

Cooperative technological development and business generation among startups and medium and large companies. Case Study:

Nexos Program (Brazil).

Open innovation is a category in which external partners are sought to enable technological development and support the development of research and development (R&D) projects. This study aimed to investigate the public policies and the relationships between companies of different sizes under support from two institutions that are part of the ecosystem for development of Small and Medium Business in Brazil. That ecosystem has gone been development in order to identify substantive elements that create synergies and increase the innovative potential of the market. Those aprouxes create and enhance the connections that both raise level of innovation in large companies as else promote a support for development of new companies. This article describes from the Nexos Program, which join a large and small companies, one case that results both to insert the Startups into the innovation market by pairing them with larger companies and else raise innovations in large companies. The case at this study shines a light on how an ecosystem fostering business generation between companies for work in a cooperative manner and positioning innovative small businesses as strategic partners in the pursue R&D activities, are fundamentals for the development of competitive economic.

Keywords: Open Innovation, Lei do Bem, Nexos Program, Brazilian Inovative System

Introduction

In the last years it has been observed a growing interaction between companies, universities, research centers/institutes, innovative environments, and Startups for combining efforts that result in technological development and value creation for society. Large companies understand it is important to be closer to small ones with goal to creating bonds to development new products, services or business model within of their innovation's strategy.

Studies about how companies could be more innovative separate in two groups: larger companies with great market share and budget to make investments, but within a great structure that enforces a slow pace to implement changes. At the other side, the small business with a light structure with focus to development new technologies or solutions realized closer of the market, but with no great revenues and living a fight to survive. The environment which approach these two worlds promote not only the development of new products, but in some case reusing or redesign assets not digital to digital market. (WESTERMAN et al., 2015)

Since last 20 years a large number of companies has trying to be innovative by offering new technology, products or even new business model, encouraging a number of books, paper and specialists about innovation. One of most used concepts when the subject is innovations is disruptive innovation, but, as Christensen who was the first to describe this concept in 95' said: "too many people who speak of "disruption" have not read a serious book or article on the subject." (CHRISTENSEN; RAYNOR; MCDONALD, 2016). In this article the root of concept is clarified that disruption is when a small company with few resources is able to successfully challenge establish incumbent business. (CHRISTENSEN et al., 2016)

A large number of countries understood how important is offers support for new companies which born to be innovative, and so they have creating laws e financial incentives for ecosystems for Small and Medium Business (SMB). (TEM REFERENCIA) That environment with public sector, private companies and university has a goal to be one of many elements for SMB increase their solutions and leverage it for create large companies, for instance in clean technology companies (LEE, 2017). For Oslo Manual of innovations, the connections with ecosystem can boost company become an innovation company extending their boundaries (OECD; EUROSTAT, 2018).

For SMB, especially those are not at conventional market, at the start operation there are "Death Valley" which to bypass depend of ecosystem on "supporting experimentation, implementation, and exploitation, particularly at an early stage, while at the same time allowing different approaches to the solution of a problem to co-evolve and compete" (EDLER; FAGERBERG, 2017). Financial resources are one of the most important elements to through this period, and for this, the innovative SMB needs resources not from traditional banks that hasn't instruments for this new market. Access to Venture Capital is more suitable because small companies cannot offer collateral for loans or other traditional credit instruments. (CARLOS, 2005).

The traditional credit providers tend to be more conservative an risk averse; especially at markets that are still developing and state-owned entities have failed to provide sufficient access to finance (ZIEGLER, 2020) In modern market the relationship between lenders and borrowers demands new instruments specially for SMB market. The speed which SMB are created and growth, or even death, is faster each year. New technologies are development and

transform into new companies or products claim financial resources to cash flow or investments. As an answer for that demand the financial market has been moving to offer new innovative instruments for support innovation for companies and entrepreneurs.

Even in the new world scenario where the Covid-19 brings a large new challenger, new instruments of credits as corporate venturing, intellectual property, marketplaces, crowdfunding, fintech solutions and public support schemes has been supporting the demand for innovation's finance (INSEAD; WIPO; CORNELL UNIVERSITY, 2020). The financial demand for innovations faces the individual characteristics of market at each country. For SME's, that are the engine of job creation, there is a lack to access finance both to support the operation and innovations projects ("MSME Financ. Gap", 2017). The alternative finance market emerges with new ambient to offer connections between SME's and financial sources, which the limits of boundaries can be reduce by digital platforms. At the study of Cambridge University shows the growth of numbers of projects that received investments around world by alternative finance instruments (CAMBRIDGE CENTER FOR ALTERNATIVE FINANCE, 2020). (input numbers)

In Brazilian market the companies that initiate in last two decades their operations have a historical battle for access to financial instruments, but during this period new publics support to innovate by National Politics for Innovations which publics banks like BNDES (DENINIR) and Finep (DEFINIR) as well as fiscal instruments that create incentive for large companies make invest in innovation project together SME (DE NEGRI; BORGES LEMOS, [s.d.]).

Beyond those initiatives, for Brazilian entrepreneur program such as the Startup Brasil from the Ministry of Science, Technology, Innovation and Communication (MCTIC) connect Startups with accelerators for professional training and bringing together clients and investors. The Program Connecting Startup Brazil also leaded by MCTIC gathers other actors (science and technology institutions, investors, mentors) and large companies to stimulate the alignment of qualified Startup to real demands from the Brazilian industries (Ministry of Science, Technology, Innovation and Communication, 2019). There are also many private innovation clusters, such as InovaBra, a co-innovation space from Bradesco Bank in São Paulo, created with the purpose of promoting integration among different actors from the national innovation environment. These are only a few of many examples of what is being called open innovation at a national level. Some catalysts of the open innovation agenda are the governmental tax instruments supporting innovation.

The Lei do Bem (Brasil - Congresso Nacional, 2005), law nº 11.196/05, was made by the Federal Government in 2005 in order to allow companies which are under the Earning Before Taxes (EBT) regime to financially support technological research and developments of technological innovation and in doing so deduct from their income tax up to 100% of its operational dispenses.

Besides allowing the reduction of the companies' taxes, the Lei do Bem stimulates the reinvestment in innovation. The tax incentives have been more and more used as a public policy instrument to promote the economic development and social wellbeing, which brings a long run perspective and business competitiveness (Vilha, 2018).

To demonstrate public incentive as an instrument for ecosystem, this article will present cases that large companies made investments in innovations project development together the SMEs by a legal and fiscal instrument call Lei do Bem

Theoretical reference

The access for capital by technology companies to evolve new business model, product or service at initial of her live is fundamental because “Their survival usually depends on their access to entrepreneurial finance in their early stages and subsequently to growth capital to scale up their businesses”, as appointed at the Global Innovation Index 2020(GLOBAL INNOVATION INDEX, 2020).

One of source for investment in new innovative companies came from large companies by a Corporate Venture Capital (CVC) that is important both for entrepreneurs and else company which made investment. For Kotha that clarifies how CVC can be important for large companies in their portfolio of investments, he highlights that “...under which portfolios of CVC relationships, an important tool of open innovations, influence investor innovation” (WADHWA et al., 2016). By a application of Open Innovation, the large companies expand the boundaries bringing new elements to inside that has been creating connection to bond large companies, which needs go to new markets or development new products, with new companies more faster in understand clients, markets and technologies (CHESBROUGH, 2003). This concept has been changed since appear for the first time due a large implementation, although the environment that results in success for many large companies, isn't the only instrument to development innovations ecosystems (CHESBROUGH; BOGERS, 2013). For Adner, large companies that use CVC to boost their level of innovative company depends not only the external competences, but “Whether—and when—it emerges is determined as much by the firm's partners as by its own performance” (ADNER, 2006). And, the most of this success of innovations to emerge at market even exceeding customer's need depend of the partners which has a high responsibility for the internal culture, what can offer risk for ecosystem because larges companies can decline more investments in innovation.

Wadhwa et all warning about how large companies should define their investments in new business (WADHWA, 2016). Their study pointed how complex is a strategy for build a portfolio of investments by CVC which add as an one among more elements for an innovation environment. Finance instruments, which CVC is one of those, is a core element for the success for the new companies but is also important for investors that looking for how give return even by money or as a strategy of business. A new model of investment has been appearing as an option for the traditional banking system. By development of new digital platforms made possible new models of investment. The Cambridge University has studied since 2015 the numbers and rules of alternative investments in ecosystems from all the world(ZIEGLER, 2020). The studies shown the raise of investments done by digital platforms which has bringing investor closer together innovation entrepreneurs from different ecosystems of many countries.

Regard the development of innovation ecosystem demands not only private sector actions, but fundamentally public politics, once the society need for rules and security that should be provide by governments actions. Working together Public and Private are capable to “identify challenges, develop solutions and disseminate information” (HUTCHENREITER, 2019) to raise new technologies which can to that way transform industries.

Among important role in an ecosystem of innovations, Incubators and Accelerators done in the micro environment as an element that boost since ideas until investments for new

companies (HAUSBERG et al., 2020). Those business model offers to new innovative companies instruments do evolve their products and services and make connections with investors to support their activities too (COHEN et al., 2019).

Many countries already acknowledged the value of innovations for their economies and published innovations policies¹². As how important is an innovation policy for the economic development, even the countries which had published one, have still a long work to put in use due the complex arranges as Fagerber pointed: “consists of a range of different policies (and policy instruments) that have been introduced at various points in time, with different motivations, and using a variety of labels, including, increasingly , innovation policy” (EDLER et al., 2017).

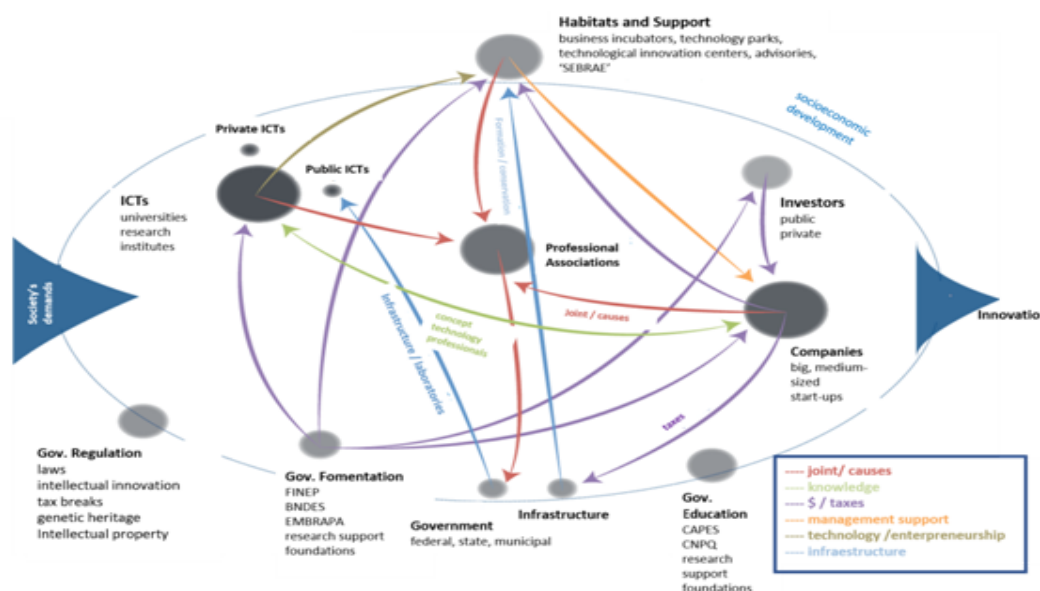
Brazil for the last 40 years had offering thru many public’s project different instruments to encourage companies investing in innovations (SERGIO, 2012). For support companies which wants to raise your level of innovations there are some public or half public. Sebrae and Anprotec are two institutions which provides support.

Open Innovation

When those innovative companies can survive their bring new offer to market directly or through bigger companies, and therefore financial constraints are particularly acute in the early and expansion stages of the life cycle of a company when their business model is still untested. This includes tech start-ups that aim to disrupt entire industries by developing new products, services, and production processes.

The National Association for Research and Development of Innovative Companies (Borges et.al, in press, Pavani, 2019) made a Map of the Brazilian Innovation System, shown in Figure 1.

Figure 1. Map of the Brazilian System of Innovation.



¹² <http://www.oecd.org/sti/inno/oecd-reviews-of-innovation-policy.htm> accessed in 04/03/2021

Source: Borges et. al. (in press)

As shown above, SEBRAE has a support agency role in the national innovation ecosystem. It composes the autonomous social service also known as the S-system. It is a private law associative corporation with a public administration. SEBRAE offers technical assistance to micro and small companies to improve its administration ease its access to markets and financial services, along with the development of innovative potential. It has 28 operational units throughout the country under the supervision of the national coordination unit (Colbari, 2014).

The goal of SEBRAE is “to promote competitiveness and sustainable development of small businesses and stimulate entrepreneurship”. In order to achieve it, it has defined as intrinsic value to its innovation model as it’s the major difference between companies (Carvalho et al., 2011), being mandatory the use of 20% of its resources into innovation actions (SEBRAE, 2019).

One of the major partners of SEBRAE regarding innovation is ANPROTEC which gathers about 370 associates, including incubators, technological parks, accelerators, coworkings, research institutes, public agencies, among other entities linked to entrepreneurship and innovation. This association is leading the innovation movement in Brazil with capacitation activities, public policy, and generating and disseminating knowledge (Aranha, 2016, Harada, 2011).

SEBRAE and ANPROTEC through a technical and financial cooperation agreement signed in 2017 designed an initiative called networked corporate innovation. This initiative ended up in a formulation of a Program which is based on joining small innovative businesses (Startups) and midsize and large companies to do business and promote technological development. This Program was formalised under the name Nexos (Pavani, 2019, Nexos Program, 2019).

In accordance with the Program’s regulation (Nexos Program, 2019), “the Program is founded on generation of economic value from intensive knowledge projects, which will contribute to innovation and company competitiveness, through improving emergent technologies, product, process and service development and acceleration of new business models, all of which contributes to the development of a National Innovation System (NIS)”.

Not only large corporations and Startups, but also incubators and accelerators are protagonists and have clear responsibilities in Nexos. As stated on the Nexos’ regulation (Nexos Program, 2019), they must provide support teams specialised for mentoring in their competent area who are limited to the scope of the incubated or accelerated project. Moreover, they are responsible

for training the Startup personnel regarding law, marketing, finance and/or others, depending on the difficulties of the project implementation.

According to the Map of the Mechanisms of Generation of Innovative Enterprises in Brazil (Ministry of Science, Technology, Innovation and Communication, 2019), incubators and accelerators are the ideal locus to create and advise companies with elevated differential potential.

A company incubator is an entity which goal is to offer technical assistance, connections to the market and investors so new Startups can develop innovative ideas and transform them into success entrepreneurs (Aranha, 2016). In order to do it, incubators offer infrastructure and managing support, guiding the entrepreneurs regarding management and competitiveness (Ghesti et.al., 2018, INPI, 2013).

On the other hand, accelerators are institutions that help Startups defining and building their initial products, identifying market niches and also securing financial resources so they can contribute in the long run, through preference share or equity (Travers, 2018).

Therefore, Nexos Program has three important targets: midsize and large corporates which demands new technologies; Startups with technological competency to codevelop solutions; incubators and accelerators to provide support Startups during the technological development cycle.

In this way, Nexos has unique characteristics which makes it one of a kind in the national innovation market: it is an open innovation Program for developing cooperated R&D projects with mandatory participation of Startups; prioritising the use of tax breaks as incentive for innovation and to reduce the financial investment of midsize and large corporates; centrality of accelerators and incubators performance as driving mechanisms of technological development; focus on low technological complexity projects (Nexos Program, 2019).

The open innovation is a firm-centred paradigm which relies on external knowledge to boost internal innovation, thus amplify the companies' economic development (Chesbrough et.al., 2017). Essentially, it is about overcoming barriers that protected corporates' R&D processes from knowledge exchange and know how to promote technological development, sharing risks, uncertainties and costs (Leydesdorff and Ivanona, 2016).

Since 2015 more and more corporates have been adhering to a movement called Corporate Startup Engagement (CSE) in which they seek Startups, and vice-versa, to co-create innovations (Mosquim, 2017). There are many kinds of corporates-Startup relationships, ranging from protected technology licence agreement for commercial exploitation from large

corporations to financially supporting the development of small business innovation projects that aim on the corporate's target market (Chesbrough, 2007).

The Nexus Program embraces the latter, which means with the financial aid from larger companies, small businesses can make feasible R&D projects by sharing technological expertise that end up in products incorporated by the large companies. Therefore, a central element in Nexus is the premise of technological development (Nexus Program, 2019, SEBRAE, 2019). It is not allowed in the Program for anchor companies, category comprising of demanding technology companies, to simply find suppliers with finished products or needing small customization. It must have experimental development.

According to Frascati Manual (OCDE, 2002), experimental development consists of systematic work based on existing knowledge obtained either by research or practical experience to establish new procedures, systems and services, or even to improve existing ones. Another key element on Nexus' structure is the use of supporting innovation tax incentives. "Tax incentive is a financial concept. It implies the reduction of compulsory public revenue or the suppression of its enforceability".

The financial investments from the corporations in the Startups for technological development are then fitted in one out of five fiscal instruments of innovation support of the Program (Nexus Program, 2018). These investments have a tax benefit character, as in *Lei do Bem*, and obliges innovative companies to do research, development and innovation (RD&I) projects, as in *Lei de Informática*

(Informatics' Law), *Rota2030*, R&D of National Agency of Electric Power (ANEEL) and R&D of National Agency of Oil, Natural Gas and Biofuels (ANP).

According with Nexus' website (Nexus Program, 2019), the characteristics of the prioritised instruments of the Program are:

A) *Lei da Informática* (*Lei* 8.248/1991) (Brasil - Congresso Nacional, 1991): concede tax incentives to hardware and automation companies that invest in R&D activities;

B) *Lei do Bem* (*Lei* 11.196/2005) (Brasil - Congresso Nacional, 2005): in a multisectoral way, it is destined to companies in every sector of the economy which are in the EBT regime and earn net income in the fiscal year;

C) ANEEL R&D (*Lei* 9.991/2000) (Brasil - Congresso Nacional, 2000): created to encourage the R&D in the electric power generation sector.

D) ANP R&D (*Lei* 9.478/1997) (Brasil - Congresso Nacional, 1997): RD&I clause that stimulates the adoption of new technologies for the oil, natural gas and biofuel sector.

E) *Rota 2030* (Lei 13.755/2018) (Brasil - Congresso Nacional, 2018): Program for the automotive sector with guidelines for mobility and logistics.

Lei do Bem, the prioritised instrument of this work, in accordance with MCTIC (Ministry of Science, Technology, Innovation and Communication, 2019), formalises the use of tax incentives for corporations in the EBT system which invest in RD&I. The tax incentives in *Lei do Bem* are shown in Table 1.

Lei do Bem in its third chapter (Brasil - Congresso Nacional, 2005) allowed corporates that do or hire RD&I services to have their tax exempted. However, only the 18th article of the law deals with the possibility of tax reduction for operational costs in technology transferring to micro or small companies.

Another intrinsic characteristic of Nexos Program is the development of projects of low technological complexity, which large and midsize corporates financial support varies between R\$ 100,000.00 and R\$ 250,000.00 (roughly US\$24,000.00 and US\$60,000.00) (Nexos Program, 2019).

Table 1 – Tax incentives from *Lei do Bem*. Source: (Soly, 2014).

Benefit	Definition	Expenses	Gain
Tax benefit ranging from 60% to 100%	Tax break for innovation activities	Operational costs	20.4 – 34%
Tax benefit ranging from 50% to 250%	Tax break for innovation activities by Research Institutes	Services from science and technology institutes	10 – 51%
Tax deduction on industrialised products	50% tax reduction on R&D machinery	R&D machinery	50%
		R&D machinery	Financial benefit
		R&D human resources	Financial benefit
Total deduction of income tax	Income tax reduced to zero on patents and brand payments overseas	Patents and brands payments overseas	100%

According to the National Aeronautics and Space Administration (NASA, 2012), the technologies readiness level (TRL) refers to a grading system used to evaluate the maturity level of a certain technology. The projects are evaluated based on parameters for each technology level and then is attributed a TRL grade to it.

The TRL grading system varies from 1 to 9 depending on the technological maturity. TRL 1 refers to fundamental research, when scientific discoveries are starting and having promising results which can evolve into R&D in the future. TRL 9 is applied to evaluate and validated technologies with immediate availability to the market (Quintella, 2017).

Therefore, from fundamental research, when the assumptions for the technological development are filled with uncertainties, up to the point where the technology is finished and can be commercialized, there is a long way to go. According to Management Centre and Strategies of Science, Technology and Innovation (Velho, 2017), the valley of death occurs between the demonstration phase and pre-competitive scaling-up (TRL 3 to 7), which is where projects still present high technological risks and needs large sums of investments to evolve from a lab concept (TRL 3) to a operational prototype (TRL 7).

Methodology

The methodological approach chosen was the deductive. The research methods used in the current work were bibliography research and case study.

The data obtained about the Nexos Program was from SEBRAE and ANPROTEC. At first, the basis of it, so its main target, characteristics, operating model, proceedings and chronogram. Then to make it tangible, two technological challenges sponsored by midsize or large corporates that invested in Startups subsidised by *Lei do Bem* were analyzed.

The techniques proposed for the study case were as in Yin (Yin, 2009) research. In this work, important aspects mentioned in Nexos regarding technology transferring and corporate-Startup interaction were studied.

Results and discussion

Nexos Program was created due to innovative small businesses needing to access market and developing technologies to assure survival and greater competitiveness. Bearing this in mind, connecting Startups and larger companies is an excellent way to achieve this goal.

SEBRAE's target market has been micro and small businesses and ANPROTEC are innovative environments such as incubators, accelerators, technological parks and coworkings. These environments have small businesses whose needs administration and capacitation to get in the

current market. So it is common both to SEBRAE and ANPROTEC to offer adequate conditions to assure the prosperity of innovative micro and small businesses.

SEBRAE is co-responsible for Nexos. As stated in the regulations (Nexos Program, 2019), SEBRAE is the entity which must coordinate the Program's activity as well as to take the adequate actions to assure satisfactory results for both parts. ANPROTEC is Nexos' operator. It is responsible for the administration of the Program and the execution of activities, establishing performance indicators and acting to prevent and to correct mistakes so quality standards are achieved (Nexos Program, 2019).

Program Phases

Nexos Program has a logic operation which comprises of 9 steps as shown in Figure 2.

Step 1 – Exploration of anchor companies

It is fundamental to have midsize and large anchor companies with specific technology demands to make the Program's operation feasible. It is crucial to explore these companies so they subscribe to Nexos from its form which can be found on their website (Nexos Program, 2019). The proposal submission represents only an interest to the Program, not having any obligations or responsibilities.

Step 2 – The receipt of adhesion forms

After the companies' registration have been approved by the Program Management Committee, which is formed by a group of SEBRAE and ANPROTEC personnel responsible for trusteeship and for activity management, it is necessary to send the adhesion term. This document must be signed by a legal representative of the firm and allows the formal admission of the company into Nexos. It is an accord in which the company agrees with the terms and conditions of the stated Program.

Step 3 – Expectation alignments and the technological challenge

The legal advice offered to anchor corporates officially begins after the adhesion term is sent. In this step several online meetings occur about exploratory research, in which one tries to comprehend the necessities and expectations regarding the demanding technologies, the timing of digital transformation, the innovative background, and most importantly, activities done with Startups, if any. Besides, it is understood which fiscal instrument regarding innovation is the most fit to the sponsoring company. In accordance with Nexos' regulation (Nexos Program, 2019), sponsoring companies are midsize or large corporates which have technological challenges, binding it to the financial support Startups to develop technology.

After the alignment with the corporate is achieved, the Committee and the anchor company define the appropriate budget and the expected amount of Startups willing to participate. Then,

it is settled at least one technological challenge which will be in the Program's official webpage. A technological challenge (Gerosa, 2016, Frey, 2019) is a barrier or challenge that must be overcome in order to have a technological improvement.

Step 4 – Registration and selection of Startups

When the challenges are launched, besides the communication efforts to publicise the claim, commonly done by press office and digital marketing, the areas of innovation associated with SEBRAE scattered all over Brazil are contacted, as are the accelerators associated with ANPROTEC, so small incubated or accelerated enterprises with suiting profiles or competences can be identified.

As soon as the challenge is on, Startups can register themselves. It is important to highlight that Startup can only register after the challenge has been set. The registration forms are specific for every challenge. Several background research are made, such as on the members of each Startup to check whether they are fitted for the job, with appropriate qualifications and work experience; adherence between Startup's line of work and the R&D project; the TRL of the solution; the budget; as well as the midterm developments.

After this period, which lasts typically 30 days, the Committee analyses the proposals and generates a list with the most promising and relevant projects. Afterwards, it is sent to the anchor company to choose which Startups to work with. This choice is made solely by the anchor corporate.

Step 5 – Signing of the R&D contract between Startup and corporate

The R&D contracts between corporates and Startup defines the final goal of each challenge as well as intermediate achievements. In them are the midterm achievements; the payment schedule; the possibility of shareholding if both are interested in; and regarding intellectual property, such as technology leasing and/or patent-to-be ownership.

Step 6 – Choosing the incubator or accelerator supporting the Startup

Shortly after the signing of the contract, the Nexos' Management Committee chooses amongst the 53 entities in its base which is the most suitable to provide the necessary support. The criteria used are adherence between incubator/accelerator expertise and the technology to be developed; familiarity with the fiscal incentive chosen by the anchor company, as the incubator/accelerator must assist with the accountability report; and, the geographic proximity with the Startup.

Step 7 – Signing of the incubation/acceleration contract

This contract is signed between the Startup and incubator or accelerator without the influence of the anchor company. In this document both parts state their obligations in the technological development cycle.

Incubators and accelerators, according to Nexos Program regulations (Nexos Program, 2019), are paid 10% of the total amount for each project. The financial support of the anchor company is for the Startup, which then pays incubator or accelerator in accordance with their R&D contract chronogram.

Step 8 – Technological Development

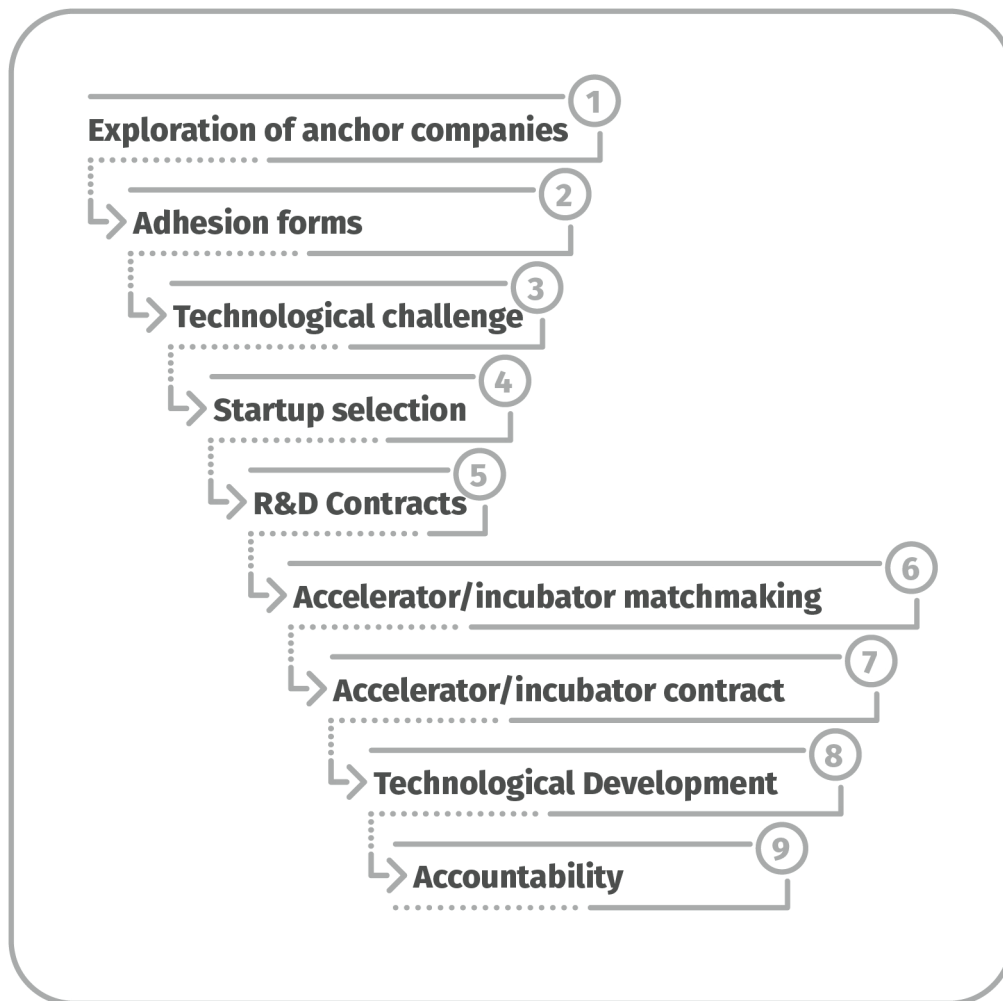
Only after all those stages mentioned above are over is that Startups effectively start the technological development.

The duration for the technology to be developed is typically between six months to a year, due to its low complexity. The duration may vary because of technological uncertainties and market. Nexos Program prioritises the valley of death, consisting of TRL 3 to 7.

Step 9 – Accountability

After the technology are finished and the contracts are terminated, there is a need to account for the use of the resources under the tax instruments supporting innovation. MCTIC is responsible for administrating the resources of *Rota 2030*, *Lei do Bem*, *Lei da Informática* (national territory except *Amazônia Legal*). The Ministry of Economy does the resource administration exclusively of *Lei da Informática*. ANEEL and ANP are responsible for their own R&D projects' resources (Ministry of Science, Technology, Innovation and Communication, 2019).

Figure 2. Steps of Nexos Program



Source: own authorship

Value generation for stakeholders

The guidance offered by Nexus Program to all parties – Startups, corporates and incubators or accelerator – since the adhesion contract from anchor companies until the accounting to the inspection agency, the end of the technological development cycle.

Despite all the benefits from Nexus with a tailored follow up, it is free for all parties involved. The only financial commitment comes exclusively from the corporate that invests in Startups for co-creation of the technology. Both SEBRAE and ANPROTEC do not financially support any party involved.

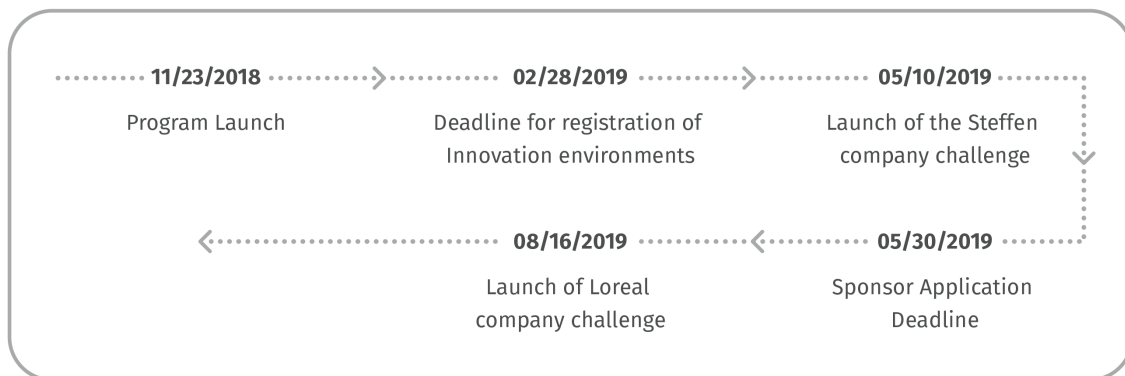
MCTIC, supervisory organ of all five tax instruments supporting innovation by the Program, officialised its full supports to it in April 2019. With this support, Nexus increased its credibility with the market because of the approval of the ministry which foresaw an outstanding opportunity to boost the economy by investing in Startups.

Nexos' chronogram

Nexos Program was launched in 23rd of November 2018, at InnovaBra Habitat, a co-innovation space sponsored by Bradesco Bank in São Paulo. From this day on, it was opened registration for both incubator/accelerator and midsize and large corporates. For the former they lasted up to 28th of February 2019, while the latter until 30th of May 2019, as shown in Figure 3.

The Startup registration depends on the technological challenges sponsored by the anchor corporates. In this work, two cases have been reported. The financial support, in both cases, is in *Lei do Bem*.

Figure 3. Nexos Program chronogram



Source: own authorship

Lei do Bem

One of Nexos Program principles, as stated above, is to prioritise the use to tax instruments to support innovation as a crucial public policy to the market, as it instigates the development of R&D activities considered important by the society and is not done by the federal government (Nassif, 2014).

Lei do Bem may be restrictive, as only companies in the EBT may benefit from it, but it has a positive impact on national economy. The benefits from *Lei do Bem* are as follow:

- 1) reduces the taxes for company which invest in R&D;
- 2) instigates technological innovation activities at a national level, regardless of the company sector;

- 3) promotes the training of R&D personnel in corporates and the presence of researchers and engineers in their staff;
- 4) promotes the protection of intellectual property, chiefly patents and cultivars;
- 5) stimulates machinery and equipment acquisition to R&D activities with reduced taxes;
- 6) brings together universities and science and technology institutes;
- 7) brings together Startups for cooperated technological development.

Technological Challenges

The company Steffen (Figure 4) was the first to send an adhesion term to Nexos in 3rd of March 2019. It is one of the largest cleaning products distributors in Rio de Janeiro. It has been for more than 50 years in the market with over 1,000 products, including its own brand. Moreover, it offers its clients consulting about a rational and economic use of their products, aiming at consumption reduce.

Steffen is a midsize corporation according to Brazilian Development Bank (BNDES), with an annual overall income of R\$ 4.8 million to R\$ 300 million (roughly US\$ 1 million to US\$ 75 million). It is currently living an expansion moment in which a digital transformation may boost their results.

Figure 4. Digital Cleaning challenge



Source: SEBRAE, 2019

The corporation identified Nexos as a superb opportunity to find Startups that could co-develop technologies which would contribute to its growth. Nevertheless, it had never been benefitted from *Lei do Bem*, decisive factor to enable the company's intention of recovering part of its investment with tax waiver.

The challenge named Digital Cleaning had a goal of developing solutions for the market intelligence, self-service, self-training and customer loyalty areas. It was expected to obtain machine learning technologies for the customer digital control. The Startup's developed solution was to segregate customers based on their profile and shopping history so that the relation could be optimised and then upsell goods. This process was measured by statistical analyses over the coming years.

The challenge had a budget of R\$ 125,000 (roughly US\$ 30 million) for each project. Of all 25 enrolled Startups from 10th of May until 23rd of June 2019 in 5th of July of same year the Startup Sankhya Code, specialized in developing algorithms to analyse market data and predict shopping behaviour.

After the R&D contract between Steffen and Sankhya Code had been signed, the Program Management Committee reach out for the most suited incubator or accelerator for the task. The chosen one was Entrepreneurial Incubation Centre (CIAEM) of Federal University of Uberlândia (UFU).

The technological development process was triggered by the joint construction of a work plan involving the company Steffen, the Startup Sankhya Code, as well as the CIAEM incubator. Technical issues were discussed in greater detail, detailing the problem to be overcome, the possible ways to find the most appropriate solution, the intermediary deliverables, contemplating the prototype and a proof of concept to be tested and validated in the market, as well as the models of reports on advances in the technological development process.

Status report reports were monthly and were essential for Steffen to internalize the knowledge that was under construction. These reports were made up of monitoring minutes, notes of necessary adjustments and development of interfaces and functionalities. Steffen highlighted two employees with a technical profile to monitor and, above all, absorb technical knowledge in order to ensure that the transfer of know-how was carried out in a satisfactory manner. Every two months the leaders of Steffen, Sankhya and CIAEM met virtually to carry out an overall assessment of the project and to ensure that the work plan initially agreed was being carried out.

Simultaneously, the management committee of the Nexos program advised the company Steffen in the preparation of the form for information on the activities of technological research and development of technological innovation. This document is an integral part of the rendering of accounts addressed to the Ministry of Science, Technology, Innovations and Communications, a public institution that manages the Lei do Bem. It contained the details of

the research and development (R&D) activities, the overcome technological barrier or challenge, the methodology used, the results achieved, and the resources disbursed.

Steffen chose not to file a patent or scientific publication on the technology developed. The project was configured as an industrial secret, where technologies are incorporated into the company's assets as tacit knowledge of the institution.

Conclusion

The present work delved into Nexos Program and contextualized one case of companies which launched technological challenges and had their investments fitted into *Lei do Bem*.

The company Steffen is concrete examples that reinforce the multisectoriality and reach heterogeneity of tax instruments as technological development and innovation promoters at a national level.

Nexos Program contributed to a midsize corporate to benefit from *Lei do Bem* for the first time. Besides, it brought together the company Steffen to a software factory (Sankhya Code) to make feasible its digital transformation, an eminent chapter in the trajectory of both enterprises in which they joined forces to share value generation. So, an anchor company connected with a Startup the *Lei do Bem* as a catalyst of the feature.

Despite being its first year, Nexos Program has presented a notorious impact on the national innovation ecosystem, principally open innovation. Nexos marshalled 53 incubators and accelerators from all over the country; favored shared R&D projects between corporates and Startups using *Lei do Bem* as tax incentive and encouraged Startups to develop emerging technologies.

Successful cases as Nexos Program must occur on a higher scale, both to insert the Startups into the innovation market by pairing them with larger companies and inserting them into their value chain, as well to increase the number of companies benefitted by tax incentives supporting innovation.

Tax deduction stimulates new companies in the open innovation agenda, as with the company Steffen. Yet it cannot be the solely reason to do R&D activities with other companies, regardless of their size. Aside from the tax impact on the company's cash flow, technological innovation must be done to assure survival in the long run. If done in a cooperation way, sharing risks and costs, the odds of success are higher.

The National System of Innovation, as shown in Figure 1, shows the interdependency relation between all parties involved. Large and midsize corporates, Startups, university, science and technology institutes, incubators and accelerators, funding agencies, government and investors

sharing knowledge and expertise are keys to a scientific and technological development of Brazil. SEBRAE and ANPROTEC, part of this ecosystem, formatted the Nexos Program to allow Startups to work with large corporations and develop their differential potential.

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