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THE INTERNATIONALIZATION IN THE INNOVATION PROCESS IN INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) BRAZILIAN STARTUPS

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Abstract

Objective: To understand how the innovation process is impacted by the internationalization strategy of the Brazilian ICT startups.

Method: The multiple cases study was adopted with seven startups. The analysis was based on the concepts of internationalization strategy defined by Carneiro and Dib (2007) and the innovation process of Tidd and Bessant (2009). Data was collected through interviews with the founders of the startups, documental analysis and observation.

Originality / Relevance: Internationalization and innovation are usually addressed separately and focused mainly in large companies. Studies connecting both themes are scarce in the academic literature., especially in emerging countries.

Results: The motivation, the choice of the country, the time to internationalization, what was internationalized and the way the startups arrived in other country impacted the innovation process of the startups. However, it was observed that the choice of the country and the form of entry contributed more to the innovation process of these nascent companies.

Theoretical / methodological contributions: The academic contribution is the empirical observation of the innovation process, considering the internationalization, in startups in an emerging country. Through the results, eight propositions were brought up to path future studies about those themes.

Social / management contributions: Based on the innovation process as a way for startups to be competitive this study contributes by identifying internationalization strategies that lead startups to the advancement of the innovation process. In this way, Brazilian ICT startups and public policies can support the development of these strategies.

Keywords: Internationalization strategy. Innovation process. Startups. Information and Communication Technology (ICT).

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1 INTRODUCTION

The internationalization of companies has been related to acknowledge learning, which leads to innovation, which in turn is a way that companies can remain competitive. In this way, some studies treat internationalization as a way to expand resources and achieve innovation in companies (Boermans & Roelfsema, 2016; Hsu et al, 2015; Kafouros et al, 2008), even though there are few studies about the internationalization and innovation of nascent companies (Pilwarsch, 2017).

A serie of theories about internationalization have already been outlined, however, their focus is usually large companies. In Brazil, for example, there is the Fundação Dom Cabral (FDC) Ranking of Brazilian Multinational firms which addresses company internationalization (Barakat et al, 2017). Even though small companies are becoming more and more representative in the economies of countries, the phenomenon of internationalization in these companies is still rarely studied, especially in developing countries.

On the other hand, Brazil since the year 2000 has been accompanying the worldwide development of a new model for companies, namely startups. Ries (2012) has defined a business model to differentiate the administration of a traditional company and a startup. The concept proposed by Ries, the *lean startup*, defines startups as institutions in which people are trying to create something new under conditions of extreme uncertainty. Blank & Dorf (2012) also recognize the revolution of the concept of the *lean startup* in business. To them, startups are temporary organizations that are projected to seek a scalable, repeatable and profitable business model. This generally occurs with innovative products which have potential within the global market, and which visualize, from the outset, operating in markets outside of their country of origin. Within this context, learning becomes fundamental, given that establishing a new company in a foreign country makes it possible to update innovative capacities (Jones & Coviello, 2005; Weerawardena et al., 2015; Zijdemans & Tanev, 2014) and this benefits the development of these nascent companies.

In this work, the term startup is used in the broad sense of companies that internationalize in their first years of operation and share the idea of uncertainty in regard to the business model, or in other words, they are dependent on innovation and this can, in turn, benefit from internationalization. The internationalization of companies

brings with it various concepts, such as *born globals* (Knight & Cavusgil, 1996; Autio; Sapienza & Almeida, 2000), *international new ventures* (INV) (Oviatt & Mcdougall, 1994), *global start-ups* (Madsen & Servais, 1997), and *borderless firms* (Da Rocha et al., 2017) with each one having its own characteristics in terms of operating abroad, the percentage of revenues from abroad, and types of entry. To study nascent companies, Carneiro and Dib (2007) propose an approach closer to the entrepreneur, where decision making is generally centralized. To these authors, strategic thinking, in whatever context, involves the identification of a set of issues, the selection of options, and a conceptual way of evaluating them, identifying possible courses of action, measuring key variables and selecting their paths to internationalization.

Startups are not just those companies created for the internet, even though this model is more frequent because it is less expensive to start a company online (Bicudo, 2016) and the return on investment occurs more rapidly. In addition, ICT startups, companies that provide technological solutions with software and cell phone apps, have gained space and visibility, because the expansion of digital business has become easier, quicker and economic – and it offers products and services which are repeatable and scalable.

Brazilian ICT startups are the subject of this work, because, with globalization, access to the internet and new communications technologies, these startups are being created with global technologies and competition can occur on the global level, and this justifies the internationalization of their search for innovation. Within this context, Tanev (2017) argues for the concept of a *lean global startup* for nascent high-tech firms which internationalize as soon as they are founded, which reinforces the idea of Alcácer, Cantwell, & Piscitello (2016). To these authors, technology signals the reality of a new paradigm where various elements can change: the competitive advantages of locations (there is a new understanding of locations), the competitive advantages and strategies of companies (there is a new understanding of property) and the structure of governance in international business networks (there is a new understanding of internationalization).

ICT companies are associated with innovation and high-tech, and a study of accelerators in Brazil (Abreu & Campos, 2016) indicates that more than 80% of startups belong to the ICT sector. So, considering the representativeness of these startups in the Brazilian economy, this analysis of the impact of an internationalization

strategy on the innovation process is justified, because the competitive strategies of ICTs are based on innovation.

Innovation, in general, is presented through specific metrics, as a result of a process that culminates in registering patents or an increase in performance. These metrics are not applied to nascent companies, and considering the uncertainties of the startup business model, in this work we have sought to identify the innovation process, demonstrating the stages within this process. Therefore Tidd & Bessant's concept (2009) has been applied, given that it divides the innovation process into four stages (search, selection, implementation, and capture), and this proposal is directly related to the concept of learning.

Thus, the objective of this work is to evaluate how the internationalization strategy affects the innovation process in Brazilian ICT startups.

2 THE INNOVATION PROCESS

Innovation and the growth of scale are the pillars that differentiate a startup from a normal business during their initial stages. There are many different innovation definitions in current research and, in general, the number and diversity of these concepts lead to a situation that does not enable a clear and unique definition of innovation. Independent of the innovation proposal they always include two points: 1) it is multi-stage process through which organizations transform ideas into products, services or new processes or improvements and 2) it refers to the use of a series of novelties, for example, new products or services, new technologies, new organizational structures, or new administrative systems, new plans and new programs, with the objective of increasing organizational performance and growth, while maintaining a sustainable organization and achieving organizational success (Rujirawanich, Addison & Smallman, 2011; Baregheh, Rowley & Sambrook, 2009).

To the Organization for Economic Cooperation and Development (OECD) the activities of innovation include all developmental, financial and commercial activities that result in innovation for a company. Innovative businesses are new or improved business products or processes (or a combination thereof) that differ significantly from the business products or processes commercialized or used by a company (OECD, 2018).

Innovation is a complex aspect to measure, and generally indicators such as financial performance (Gopalakrishnan, 2000), the development of new products (Rhyne, Teagarden & Panhuyzen, 2002; Yang & Li, 2011), increases in sales or the workforce or even patents (Sampson, 2007) are used to measure it. Most of these indicators are distant from the reality of startups, and therefore the results of innovation may not reflect this reality.

Considering that innovation is a process that can be learned, and therefore aligned with the perspective that startups seek knowledge and resources through internationalization, the concept of Tidd & Bessant (2009) was used in this study, considering the defined process stages and not viewing innovation as a result. Figure 1 shows the stages of innovation processes proposed by the authors.

Stages	Brief description of stage
Search	Finding internal and external resources that can generate innovation
Selection	Using methods to select the best opportunities
Implementation	Making alterations in products, services or technology
Capture	Learning from the innovation process

Figure 1: Tidd & Bessant's Proposed Innovation Process Stages
Source: Tidd & Bessant (2009).

The first part of the innovation process, the "search," refers to understanding which ideas and opportunities can result in potential innovations to increase the competitive advantage of the organization. Innovations can be related to a specific product, production process or a strategic level of innovation. Innovative ideas include threats and opportunities for change which can come about in various ways: new technologies, new market requirements, changes in legislation, etc. That being so, it is necessary to implement mechanisms to identify, select and process information regarding drivers of innovation.

"Selection" refers to choosing which ideas or concepts will be applied. The strategic alignment of a company and its capacities and abilities determine which projects should succeed in reaching the next stages of the innovation process.

"Implementation" is the real development of concepts identified as projects in the previous stage. This activity combines development, execution, launching and maintaining an internal or external market innovation. This phase is gradual and permeated by uncertainties, but at the end, this is what makes innovation possible.

The review of the innovation process model realized in 2009 by Tidd and Bessant transferred the learning item proposed in the 2005 model to the stage involved

in the “capture” of the value of the innovation. This final phase refers to the learning process that makes it possible to do things better the next time.

To measure innovation in this work, we have sought to identify the actions of startups that are characteristic of the search to the capture stages, sequentially in accordance with Tidd & Bessant’s model (2009).

3 INTERNATIONALIZATION STRATEGY

Ansoff (1993) has defined internationalization as a process of decentralizing the activities which are progressively distributed among the countries where the company intends to operate. This concept has been defined by observing the operations of traditional companies, or in other ways, companies in which innovation and the intensive use of knowledge has not been a competitive strategy. For companies that are already consolidated, the most important dimensions to discuss in internationalization are long-term development and the results are scope, scale, velocity and the type of internationalization (Kuivalainen, Sundqvist & Servais, 2007; Laurell, Achtenhagen & Andersson, 2017).

In the 25 years since Ansoff’s definition, various changes have taken place in the global market, and this proposal for the definition of internationalization is not appropriate for the startup model, given that the internationalization process in a consolidated company is different from the process within a startup. Nascent companies have to deal with the difficulties of not being known in the market, having limited resources, and often can only rely on the entrepreneurs themselves (Zahra, Ireland & Hitt, 2000).

The internationalization strategy of nascent companies is something in development, which is why Carneiro & Dib's strategy (2007) limited itself to evaluating the criteria that companies should consider before initiating an internationalization process. The authors present the five questions that define nascent companies that are seeking internationalization: Why?, What?, When?, Where? and How?, and they are explained with examples in Figure 2.

Item	Explanation	Examples
Why?	Considering the motivation for internationalization	Seeking technological knowledge Market expansion
What?	Product, service or technological internationalization	A product or service process
When?	It is necessary to realize the internationalization movement at most five years after a company's founding	Time in years between the company's founding and internationalization
Where?	Choose the region or country for internationalization	Countries in which the company operates or has an office
How?	Choose the entry mode	Exports (product sales), networking (partnerships) or direct investment (office in another country)

Table 2: Internationalization Strategy Proposed by Carneiro & Dib (2007)
Source: Carneiro & Dib (2007).

Relating internationalization strategy with innovation, we seek to understand how an internationalization strategy affects the innovation process in startups. To do this, we have verified whether startups present innovation for the various motives of internationalization. We questioned them about the choice of the product to be internationalized, the country and time for internationalization, to identify whether these items influenced innovation. The "how," the form of internationalization, was also asked to meet the objectives of this study.

4. METHOD

This exploratory study uses semi-structured interviews with the founders of internationalized Brazilian ICT startups for its data collection, and we also later use content analysis of the results of these reports.

The search for internationalized startups required intense contact with entrepreneurs and directors of organizations within the entrepreneurial ecosystem during the period from July 2018 to January 2019. Incubators, acceleration programs and the Brazilian Startup Association (ABStartup), an association which centralizes information for startups all over Brazil, were consulted. These institutions realize studies of existing startups and provide the name of those approved for incubation or acceleration on their websites, but information about innovation and the internationalization process are not provided there.

After an initial introduction from the Director of ABStartup and other introductions from directors of Brazilian accelerators, we got in contact with entrepreneurs who have already been through the internationalization process, and this began a snowball process. This non-probabilistic method of data collection is

applied in exploratory research of a qualitative nature as is the case in this study. The snowball method is purely based on referrals and a researcher can generate a sample in this way. Based on the identification of a few members of a rare (seed) population, these members are invited to identify other members of the population. Those that are identified in this way are invited to identify others, and so on (Handcock & Gile, 2011; Goodman, 1961).

The initial contacts resulted in referrals to 22 startup entrepreneurs. Ten did not respond to our attempts to contact them and nine responded that they are internationalized, but do not operate in the ICT area. Three startups affirmed that they had just "initiated the internationalization process," which indicates that there is an internationalization movement, but it has not been consolidated. In this way, the sample was established using seven startups who have completed the internationalization process and accepted our invitation to participate in this study. Table 1 displays the relationships between the studied startups and the general information provided about them. The names of the companies have been retained and our results contain a more detailed description of these startups.

Table 1: Selected Startups

Characteristics	Startups						
	1	2	3	4	5	6	7
Location (State)	SP	SP	SP	SP	RJ	MG	PR
Participated in the internationalization program	Yes		No			Yes	
Number of partners	3	2	3	1	3	4	4
Mode of internationalization	Exports			Network	Direct investment		
Year of founding	2015	2013	2016		2010	2016	2015
Year of internationalization	2016	2017	2016			2017	2015

Source: Firsthand research conducted by the Authors.

5 RESULTS

5.1 Startup 1

Startup 1 was founded in 2016 with the participation of its CEO in an acceleration program called the Founder Institute. The entrepreneur had already worked in exchange agencies in Australia and knew the course offerings quite well. The CEO innovated in developing an online management system for education

agencies, international schools, and school exchange housing and service providers. This software simplified the selling of international trips, provided the tools necessary to involve students and partners in an intelligent manner. By 2016 it already handled the needs of agencies in Australia, due to the founder's contacts and today handles customers in 40 countries. The motive for the internationalization of Startup 1 was to keep on expanding its operations, so it can be classified as the search for resources to remain competitive, or within the scope of this work, innovating. However, the innovation process, did not go through the selection process, because even though he sought to meet market demand, there was not a more critical analysis. Due to the product's characteristics, a CRM for exchange agencies, a large amount of contact with other countries is inherent in this type of business.

The product was offered to agencies, initially those that the director had access to, and later through their referrals. The time that it took to win over these first customers did not affect the innovation process. However, the choice of the location and the internationalization did. Choosing to commercialize its product in a location where the entrepreneur already had previous work experience enabled the company to have greater domination of the market and implement changes in the product. These changes occurred quickly with the entry of the company into a new country. It's interesting to point out that in talking about internationalization, the entrepreneur emphasizes, "we didn't plan go to Japan because the payment method there is very different."

The form of internationalization selected was the commercialization of the product (export) which is digital. The directors took turns doing night shifts to offer "24-hour customer service" to countries in very different time zones. Even though the internationalization was successful through exports, due to bureaucratic issues, the startup had to recently open a company in the United States to shift money to a foreign bank account; in other words, they have opted for direct investment.

5.2 Startup 2

This startup developed an innovative app that uses the GPSs of cell phones to advise the guards at schools when students' parents are arriving to pick them up. In addition to increasing the agility of students' leaving school, the offering of safety is also a value of this startup.

Participation in internationalization programs with countries such as Canada, France and Colombia was decisive in the internationalization process. The startup's CEO believes that these international missions were fundamental to getting to know the market. He points to internationalization as being necessary "to understand the market, by research or by experience. By experience is more expensive, but much better, more rapid and precise, but research can work as well." His first international customer, a school in Canada, appeared after one of the international missions.

In terms of innovation, the product is frequently updated, always aggregating proposals in Brazil as well as abroad. Through internationalization the company has been exposed to demands that can be incorporated in the product and also offered in Brazil and other countries where the company operates. For example, the need to follow the hours and names of the passengers of the school bus in Canada made the startup offer a new service to those who operate vans and individual services in Brazil.

5.3 Startup 3

This startup is managed by four partners and an investor, who command a team of 24 people divided among two municipalities in São Paulo. The product developed is management software to administrate work travel expenses. In addition to having data recognized by artificial intelligence, Startup 3's innovation is the capacity to integrate ERP authorizations and enabling people to follow resources from beginning to end, using IT.

Even though it's aimed at small and medium sized companies, it's been the Brazilian affiliate's meeting of the needs of multinational customers that has opened up doors to five other countries. The manager states that they never made an internationalization plan. "It's been organic," and other multinational affiliates already established in Brazil had the same demand.

The software was written in English and Spanish due to its approval for serving multinationals, which generally do not have subsidiaries in Brazil. The approval of a decision by a Brazilian CEO depends on approval from a foreign office. Soon, the same product was offered in Brazil, without the specific modifications demanded by other countries.

The manager, even though he already meets the needs of multinationals, states they don't have any interest in trying to deepen their internationalization strategies at

the moment. To him, a startup to internationalize needs to “research the market and understand the pain” and with a “gigantic” Brazilian market, he believes that they need to strengthen the brand before taking the next step.

5.4 Startup 4

The startup’s only founder had previous experience in academia and as a businessman, and thus combined know how to apply it in simulators in the active learning process of forming a business. Startup 4’s product is an online course in entrepreneurship which is innovative in its use of simulators. The entrepreneur affirms that it is possible to experience what it is like to be an entrepreneur and through these simulations one can see the consequences of decisions taken during the course and learn from them. The simulator is based on an extensive database and the course was developed by the founder in partnership with a professor from the United States.

The international relationship occurred due to his proximity to specialists in this subject and they connected him through associations dealing with this area and proposed the co-designing of the product. Filming and feedback from the international professor were essential to “feeding” the simulator with data and thus optimizing the product. The main contribution of the partnership has been “being able to understand how others view the product” considering the foreign students.

5.5 Startup 5

Bothered by the difficulties that small companies have in presenting their brand, a commercial presentation or a façade with a more professional appearance, this entrepreneur founded Startup 5. The company’s been on the market for 9 years, and the founder still classifies the company as a startup due to its search for an ideal business model. The innovation that differentiates it from a simple designer service or advertising agency is a platform that combines methodology, technology and customer service, offering small entrepreneurs a service that is already known for large companies: advertising through creative competition.

The client defines the value to be paid for the solicited service and the professionals registered on the online platform accept the project, posting the creation to the selected client. All this is done through the internet and the founder tells us that the platform’s modifications are defined by the clients. The startup was founded in 2010, but it only added a co-working office in Portugal in 2016. This measure was taken

to better serve strategic clients who had already used the website, but had difficulties making payments to a Brazilian company. The entrepreneur emphasizes that the name of the startup already envisioned internationalization; “we always have been thinking of the world market.” Thinking of expanding to the world market, the founder says that “80% of the Portuguese designers on the platform also speak English and 40% also speak French, therefore if we wish to enter other markets, we need to put an effort to meet the needs of these customers.”

5.6 Startup 6

Startup 6 offers a platform with digital content in real time. The differential characteristic of this product is the ability to integrate various forms of media and social networks. The startup’s idea began to be developed in 2016 when one of the partners lived in the United States and decided to become an entrepreneur. After being accelerated by one of the largest ICT accelerators in the world, TechStars, they formalized the company’s headquarters in a company incubator, Plug and Play, which is in Silicon Valley, which is known to be a rich ecosystem of entrepreneurship and innovation.

The entrepreneur tells us that internationalization stimulated changes in the product even during the acceleration process:

> [...] we had various mentors there, and we had the chance to choose our mentor and see various talks there, and we changed our direction a little and saw that it would be interesting to do something with greater amplitude for live events, in which the final users could accompany what was happening during a live event.

After the acceleration experience, part of the team returned to Brazil and began developing the database which is fundamental to how current the platform is. The acceleration was fundamental for Startup 6 in terms of access to capital and the validation of its business. The partner explains that

> […] when you enter TechStars, you have a greater guarantee, meaning that investors see you with different eyes... There are investors who only invest in companies that enter TechStars... (there are) people there in the United States who only work with companies that work with these accelerators, so there’s that as well.

5.7 Startup 7

Startup 7 positions itself as a platform for managing processes virtually. The director of startup operations, who is also one of the founding partners, emphasizes that the company was already born global. Based on the input of mentors of this

software in Israel, the four partners decided to participate in a five-month acceleration program in Silicon Valley.

The main motive for internationalization was the ease of access to international credit. In addition, the acceleration program admits that only a portion of its companies will survive and generate profits. Thus, this approval from the accelerator represents a very strong validation for those who are looking for a series of investments. The entrepreneur commented:

> Just the fact that we're looking at the global market, already exposes us to greater opportunities from the start and also required us to be more demanding; the bar was very high…we had to go outside of our comfort zone, competing with other firms, and it was very good that we were already thinking in this way.

The product did not require significant alterations, "because it was already born in that reality." Even though it is used in over 140 countries, the director affirms that he has never made a campaign to attract foreign customers.

6 ANALYSIS OF THE RESULTS

The content of interviews with the founders was analyzed to understand the relationship between internationalization strategy and the innovation process in the studied startups. To achieve this, we observed the motivation for internationalization, the element internationalized, the location, the time taken to internationalize, and the form of entry in other countries. Based on their responses, we were able to identify how the innovation process evolved based on each element of the internationalization strategy. In the summary tables, we display the evolution of the stages of the innovation process using the blue color, both light blue and dark blue, which represent the stage in which the startup enters the innovation process with the item of analyzing the internationalization strategy. These results form the basis of eight propositions involving the impact of internationalization strategy on the startup processes in internationalized Brazilian ICT startups.

6.1 Why? The motivation

Analyzing the innovation process in accordance with the motivation for the internationalization strategy, we observed that some startups did not have strategically thought out internationalization, or in other words, they were just meeting external demands, and did not advance in the innovation process. This is the case with Startup

3 which “met the needs of multinationals operating in Brazil,” and Startup 5, which also began with foreign demand, but without it being identified as a strategy by the company. These two startups offer their products in a “*self-service*” manner, which is often used by digital products, and there are options on the websites where the company and the customer can register and make payments online using the tool.

According to the results, Startups 1 and 2, which adopted the internationalization strategy due to the expansion of the market, did pass through the “search” stage in the innovation process. Through the experience of the founder of Startup 1 it was possible to observe the market dynamics, and he developed an application with a new technology in a market that he was already familiar with. Startup 2 also initiated the innovation process by making a qualified “search” through the connection process, defined by contact with various international missions. In addition, Startup 2 had to choose which internationalization program to select (Canada or the USA) and this choice affected the startup’s innovation process, because in choosing the program which represented greater competitiveness, he had to make alterations in the startup’s product and processes, thus arriving at the “selection” stage.

Startups 4, 6 and 7 presented an internationalization strategy motivated by the search for foreign knowledge or resources and this deliberate exposure to new markets brought different aspects that these startups had to address. The search for external connections already displays the pre-disposition of these startups for the “search” stage and the exposure to international acceleration programs brought external knowledge such as mentoring and networking with a new mindset model, and the practical possibility of implementing the innovation process. The partner of startup 6 tells us that the product that was offered changed completely during the acceleration process (this process is known as pivoting, a lean startup term that refers to the changes in the objectives that the startup seeks to implement) and also changed its name “to be more global,” or in other words, the “selection” process was identified in these startups. The founder of the only startup that internationalized through a partnership, Startup 4, states that being exposed to external knowledge was fundamental to improving the entrepreneurship course that uses simulators. In this foreign experience, the entrepreneur could film students realizing the course in Asian and American classes to better understand the reactions of students according to the

decisions of the simulators. Thus, it was possible to choose which alterations will be made in the product according to the options which present positive reactions during the experience.

Below, Figure 3 displays the analysis of the innovation process in accordance with the startup's motivation for internationalization; the darker the blue, the greater the advance in the stages of the innovation process:

Internationalization strategy: Why? Motivation		**Advance in the Innovation Process**			
Startup 1	To increase the market	Search	Selection	Implementation	Capture
Startup 2	To increase the market	Search	Selection	Implementation	Capture
Startup 3	To meet demand	Search	Selection	Implementation	Capture
Startup 4	Seeking knowledge	Search	Selection	Implementation	Capture
Startup 5	To meet demand	Search	Selection	Implementation	Capture
Startup 6	Seeking knowledge and financial resources	Search	Selection	Implementation	Capture
Startup 7	Seeking knowledge and financial resources	Search	Selection	Implementation	Capture

Figure 3: The Impact of Motivation on the Internationalization of the Innovation Proces
Source: Firsthand research conducted by the Authors (2019).

The results obtained show that in terms of the motivation of the internationalization strategy, in addition to seeking technological knowledge or market expansion, which are characteristics of consolidated companies, the startups indicated other reasons for searching for internationalization and these motivations affect the innovation process.

We have identified, for example, the need for global recognition of startups which seek to participate in acceleration processes abroad. This is a form of validation that supports the operations of these startups, because it facilitates access to foreign investment, mainly venture capital. This result is aligned with the findings of Gabrielsson, Kirpalani, Dimitratos, Soberg e Zuchella (2008) who propose that sustainable born global firms seek out risky venture capital within their own country and/or abroad.

The startups that declared that they were motivated in their internationalization strategy by their search for knowledge, participated in internationalization programs or even international missions. The entrepreneurs of these startups report that abroad, mainly in Silicon Valley, in addition to the advantages of an abundance of financial resources, there are investors who are more receptive and the participation in the

innovative ecosystem stimulates changes and does not condemn failure. This way the startup gains velocity in testing its ideas and correcting them quickly, in accordance with the concept of a lean startup. In testing these ideas, the startup innovates and can pivot to remain competitive as was the case with Startup 6.

This strategy of exposure to the international scenario with the goal of raising funding, achieving international recognition and seeking learning, leads us to the following propositions:

Proposition 1: Brazilian ICT startups advance further in the innovation process by seeking foreign investment.

Proposition 2: Brazilian ICT startups that have an internationalization strategy motivated by seeking knowledge advance further in the innovation process than those that export their products.

6.2 What internationalize?

Except for Startup 4, which realized its development process through an international partnership, the other startups internationalized their products or services that were already commercialized in Brazil or adapted to the reality of the destination country. All seven startups in the sample participated in the “implementation” stage, or in other words, they realized modifications in products or processes in accordance with the innovation process. This result corroborates the idea that ICT startups count on the possibility of an agile alteration in the structure of their products, software or apps (OECD, 2018). Innovations based on digital technology include innovations in business products or processes that contain ICTs, as well as innovations that depend in large part on ICTs for their development or implementation. Qualitative studies have found that innovations which are digitally based spread widely and those interviewed have observed their use in a very high portion of innovations in all sectors (OECD, 2015).

All the studied startups described the exposure of customer demand due to new business models and even access to external mentors during the “search” stage. The studied startups rely on open channels with consumers, such as chatbots or emails, and in this way the demand for modifications is constant and guides the development of these products, and this item is directly linked to the search stage. The concept that fits in here is user innovation, where the customer collaborates in the development of the product (Hippel, 2005). According to the interviewed entrepreneurs, there is a

regulating procedure for collecting these customer interactions, and analyses and tests which characterize the “selection” stage. This corroborates the idea proposed by Rasmussen and Petersen (2017) that there is a new business model related to platforms that seeks continuous innovation, instead of patents or one-off results. In two of the startups, we observed formal positions regarding innovation: in Startup 3 there is the figure of a manager of innovation who is responsible for accompanying and compiling all of the data about modifications and trends, and in Startup 5 decisions about new products are approved by the board and passed on for implementation.

All these startups go through the “implementation” stage. This stage is related to product launches and, in these companies, we saw an incremental innovation process or upgrade as it is called in the ICT area. This evaluation, choice and modification of the product occurs so naturally in the digital world, that even the partners have difficulty in classifying the evolution of products as innovations. Despite these innovations in products, Startups 1 and 3 did not handle the learning level of “capture,” as a function of the exploration of their products abroad. They offer their products without any alterations or a continuity of lines, as the learning process has been understood in this work.

The “capture” stage was achieved by Startups 2, 4, 5, 6 and 7, which expanded their applications in the same sense as the initial innovation, configuring learning in the first cycle of innovation. Startup 2 created a service related to the “automatic” physical access of parents to schools. In this sense of learning during the innovation process based on product internationalization, Startup 4 came to apply its knowledge of simulations to other materials. Startup 5 will soon launch an artificial intelligence product to complement its innovation in the codification of receipts. We can consider Startup 6 to have achieved the “capture” stage, because after internationalization, instead of focusing just on games, it began to cover other types of media award events. And finally, Startup 7 also succeeded in this stage, because it developed other applications and tools in the same line as the online management processes that existed before internationalization, such as, for example, the control of hiring its employees.

Figure 4 displays the analysis of the innovation process in accordance with which element the startup has internationalized. The deeper the blue, the greater the advances made in the innovation process:

Internationalization: What?		**Advances in the innovation process**			
Startup1	Product	Search	Selection	Implementation	Capture
Startup 2	Product	Search	Selection	Implementation	Capture
Startup 3	Product	Search	Selection	Implementation	Capture
Startup 4	Development	Search	Selection	Implementation	Capture
Startup 5	Product	Search	Selection	Implementation	Capture
Startup 6	Product	Search	Selection	Implementation	Capture
Startup 7	Product	Search	Selection	Implementation	Capture

Figure 4: The Impact of Internationalization on the Innovation Process
Source: Firsthand research by the Authors (2019).

Large companies can internationalize customer service, research and development, manufacturing, etc., but observing Table 5, in evaluating the element which was internationalized by these startups, six internationalized their already developed "ready" products, software and apps, and only Startup 4 opted to internationalize the development of its product.

The agile profile of IT startups contributed to the evolution of their products in accordance with market demands, and the implementation stage took place soon afterward. It happens that most of the entrepreneurs do not consider these modifications to be incremental innovations. In addition, they emphasize the differences in the relationship with Brazilian customers and foreign customers in the "implementation" stage, and we can infer that innovation in processes was also identified. The startups report little need to interact with foreign customers when the company offers a self-service tool on its website, while Brazilians require meetings, the company's history and phone calls to close a sale. This relationship with foreign customers is a factor that affects the innovation process for startups and deserves greater attention. Even the startups who opted to export their products (direct sales), which would be a simpler form of internationalization, use artifices such as a direct contact telephone line or chatbots to minimize the distance with the customer. In this manner, it is suggested that the proximity with the country that will receive an internationalized startup can be relevant to the innovation process and should be studied. Thus, we arrive at the following proposition:

Proposition 3: Internationalized Brazilian ITC startups will advance further in the innovation process, to the extent that they open communications channels and handle their customers' feedback.

6.3 When?

To analyze the innovation process in terms of the internationalization strategy, we have also observed the time in years between the company's founding and its internationalization, in an attempt to approximate the concept of born globals and the definition of a startup. The results corroborate the proposal of Rasmussen & Tanev (2015) who propose a new concept, different from the born global, to explain the internationalization of "push button" companies, or in other words, companies that can realize their operations through IT. Five (Startups 1, 3, 4, 6 and 7) of these seven startups initiated the internationalization process the same year as, or the year following, the company's founding. This corroborates the concepts of Stayton & Mangematin (2016) who suggest that ICT startups internationalize as they develop, without delineated steps as is the case with multinationals and companies with traditional products.

The founder of Startup 5, who took seven years to set up an office outside of the country, still considers his company a startup because he is still searching for his ideal business model. In terms of internationalization, he says that he decided to meet the already existing demand from customers in Portuguese speaking countries (Portugal and Angola) who had acquired his product online but did not have satisfactory support.

The only startup that presented an alteration in the innovation process considering the impact of time on the innovation process was Startup 2, which won over its first international customers after a mission to learn about the Canadian market. This "search" phase with participation in this mission later led to an acceleration in international business. The "selection" in this innovation process was managed by the accelerator itself which suggested going to Canada first and then Latin America. The "implementation" was changing the product in accordance with the guidelines of Canadian customers. In this manner, it was the only startup in our sample in which the number of years of the internationalization strategy altered the innovation process, because the modifications occurred after the product had been formatted for

the Brazilian market even though it was exposed to an acceleration process abroad. However, this innovation was one-off and did not constitute the "capture" stage.

Below, Figure 5 displays the innovation process in accordance with the time in years between the startup's founding and internationalization. The darker the blue is, the greater advances there were during these stages of the innovation process associated with this item:

Internationalization strategy: When? Years after the founding of the startup		**Advances in the innovation process**			
Startup 1	1	Search	Selection	Implementation	Capture
Startup 2	4	Search	Selection	Implementation	Capture
Startup 3	0	Search	Selection	Implementation	Capture
Startup 4	0	Search	Selection	Implementation	Capture
Startup 5	7	Search	Selection	Implementation	Capture
Startup 6	1	Search	Selection	Implementation	Capture
Startup 7	0	Search	Selection	Implementation	Capture

Figure 5: The Impact of Time on the Internationalization of the Innovation Process
Source: Firsthand research by the Authors (2019).

Evaluating the "when" aspect by looking at the time in years between the foundation of the startups and internationalization, we can affirm that, with the exception of Startup 2, for the other startups the length of time between the startup's foundation and internationalization did not affect the innovation process in the startups examined. There is no evidence for waiting for some specific moment before internationalizing or previous preparation during the search stage which initiates the innovation process.

The ease of internationalization is reinforced in startups that, for example, already began their business in a global language, English. In the ICT area, the access to products have fewer geographic barriers, or in other words, they are accessible through the internet. Neubert (2018), in his study of lean global startups, shows that digitalization allows startups to create knowledge and networks in a quicker rhythm, which increases the efficiency of decision-making processes, which increases the velocity of internationalization. Using internal and external data to forecast the future development of the market, startups increase the velocity of innovation (Neubert, 2018). Thus, we can suggest the following propositions about the influence of the time of internationalization on the innovation process in startups:

Proposition 4: When internationalized Brazilian ICT startups launch their products with international attributes, how many years it took to internationalization does not affect the innovation process of these companies.

Proposition 5: In terms of time, the innovation process in internationalized Brazilian ICT startups occurs in accordance with the lean global startup model, together with internationalization.

6.4 Where?

The internationalization of startups occurs based on the entrepreneur's wishes, the openness of the destination country, and various other aspects (Cannone, G. & Ughetto, E.,2015; Stayton, J. & Mangematin, V, 2016). According to the data collected, the country selected for internationalization can influence the advance of innovation in startups. In the case of Startup 1, due to the various levels of taxation in the countries where it operates, it had to modify the forms of payment offered. The lack of acceptance of installment payments for credit cards, which is common in Brazil, is a decisive factor that has to be adopted to each country in which it operates. In having to meet this initial demand, there was learning and the "capture" of this knowledge to develop an "extension" so that its CRM would match the payment issues in these various countries.

In terms of the selection of countries, it is also interesting to note that the startups that had the experience of an accelerator or internationalization in a given country, chose to open an international office there, or had their first international customer there. This is the case with Startups 2, 6 and 7. Startup 2 evolved in the innovation process due to the country selected, because when it looked for connections through international missions (the search stage), it was able to identify a business opportunity in Canada (selection) and applied it in Brazil (implementation). Even though Startup 2 launched products in the same line, the founder affirms that they are not related to the innovation proposed for the Canadian customer. The other two startups (6 and 7) already initiated their products in English as a way to compete in the global market, a factor which was influenced by their accelerator experience in Silicon Valley. Or in other words, by searching for connections in the international accelerator program, which is focused on implementing the product in the market, they advanced to this stage.

When the selection of the country does not exist, or in other words, the startup just meets international demand, which was the case with Startups 3 and 5, there was no demonstrated advance in the innovation process. Startup 3 met the needs of affiliates of multinationals that it already handled in Brazil, or in other words, without any modification of products and processes, and Startup 5 handled countries in the same language that they already used for its product and also presented no innovation.

Startup 4 points out that the experience in another country made it possible to make changes in its products, and it was very important to understand how people of other nationalities interacted with the product. Besides the implementation, the opportunity abroad made it possible to develop improvements in its simulator and apply them to other areas, which constitutes the "capture" of the innovation process of this startup.

Figure 6 below displays the innovation process in accordance with the location selected for internationalization. The darker the blue, the greater the advances in the stages of the innovation process.

Internationalization strategy: Where? Contact with a foreign country		**Advances in the innovation process**			
Startup 1	Australia +	Search	Selection	Implementation	Capture
Startup 2	Canada and Paraguay	Search	Selection	Implementation	Capture
Startup 3	Bolivia, Argentina, Mexico and the USA	Search	Selection	Implementation	Capture
Startup 4	USA and Thailand	Search	Selection	Implementation	Capture
Startup 5	Portugal and Angola	Search	Selection	Implementation	Capture
Startup 6	USA +	Search	Selection	Implementation	Capture
Startup 7	USA +	Search	Selection	Implementation	Capture

Figure 6: The Impact of the Location Selected for the Internationalization of the Innovation Process
Source: Firsthand Research by the Authors.

In considering the countries which these startups selected for internationalization, we can conclude that the deliberate exposure of startups abroad aggregates value in advance of the innovation process, while the startups that just handled international demand did not even begin the innovation process. In the case of ICT companies, the possibilities of the internet and similar resources from this area, made it possible to handle the entire world, even without actions dedicated to specific

countries. However, the analysis of these results considering the selected countries for internationalization demonstrates that advances in the innovation process only occurred in the startups that internationalized through accelerator programs abroad and adapted their products to international customers. In this manner, we arrive at the following proposition:

Proposition 6: When Brazilian ICT startups define the countries to implement their internationalization strategy, they advance more in the innovation process than when they simply meet demand from abroad.

6.5 How? The form of internationalization

Startups 1 and 2, which realized the export of their products, are open to external market interactions, but this occurred only during the "search" stage where they understood the market's needs, and this form of entry did not influence in advance the "selection" stage of the innovation process. The startups that just met international demand, such as Startup 3, did not even initiate the innovation process, as we can see in Table 8.

Out of our selection of startups for this study, just Startup 4 internationalized through a network. This contradicts the expectations of this work, because studies of INVs (international new ventures) indicate international partnerships as the main way of acquiring external resources (Coviello, 2006). However, this result also appears in the study of Magnani and Zucchella (2019), in which they did not identify the network as a form of diminishing the uncertainty of the startup internationalization process. In the case of Brazilian multinational ICTs, the negative contribution of international alliances to innovation performance has already been identified by Galina (2018) in a qualitative-quantitative study of internationalization and innovation. However, in the specific case of Startup 4, the international partnership in the "search" contributed to the selection of the innovation to be implemented and the understanding the international market, and it was possible to learn with the innovation process. The entrepreneur signaled that the international network was relevant to his understanding of the expectations of foreign customers in terms of his product, or in other words, again it was limited to the consumer's contribution and to innovating and not that of a partner.

In terms of the other Startups (5, 6 and 7) which opted for the direct investment form of entry, the "search" stage was identified by the search to understand the market

and get contact with cutting-edge technology, mainly in Silicon Valley, and the mindset of the foreign investors it encountered there. The chance to be exposed to this knowledge is a differentiating characteristic that compensates for the direct investment of Startups 6 and 7. These results confirm that access to "*soft*" resources, such as interorganizational relationships, also promotes learning and innovation, and international diversity offers exposure to new ideas and multiple cultural and market perspectives (Zahra, Ireland & Hitt, 2000).

Startup 5 did not identify the influence of direct investment on the innovation process, because the selection of the innovation was not influenced by exposure to the outside world. The startup already had an internal board that decides which projects continue to implementation. Meanwhile, for Startups 6 and 7, the selection of innovation was influenced directly by the international accelerator. With a focus on implementation, the acceleration process was stimulated by MVP and access to financial resources. The "capture" phase was justified by the learning obtained in their experiences abroad, which besides the contribution to the launch of innovative current products, brought them knowledge which could be replicated in the startup innovation development process. Or in other words, accelerated startups continue innovating with what they have learned.

Figure 7 displays the analysis of the innovation process in accordance with the form of internationalization. The darker the blue, the greater the advances in the stages of the innovation process:

Internationalization strategy: How? Form of internationalization		**Advances in the innovation process**			
Startup1	Exports	Search	Selection	Implementation	Capture
Startup 2	Exports	Search	Selection	Implementation	Capture
Startup 3	Exports	Search	Selection	Implementation	Capture
Startup 4	Network	Search	Selection	Implementation	Capture
Startup 5	Direct investment	Search	Selection	Implementation	Capture
Startup 6	Direct investment	Search	Selection	Implementation	Capture
Startup 7	Direct investment	Search	Selection	Implementation	Capture

Figure 7: The Impact of the Form of Internationalization on the Innovation Process
Source: Firsthand research by the Authors.

It should be noted that the startups with direct investment, or in other words, at least one employee or partner in a foreign office, affirmed that the commercial operation abroad facilitated contact with foreign customers and also brought with it the aspect of relevance in terms of belonging to an innovation ecosystem that is recognized globally. This international recognition, in addition to facilitating foreign credit, validates the operation of this startup because it is recognized among its peers. This brings us to the following proposition:

Proposition 7: Internationalized Brazilian ICT startups advance further in the innovation process when they opt for the direct investment or network methods of entry.

Proposition 8: Internationalized Brazilian ICT startups advance further in the innovation process when they opt for the direct investment method rather than through exports.

7 CONCLUSION

The internationalization strategy approach has enabled us to deepen our analysis of the innovation process in internationalized Brazilian ICT startups. We have considered the innovation process to be a non-linear cycle of various divergent and convergent activities, within an innovation process translated into stages. Thus, we have evaluated the innovation process in startups considering the motive for internationalization, concluding that an internationalization strategy guided by the search for knowledge and access to financial resources abroad affects the innovation process in startups more than simply seeking market expansion or meeting the demands of foreign customers who access products online.

In trying to understand the innovation process in startups considering the element of internationalization, we have identified that innovation is inherent in startups in general and that entrepreneurs have difficulty in identifying radical and incremental innovations that they realize in their startups and the structure of their innovation processes. The results indicate that innovation in internationalized ICT startups is characterized much more by constant modifications and parallel modifications in their products. The focus on the implementation of the product in the market is affected by foreign customer demands, but this advance was already expected due to the characteristics of the products offered by ICT startups.

In evaluating the influence of the amount of time that the startup takes to internationalize on the innovation process, we have observed that this amount of time does not affect the innovation process, but this does occur when startups already possess products with global technologies and offer their products in English. This result corroborates the idea of the influence of digitalization on internationalization and the appearance of a new type of company termed *lean global startups* that innovate at the same time that they internationalize.

In terms of the relationship between the innovation process and the country selected for internationalization, we may conclude that the location affects the innovation process, affecting also the “capture” phase, or in other words, this item of internationalization strategy affects the innovation process, and contributes to a startup’s learning. This result is explained by the determination of the entrepreneur to define the country in which the company will operate.

Finally, in analyzing the internationalization strategy considering the form of entry, we can observe the greatest impact on the innovation process during the “capture” phase. It is understood that startups that have participated in accelerator programs, international missions or networking abroad advance further in the innovation process than those firms that simply have commercialized their products in foreign markets.

We conclude that the internationalization strategy affects the innovation process in Brazilian ICT startups, however, the motivation, choice of country and the form of entry contribute more to the innovation processes of these nascent companies. Given this, the internationalization strategy affects the innovation process when the entrepreneur is motivated by the search for knowledge of international markets and access to venture capital, or in other words, business investment and a form of recognition in the foreign market.

The choice of the location for internationalization also affects the innovation process when the entrepreneur evaluates the psychic distance between markets, and they opt for countries where they feel comfortable in operating. Finally, the innovation process is also affected by the forms of entry of direct investment or networks. This study’s results show that large accelerators require that startups realize direct investment in the foreign country selected. With a foreign operation, startups gain

proximity to foreign customers and stand out because they are part of the reference ecosystem, in this cases, part of Silicon Valley startups.

The managerial relevance of this work is based on the innovation process as a way for startups to remain competitive. In identifying internationalization strategies which lead to advances in the innovation process, Brazilian ICT startups can direct their efforts in this sense, mainly based on their results as much as their form of entry which offers an important indication of the importance of maintaining, broadening and specializing internationalization programs specific to Brazilian startups.

This work's academic contribution is related to the understanding of the innovation process in startups in a developing country which are considering internationalization. The influence of digitalization and the appearance of a new type of company, namely *lean global startups*, should also be studied for emerging countries, due to the impact of nascent firms on the economies of these countries.

The limitations of this work involve our restricted non-probabilistic sample, which does not permit generalizations because it is a multicase study. The field of analyzed startups, ICTs, has distinctive characteristics in terms of internationalization and innovation, given that they are already considered innovative and the internationalization process in this area involves software and apps which are facilitated by technology. It is possible to sell a product, an ICT solution, to other countries through a company's website, and this constitutes exporting it, therefore we suggest a study of startups in other areas. In addition, a mapping of internationalized startups or the availability, through government agencies, to identify these companies, would permit quantitative works to further the understanding of the innovation process in these nascent internationalized companies.

For future studies, we propose a deeper approach to internationalization strategy as it affects the innovation process of Brazilian ICT startups using the prepositions suggested in this work and observing the dynamic capacities of innovation in these nascent firms.

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