizo et al., 2019; Barge-Gil et al., 2011).

The answers to the exploratory questions add understanding to the previously mentioned contradiction. Three out of seven incubatees that were engaged in research projects prior to joining the incubation program stated general satisfaction with the incubator. The fact they already had access to resource d.2 before joining the incubator explains why they did not consider this resource as pertaining to the incubator's portfolio and why they did not consider rating their satisfaction with this resource.

On the other hand, four out of seven incubated firms that were seeking university-related resources such as product innovation, product or process quality certifications, but were not previously engaged in research projects, declared low overall satisfaction ratings. These incubatees did not account for the availability of a resource they rate as highly important and thus expressed their total dissatisfaction with resource d.2. Table 6 shows the relationship between overall customer satisfaction and prior access to resources that express the "raison d'être" of UBIs.

Table 5 - Relationship between overall satisfaction with the incubator and entrepreneur's previous linkage with University Research.

Incubated Firms	Number of resources considered to belong to the portfolio (out of 11 resources)	Average Satisfaction with the resource portfolio	Overall Satisfaction with the incubation programam	Is your business resultant from an university's research program?
A	7	4,1	5	YES
B	4	3	4	YES
C	2	2,5	2	NO
D	4	1,8	2	NO
E	6	2,2	3	NO
F	7	3,3	2	NO
G	8	4,9	3	YES

Source: The authors themselves.

CONCLUSION

This research elected as object of investigation to understand and evaluate the adequacy of the supply of resources to the needs of customers in a Business Incubator, with the purpose of proposing a methodology to assess customer satisfaction in a business incubator and identify opportunities for satisfaction enhancement. The results found in its empirical application demonstrate that the methodology meets the proposed objectives. The methodology adopts a systemic approach to evaluate customer satisfaction, which demands the combined analysis of a set of elements that must be collected during the empirical phase. With these elements in hand, the methodology's user can both assess customer satisfaction and, under certain stablished criteria, identify the main opportunities for satisfaction enhancement. Incubators can benefit from the methodology's application results, as they might also provide understanding either concerning actions towards resource quality improvement or regarding the alteration of the current customer selection strategy.

The proposed methodology also meets the objectives of being applicable to incubators of any model and type or region. However, in the case of big samples or in comparative applications of this methodology, the validity of the research structure should be reviewed. Concerning the ease of use and execution the objectives were partially met, since disadvantages might come from the interview duration, which in average took 40 min, and the need of specialized human resources to collect and interpret answers to qualitative questions.

Finally, in relation to the objectives of quick data consolidation and analysis, the bigger the samples, more the agility depends on the balance between subjective and objective data. If speed is required, empirical research should concentrate efforts upon objective data collection and analysis.

Concerning the limitations of this investigation, the methodology was validated in one incubator with small population and sample. Therefore, further research should be conducted to encompass larger samples and comparisons between incubators aiming to support broader initiatives.

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