

Understanding what leads to a Start-up failure by creating an S/F
Prediction model for the Portuguese companies

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2 Abstract

Nowadays, the amount of companies' creation has been progressively increasing year by year but, that does not necessarily mean they are being developed in the way they should to reach their goals.

The start-up tech industry and all the external factors that influence them have changed over time but, there are still some improvements to do regarding some of the internal factors that influence and might contribute to the early-stage company failure. Since the Portuguese State created programs that backup monetarily some of these companies, sometimes they do not have enough knowledge nor reliable feedback of their market to launch a start-up, consequently having a negative economic and social impact on the country.

Being aware of this subject, this study decided to analyse all the topics that would influence these types of companies starting by doing a literature review, critical for the whole development of the dissertation because of the substantiation it gives to it. Thus, some topics were searched to understand how those variables could be relatable to the success or failure of a start-up.

The methodology involved in this study is essentially an analysis of the Portuguese start-ups by inquiring their founders through a questionnaire, both for those who failed and those who succeed, about their experiences in the company. Subsequently, it was made a comparison between the two of them with the aim to understand and infer some conclusions about the variables that influence the most this problematic by creating a prediction model.

Keywords: Start-up, Failure, Success, Prediction Model

JEL Classification: L25, L26, M13

3 Abstrato

A indústria das Start-up tecnológicas e todos os fatores externos que a influenciam têm vindo a alterar ao longo do tempo, mas, ainda há aspetos a melhorar sobretudo ao nível interno das empresas, sendo esses fatores muitas das vezes as principais causas da falha de uma firma numa fase inicial. O Estado Português tem criado programas direcionados para apoiar financeiramente as Start-ups, no entanto, para além desse apoio, as empresas por vezes não possuem o conhecimento ou realizaram um estudo de mercado insuficiente a fim de conseguir utilizadores para o seu produto/serviço, acabando por ter um impacto negativo ao nível económico e social no nosso país.

Portanto, este estudo decidiu começar por analisar alguns dos tópicos que acabam por influenciar este tipo de empresas através de uma revisão de literatura, sendo que é importante para todo o desenvolvimento desta dissertação devido ao suporte teórico que lhe dá. Após isso, problemas como as características dos fundadores das start-ups e outros fatores externos, como por exemplo o financiamento, foram pesquisados a fim de perceber como estes podem estar relacionados com o sucesso ou insucesso de uma microcompanhia.

A metodologia envolvida neste estudo é essencialmente constituída por uma análise através de um questionário feito aos fundadores das empresas, quer tenham tido sucesso ou não. Consequentemente, foi feita uma comparação entre os dois tipos de informação recolhida e, tentar perceber de que forma existe uma correlação entre as variáveis abordadas a fim de retirar conclusões e criar um modelo de previsão.

Palavras-Chave: Start-up, Falha, Sucesso, Modelo de Previsão

Classificação JEL: L25, L26, M13

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5 Introduction

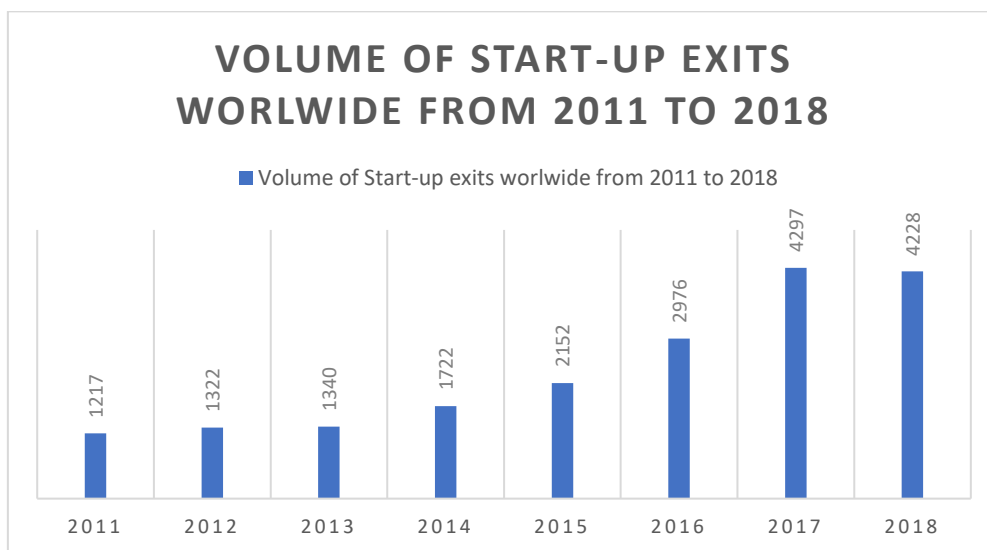
5.1 Industry Contextualization

Start-ups. Their birth rate is has increased over the years but, do they survive?

In a global view, according to GEM Global Report, a staggering number of 100 million new companies are launched annually, which dragged with them billions of venture capital investments and other types of funding. But, unfortunately, the percentage of companies that have at least 1 year of activity is 10%.

To have a better overview of the numbers, in the next chart we can confirm in terms of volume how many Start-ups exited since the period of 2011 to 2018.

Graphic 1 -Volume of Start-up exits worldwide between 2011 and 2018

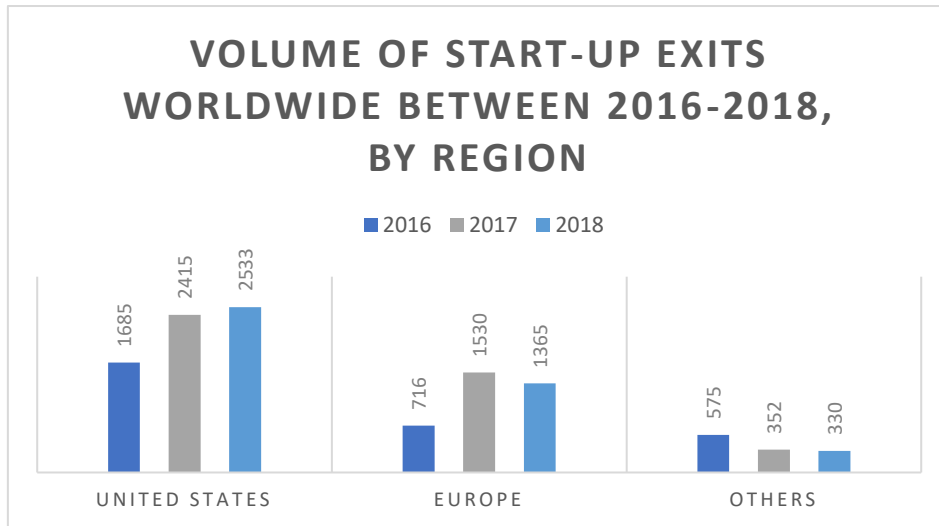


Source: Statista

There has been a constant increase since until 2017, however, it is verified a slightly decrease between 2017 and 2018 of 1,6%. Also, by seeing the volume of Start-ups exited

per region, focusing more on the United States and Europe, it can be seen a similar increasing pattern on those regions, but with more exits in the United States region because of the higher number of start-ups in that zone. That can be analysed on the following chart.

Graphic 2 - Volume of Start-up exits worldwide between 2016 and 2018, by region



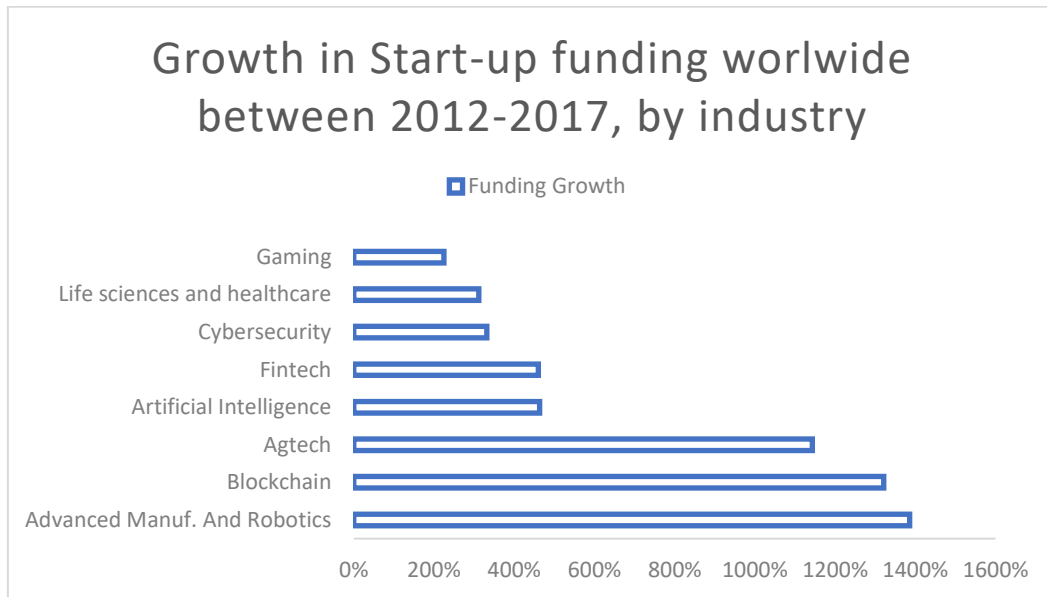
Source: Statista

Is important to understand as well that funding is a key factor regarding the survival of a Start-up, even more when an entrepreneur is considering pursuing this path and need to know which type of companies can receive financial backup more easily. To support this state, the following chart analyses the growth in start-up funding according to the different business areas, helping those who are interested in creating one to decide whether should they focus on Gaming or Blockchain.

Advanced Manufacturing and Robotics is the Start-up category that had a bigger growth, with 1386% since 2012 to 2017. After that we had the companies that are included in the Blockchain industry, with an estimated growth of 1321%. On the opposite of those

industries are the Life sciences and healthcare and Gaming, with a growth of only 312% and 225%, respectively.

Graphic 3 - Start-up funding growth worldwide, 2012-2017

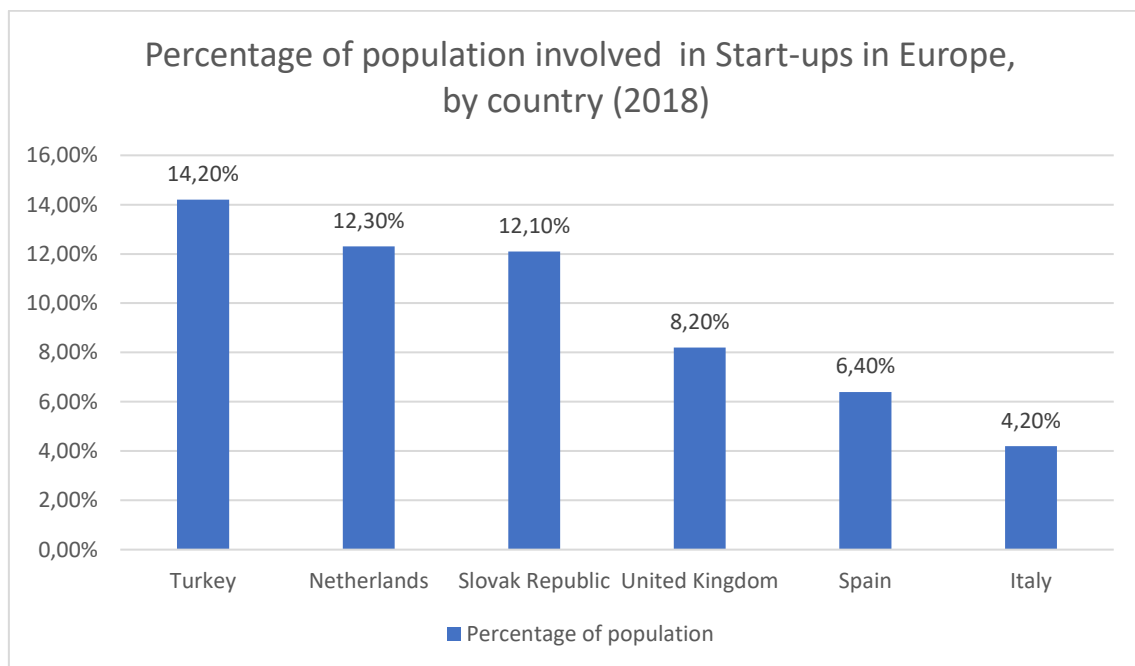


Source: Statista

The total early-stage Entrepreneurial Activity (TEA) is quite a significant factor in a country. Their impact doesn't only affect the economy of the country, but also the social matter of the country, and both are an important indicator because it has a big influence on the region's employment but also the way the citizens feel about their capacities and the motivation it generates for them. Portugal, in 2016, had 8,15%, where the global average was 12,33% at the time. In the next chart it's presented the percentages related to other countries of the European zone, so that it can be compared with other countries and have a different overview.

As it shows on graphic 4, the country that has more percentage of 18 to 64 population who are an owner of a new business in 2018 is Turkey, which has almost 2% more than the global average in 2016, 14,2%. Spain and Italy are both the countries with lower percentage, having almost less 2% and approximately 4% lower than Portugal in 2016, respectively.

Graphic 4 - Percentage of population involved in Start-ups in Europe in 2018, by country



Source: Statista

According to Jornal Económico (2016), in Portugal, every year emerge 35.000 start-ups, in which, 2,5% have less than one year and are related to the technology sector, however, the same type of companies but with 6 years existence, that percentage lowers to 1,8%. Portuguese start-ups are getting more and more funds from international investors, predominantly from USA, around 160 million in 2017, while the Portuguese investors have spent around 120 million (Observador, 2017).

In July of 2019, the start-ups represented 1,1% of the Portuguese GDP, having a total sum of 2,2 billion euros in sales. Another important factor is the consequent increase of creation of incubators to help the start-ups' development, in 2018 the number of incubators were approximately 153, 18 more than 2017.

One of the most important roles of the small companies, according to (Lussier & Corman, 1996), is to have a better understanding of why they fail and succeed to create a stable and healthy economy.

The Portuguese Start-up ecosystem is growing and, to face this trend, some new start-ups must think how they can pursue their survival that is influenced by the economy and internal issues that might appear. So, the aim would be to try to make a kind of "Holy Grail" for the start-ups that would minimize (because solve is nearly impossible) the main factors that affect them, and even when they are already scaling up, including their choices and methods to achieve their goals and the most suitable ones, since, in Portugal, the percentage of companies created that went broke within 2 years of life is quietly high, so, the aim is try to reduce those numbers. By analysing the start-ups that failed already and do some comparison between them, since their area of expertise to their company dimension, this research would try to make a correlation among those variables so that it is possible to establish a pattern.

6 Literature Review

6.1 What is a Startup?

As the creator of the concept of The Lean Start-up says, Eric Ries, he defines it as "A human institution designed to create new products and services under conditions of extreme uncertainty (Ries, 2011) cit in (Frederiksen & Brem, 2017). To help these companies there some frameworks that were designed such as the Customer Development by (Blank, 2003) cit in (Frederiksen & Brem, 2017), the Business Model Canvas by (Osterwalder and Pigneur, 2010) cit in (Frederiksen & Brem, 2017), Value Proposition

Design by (Osterwalder et al. 2014) cit in (Frederiksen & Brem, 2017), but exist many other.

Focusing now on The Lean Start-up, Ries (2011) came up with five principles that constitutes this method, which are the following ones: Entrepreneurs are everywhere, Entrepreneurship is Management, Validated Learning, Build-Measure-Learn and Innovation Accounting. The last three are the important ones, since they are the process of capturing the knowledge a new start-up generates, the process that keeps the company work in cycle and the last one, innovation accounting, that tells how the progress of the start-up is concerning all the steps to validate correctly or to reject hypotheses. Basically any business and product development are very iterative and the feedback from its customers must be continuous (Frederiksen & Brem, 2017).

This “beta” version is named as Minimum Viable Product (MVP), and its purpose is to reach early adopters to make a future engagement on them when they reach mature stage. The main goal of a start-up is to be continually growing in a sustainable way, by keeping attempting new ways improve some metrics that failed so that they can make new tests to make a substantial change in the business process. And this only happens when the speed of learning is maximized while the expenses are running low, otherwise the initial money invested ends. That’s why it’s very important to have an huge customer involvement in the product and in the business development, the product has to be made along with the customer feedback, if not, they won’t sell (Frederiksen & Brem, 2017).

6.2 Why Start-ups fail?

6.2.1 Characteristics of the Start-up

6.2.1.1 Human Capital

Regarding the human capital, there are signals that are needed to be exploited, like the relevance of the management expertise or the level of education presented in the human

characteristics that leads to the attractiveness of the investors, which consequently is going to have impact on the start-up survival (Gimmon & Levie, 2010). Past research have shown that VCs tend to look up for companies that possess founders with relevant experience (Kaplan and Strömberg, 2004) cit in (Gimmon & Levie, 2010). Not only professional experience and academic status is important, but above all, having previous experience in developing start-ups is highly significant as well (Hsu, 2007) cit in (Gimmon & Levie, 2010), but can be pleased by the co-founders or the collaborators (Gimmon & Levie, 2010). Hsu (2007) found out that being in an early stage company and holding a doctorate degree is more likely to obtain higher funding's, when applied to technology-based start-ups. On the other hand, Stuart and Abetti (1988) concluded that entrepreneurs with master's degree were more successful and had better performance than those who had doctorate degrees. Muzyka (1996) pursued an investigation where he found out that the mostly of the Venture Capitalists made investments decisions essentially focused on the business management criteria, instead of considering the product, the fund or even the capabilities criteria as more vital. So, to sum up, the fact is that the academic status doesn't affect directly the survival of the of a start-up, which leads that's the investors might have "judged the book by its cover" instead of searching deeper (Gimmon & Levie, 2010).

About entering foreign markets, the founders' human capital is also essential, since the start-ups founders need to have knowledge about those international networks that was acquired during international experience in order to reach that market (McDougall et al., 2003) cit in (Stucki, 2016). However, sometime is hard to generalize this kind of knowledge based on the founders' human capital, because they can have experience in a certain market or country but then they cannot extend that data and generalize it if there is lack of human capital (Stucki, 2016). Also important is the way the founders deal with bureaucracies, which does not affect start-ups' competitive advantage but is a factor that requires time and knowledge from the founders. Moreover, some strategies to lighten the liability of newness are the strong relationships to be built with the suppliers and the distributors helped by the experienced human capital, leading to an improved and better

competitive advantage against other companies (Lerner & Haber, 2001) cit in (Oe & Mitsuhashi, 2013).

Now, regarding to the intensity of the exportation based on the international experience, Stucki (2016) concluded that, in fact, there is a positive association between education and export intensity, whereas only university education and not tertiary level of education. Based on this, the founders' skills have a positive impact regarding the start-up exportation and are indeed very important in developing a competitive advantage due to their capabilities.

Also, Colombo and Grilli (2005) and some researches done some years ago, found that the founders with particular human capital characteristics, education level and previous work experience, have a positive correlation between the growth of a firm, which consequently has an impact on obtaining investments by Venture Capitalists and that leads to an easier access to external resources and capabilities. The founder's characteristics have a considerable influence on the firm's exploitation of the crowd, meaning that the B2C¹ businesses are going to be easier to benefit from crowd's information. Open Innovation is discouraged with the presence of professional investors, and since the period of development of the start-up influences the interactions of the crowd, this will let that the early-stage companies will take more advantage from knowledge exploitation activities compared to a later-stage start-up the will only benefit with the crowd network. So, Di Pietro (2018) concluded that by linking Open Innovation with the companies' later performance the start-ups are more likely to have success two years later if they exploit the crowd's network, compared to those who do not.

Cantamessa et al (2018) realized that inexperienced management could be one of the main problems why a start-up cannot reach more than four years of survival. And Bendickson (2017) believe that can be solved by putting the start-ups using an improved human resource management to raise the rates of growth. HPWS (High Performance Work Systems) are a group of better practices that normally include, such as decentralized and

¹ Business to Consumer

compensation, that can give competitive advantage to a start-up (Evans, 2005) cit in (Bendickson, Ligouri, & Midgett, 2017).

There is evidence that the companies whose focus is a differentiated strategy are more likely to use HPWS than start-ups that follow a cost-leadership strategy. And besides that, they believe that start-ups with HPWS will benefit the same effect as they do on large companies and, consequently, experience better outcomes (Buller & McEvoy, 2012) cit in (Bendickson et al., 2017). Thus, start-ups that follow the HPWS method might have a much easier period to put in practice and using it continuously when they reach maturity than the companies that did not during the initial phase so, they must be implemented when they are still at a younger stage.

Some discoveries found out that this method does not make difference in some sectors, such as technology or bio-tech start-ups, since they could be bought sooner or later however, they might need to invest in HPWS to produce new technology (Nahapiet, 1998) cit in (Bendickson et al., 2017).

H1a: Does the founders' human capital characteristics have impact on the growth of a start-up?

H1b: Does internal human resources management processes have impact on the survival of the star-ups?

6.2.1.2 Innovation

Innovation is what a start-up and any kind of firm tries to deliver to their customers, by creating new products or services with their new concepts (Song & Ju, 2016) cit in (Caseiro & Coelho, 2018). Always creating new benefits or improving old ones for their market is one of the main drivers of organizational performance, since the firm is

evaluated by their rate of adoption of innovation or, by their predisposition to change (Calantone, 2002) cit in (Caseiro & Coelho, 2018).

Open Innovation is a concept that typically suggests that a start-up should cooperate with external mediators, from customers to institutions of educations (Wallin & von Krogh, 2010) cit in (Gimenez-Fernandez & Beukel, 2017). The major disadvantage of a start-up is being small and usually they do not own sufficient financial resources to present to the market a new technology or product/service (Neyens, 2010) cit in (Gimenez-Fernandez & Beukel, 2017). To turn that into an advantage, the companies must search for external sources to acquire those resources that they do not have or to gather some complementary assets, such as creating partnerships with some known firm in the market. Doing that, they can improve their strategic position and try to legitimate the product/service (Eisenhardt & Schoonhoven, 1996) cit in (Gimenez-Fernandez & Beukel, 2017), since the big firms will act like free publicity to the new entrant and it will give the customers some confidence already (Stuart, 2000) cit in (Gimenez-Fernandez & Beukel, 2017). So, as Laursen & Salter (2006) cit in (Gimenez-Fernandez & Beukel, 2017) already studied, there exist two different ways of exploration of innovation on market, the radical and incremental innovation. The first one states the ability that a company has to present new products to the market, while the second one is considered to develop new products that are new to the company (OECD, 2005) cit in (Gimenez-Fernandez & Beukel, 2017).

Said this, between these two types, the most suitable to the start-ups rather than to incumbent firms ² is the radical innovation for the reason that they are viewed as a font of “creative destruction” (Schumpeter, 1934) cit in (Gimenez-Fernandez & Beukel, 2017). The way they treat the routines and their flexibility allows them to revolutionize the market with new products/services, which consequently leads the incumbent firms’ products out of the market. But, as a company grows it starts to lose the capability of entering emerging markets (Christensen & Overdorf, 2000) cit in (Gimenez-Fernandez & Beukel, 2017).

² A firm that is already positioned in the market.

Acquiring this kind of ideology is what determines the difference between two firms, one's being more adaptable to a fast changing environment than others (Wang & Wang, 2012) cit in (Caseiro & Coelho, 2018).

There are some estimations done by Hyytinen, Pajarinen and Rouvinen (2015) that relates the survival rate and the fact of if a start-up is considered innovative or not, where those who are considered innovative have lower expectancies to survive rather than those who are not. And this can be explained by seeing that when a company pursues innovation there is a higher tendency to failure, since the processes might get more complex (Samuelsson, 2009) cit in (Hyytinen, 2015) which would lead to skewed returns and consequently to extended and uncertain payback times (Brown et al., 2012) cit in (Hyytinen, 2015). This can be explained because companies that want to innovate collect fewer tangible assets and, therefore, they will have some limitations regarding the collateral to pledge as part of a lending process (Minetti, 2011) cit in (Hyytinen, 2015). This kind of limitations have impact on the accessibility of the external financing and subsequently it will be harder to have an economic support. Also, there is a certain risk regarding the diversification, where the new innovative ventures do not diversify the R&D portfolios, so they might convey a non-negligible amount of distinctive risks, where the failure of just one project can be a threat to the whole venture. As Buddelmeyer (2010) stated in his studies, there is a certain association between the entrepreneurs' higher desire for risk and the consequent reduction of the survival expectancies of their companies.

Apart from other variables that are presented in the economic growth models, for example investments and public spending, recently, entrepreneurship has been seen as an essential effect on some country's economic growth because of their contribution to job creation and so, generating economic activity (Castaño, Méndez, & Galindo, 2015).

Entrepreneurship activity has more impact in countries wither bigger income inequality and, in terms of developing countries, the necessity-driven entrepreneurship has a larger presence than opportunity entrepreneurship (Reynolds, Bygrave, Autio, Cox & Hay, 2001) cit in (Castaño et al., 2015). This last one type of entrepreneurship mentioned is characterized by the main functions of discovery, monitoring and exploitation of new

business opportunities, making a close relationship with the economic background. Thus, the relevance of the qualifications of entrepreneurship might depend on the state of the economy (Shane & Venkataraman, 2000) cit in (Castaño et al., 2015).

When the external conditions are suffering an economic crisis, that push factor will lead to entrepreneurship as an option for the lack of workable alternatives. Those periods of high rate of unemployment creates a drive to throw yourself into self-employment and be autonomous, because of the job opportunities absenteeism, which would attract the entrepreneurs to try to create a way of seizing the market opportunities (niche markets) (Dawson & Henley, 2012) cit in (Castaño et al., 2015).

The major types of entrepreneurship that were previously referenced, opportunity entrepreneurship and necessity entrepreneurship, are mainly driven by pull and push motivation, which consequently as a high impact regarding the motivation. A Start-up that is looking forward to grab an opportunity has the highest probability to achieve progressively growth than a company whose motivation is caused by the disappointment with other job or unemployment (Zali, Faghieh, Ghotbi and Rajaie, 2013) cit in (Castaño et al., 2015).

Studies carried by Castaño et al (2015) show that are some combination of factors that might lead to better results during recessions than expansion periods, whereas if they have certain characteristics, such as the capability of the entrepreneur to notice when to capitalize on market opportunities with their remarkable familiarity with a determined sector. Also, according to these findings, proceeding into necessity entrepreneurship does not necessarily mean that they will not survive, even though their probability of failure is still high.

So, the opportunity recognition in a certain market still is a success factor during a recession.

Said this, I mention the following hypothesis:

H2a: Economical environment is positively correlated with the failure/success of the start-ups.

H2b: The higher the risk of innovation, the higher the probability of failure.

6.2.1.3 Lack of Market Needed

Customer development is a practice that should put into work in every early-stage company, where the entrepreneur is stimulated to do some research of the market, collect the information and then make a grounded judgement based on the evaluation made (York, Jonathan L.; Danes, 2014). There is a NPD (New Product Development) model that was proposed by Cooper (1998) and modified by the same author in 2011. This model gives some emphasis to the activities connected to the customers in the early stage of the start-up, where they ended up understanding that many projects/companies fail due to an overemphasis of the technical activities more than the other business-oriented tasks (Cooper, 2013) cit in (York, Jonathan L.; Danes, 2014). If the activities and processes made by the company are not done before the formal design and development of the product, it will play an important role whether they will be successful or not (Edgett, 2011) cit in (York, Jonathan L.; Danes, 2014).

Besides this, some authors have in mind that the customer development approach neither should be done only before or after the product development is ongoing but during all the process, which means that the customer development is always improving and is never “finished” (Blank, 2007) cit in (York, Jonathan L.; Danes, 2014).

The technology-based start-ups nowadays face two mainly challenges to be successful in the market they are focusing on, which are the communication of the value of their innovation that they are offering to the customers and, since these early stage firms have less resources than reputable supplier firms, they need to concentrate in obtaining support from their clients to deliver instead their innovative offerings. These technology driven

companies need to create what is called “Leveraging Assistance Value Proposition” (Wouters, Anderson, & Kirchberger, 2018).

As Martinez (2003) cit in (Le & Suh, 2018) stated, it exists two different viewpoints of value proposition that should be analysed, the one which is resultant from the shareholder’s perspective (internal value), and the other comes from the customer’s perspective (external value) which is counted as the customer satisfaction. There are five value propositions that the companies should consider and pay attention to, which are low cost, quality, speed, service and innovation. The customer’s buying behaviour and the customer-perceived value are highly connected, and Fifield (2009) cit in (Le & Suh, 2018) enumerated some of the moments when that happen including, the moment that the customer has a urgent need to buy some product or service, the partnership that exists between the suppliers and the company , the existence of quite a few options to buy, the lack of an obtainable substitute product and, more specifically, when the price of a product or service are positively correlated with the perceived value of the same product.

Many of the early stage start-ups fail, and one of the main factors that contribute for that matter is the lack of perception about what the market needs and what the customer wants. Those are the most important tasks that a company should have in mind so that they can be successful (Le & Suh, 2018).

The limited knowledge that a start-up has about the market put them in disadvantage against the incumbent firms. At the time they enter the market they will not have the innovation routines developed that an established company has, besides the market knowledge that they already possess (Katila & Shane, 2005) cit in (Gimenez-Fernandez & Beukel, 2017). But, on the other side, the new entrants benefit exactly from that informality and not having rigid routines that can prejudice some innovation processes (Katila & Shane, 2005).

Throughout the years, the relationship between the customer and a company has been studied so that they could know what might influence the perception of the client regarding the start-up. Focusing on Internet based start-ups, in the 90s, the customers

valued the companies for gratifying knowledge and information, all they wanted was to share experiences and resources. In the 2000s and 2010s, the clients wanted a company that could give them “enjoyment and playfulness”, however, in the recent year those levels increased up to more than ten times. It followed a trend where the start-ups allowed a more proactive involvement with their customers to make better emotional connections. Nowadays, as the world is constantly evolving and modernizing itself, the customers try to keep up with it so they start to care more about their privacy and security (Le & Suh, 2018).

H3: The lack of market need is positively correlated with the failure of a start-up.

6.2.1.4 Outsourcing

Outsourcing is a mechanism that it is included in the Knowledge spillover³, along with clustering and labour mobility, and their main objective is to foster the flow of ideas between firms, however, this circulation might not be always beneficial for the industry if the firms do not have the incentive required to innovate (De Bondt, 1997) cit in (Stanko & Olleros, 2013). Some researchers suggest that outsourcing can possibly minimize costs and increase the speed-to-market (Stanko & Calantone, 2011) cit in (Stanko & Olleros, 2013). But outsourcing innovation leads to less innovative outcomes. So, the companies have a tendency to outsource activities in their business that are no longer considered a core action that needs to be constantly invested in (Howells, 1999) cit in (Stanko & Olleros, 2013). On contrary to this, if a firm just focus on external contractors, that can lead to the deterioration of the internal innovative capacity since the knowledge is passed to the external company (Henard & McFadyen, 2006) cit in (Stanko & Olleros, 2013). But these are trade-offs that need to be made, outsourcing permits companies to have a

³ Involuntary leakage or voluntary Exchange of technological knowledge within an industry

rapidly increase on the number of products of their portfolio (Quinn, 2000), and at the same time, the use of contractors will give to the firm some cost savings (Al Zu'bi & Tsinopoulos, 2012) cit in (Stanko & Olleros, 2013).

In an industry sector that is in constant growing rate of expansion, a lot of short-term business opportunities starts and that's where the opportunities to reach the breakeven and to get some financial returns (Murtha, 2001) cit in (Stanko & Olleros, 2013). At these times of high proliferation of products and services sometimes the companies "disconnect" from the market and struggle to keep up with market and the technology changes (Saxenian, 1990) cit in (Stanko & Olleros, 2013). With a vigorous alliance with external specialized contractors, the companies start to be alert of their surroundings, such like the competitors' offerings, technological changes and perception of the market, which means that a partnership with becomes a necessity with all the customers' demands and the intensive request of more products that a company needs to fill with. Although, in the sectors of the market that are characterized by the diminishing of growth, it might be a sign that the companies no longer see the development and improvement of a certain product as a core activities and the commoditization starts to be a reality (Stanko & Olleros, 2013).

Subcontracting services to help the start-ups to perform non-core activities have been a frequent practice for these companies to help them to reach the growth they want, since there always some barriers related with the internal resources and the capabilities, then, the company can focus on their core business. Since there are still lack of studies about the outsourcing services, Bhalla & Terjesen (2013) cit in (Bustamante, 2018) have done research about the start-ups that have been through accelerator programs since they are phenomenon that is going upwards. Although, Folta (1998) cit in (Bustamante, 2018) concluded the technologic start-ups that are pursuing an international expansion, and are certainly facing a bigger uncertainty, have a higher desire for joint ventures and direct investments instead of acquisition, due to the flexibility of the government structures.

When a start-up starts to expand their business, the institutional distance also increases, furthermore, hiring internally under a condition of higher level of uncertainty requires a

level of resource commitment that the company do not possess at that time. All these barriers compared to the domestic firm will be incurred by the company, such as increasing of costs and dealing with legal regulations regarding personnel contracts of a market where they lack know-how (Bhalla & Terjesen, 2013) cit in (Bustamante, 2018). The best way is to keep the structure costs low in the short term, which will permit to the start-up to have a constant growth. And since the international distance from the domestic firm is high, the companies in an early stage should have as their priority outsourcing over insourcing (Bustamante, 2018).

In the Bustamante (2018) research he noted the existence of a correlation between the different stage of a start-up regarding the acceleration program phase and the use of outsourcing as a strategy. The companies that are inserted in the programs in a later stage are less predisposed to outsource than those who start in an early stage, which leads to the conclusion that following an outsourcing strategy is indeed preferred by the start-ups that are in an early stage.

H4: If a start-up wants to expand to other markets, does their rate of survival increase when using an outsourcing strategy?

6.2.1.5 Start-up Incubation

Business incubators are a very important “supplement” in the development of start-ups. Primarily because it is a space where they can evolve and promote their business and have an easiest approach to the market since they belong most of the time to institutions like universities, that support student ideas sometimes, or to large investment firms that fund those R&D facilities (Chapple et al. 2005; Chukumba and Jensen 2005; Markman et al. 2005; Anderson et al. 2007; Siegeletal. 2008; Fukugawa 2009; Amico Roxas et al. 2011; Hsu et al. 2015) cit in (Fukugawa, 2018).

To be exact, business incubators not only offer to these companies’ physical resources, like offices and labs and other facilities that help them to grow their business, but also

expertise from the managers presented there, since they are going to help the novice entrepreneurs acquiring business skills (Lach and Schankerman, 2008) cit in (Fukugawa, 2018). They are supposed to aid the companies enhance social capital by enabling the start-ups to extract some benefits, such as connection with customers and foreign organizations to build solid social networks.

There are some engagement methods between the corporate accelerators and the start-ups such as the “Corporate Hackathons” where in a certain period of time the early stage company must try to solve a problem related to an “innovation challenge” subject, this will permit to the start-up to have a wider engagement with the contestants (Newton, 2015) cit in (Kohler, 2016). The “Corporate Incubation” is a method that “provides as path to market for corporate non-core innovations” but, unfortunately, the internal forces are not strong enough and the full capacity of the corporate accelerators is not used at their maximum to explore new external innovators (Miller and Stacey, 2014) cit in (Kohler, 2016).

Some authors believe that difference of gender affects the need to receive help from incubators, among other factors, such as the entrepreneurs’ education, the previous experience of creating a firm along with the age of the founder (Gupta et al, 2014; Thomas, 2009; Mintzberg, 2004) cit in (Albort-Morant & Oghazi, 2016). On one side the younger entrepreneurs’ will be more adventurous and will be with more energy to face some risks but they might be not successful since they do not possess the skills necessary to pull off a successful business, on the other side, the older people might have that experience needed but they might be a little bit uncertain about the risks that sometimes have to be taken into account (Blanchflower & Meyer, 1994) cit in (Kohler, 2016).

Then we have the accelerators, that basically are programs created by organizations that have the aim of providing to the start-ups mainly mentoring services, in a limited and intensive period, to help them become a successful company (Pauwels et al. 2016) cit in (Wright, Siegel, & Mustar, 2017). Most of these programs that help early stage ventures with their embryonic ideas usually involves venture labs and co-working spaces where all the participants on the program can help each other and exchange experiences, being

very important to those student entrepreneurships where the lack of experience is the major barrier for them to develop their company (Wright, Siegel, & Mustar, 2017).

To sum up, the incubators act as a link between the start-ups and the external fonts of knowledge, by using the incubator's managers expertise in the diversified industrial areas. Also, the easiness of leveraging those companies with minor social capital investment is higher and more rewarding (Ebbers, 2014) cit in (Fukugawa, 2018). Basically there exists a mutual agreement between the incubators and their start-ups, and they will definitely both benefit if they share the same goal, otherwise the Incubator will not provide the environment to the star-up to test their product-market fit and potentialize their operations (Kohler, 2016).

Also, the fact that these incubators are located geographically in a strategic local, such as near universities and other institutions concerning technological development, facilitate the communication and help potentialize those collaborations, which would be easier to backing these start-ups (Fukugawa, 2018).

H5: The rate of survival of a start-up increases if the they were part of an incubation program?

6.2.1.6 Geographical Expansion

Entering new markets is used by start-ups as an alternative to their strategy to seek growth, since diversification of the product to acquisition, these kinds of strategies help them to exploit new niches in new markets to expand their business. However, it can be challenging to find the local resources needed to boost the business as well as some barriers regarding legal regulations (Emmons et al, 2004) cit in (Chung, Chen, & Hsieh, 2007).

The companies need to have previous experiences related to this kind of strategy in order to have a certain level of skills to deal with some of the barriers that might appear, such as the facility of owning physical assets and a talented group of collaborators to deal with managerial matters (Barringer & Greening, 1998) cit in (Chung et al., 2007). So, it's

important that a start-up should know when and what they should possess to initiate that process(Chung et al., 2007).

As (BarNir et al, 2003) cit in (Chung et al., 2007) said, “firm initial size significantly affects firm strategies” since it affects directly the internal resources of the company and the external relationships. It is not absurd to think that big firms will have in their possess characteristics of having competitive advantages that other big firms will have as well so, it is normal to think that companies in their early stage phase are going to struggle because they lack of resources to “protect” their established market positioning (Shamsie et al, 2004) cit in(Chung et al., 2007). This start-ups with less people in their structure might need help to have some substantial critical mass so that they can implement some compact operational tactics, but on the contrary, larger start-ups are more propitious to get more tangible and intangible resources, which consequently will lead them to get a much easier response to some external factors. Such as the managerial issues that might appear concerning the need to get qualified staff with the right skills to run the new subsidiary in the new market (Audia et al, 2001) cit in (Chung et al., 2007). Another foundation that it is important to these companies that use geographical expansion as a strategy to diversify and to leverage their business is the entry timing that a company should have when they initiate their first geographic growth (Hannan and Freeman, 1977) cit in (Chung et al., 2007). It is very relevant to this cases that the start-up is the first one to find new niches in the market because according to previous studies in general the companies that are the first ones to entry that market are considered to have the first move advantage, gaining some lead against the competitors regarding the access to customers and by winning some notoriety in order to create a strong brand loyalty (Shamsie et al, 2004) cit in (Chung et al., 2007).

However, while the first movers might benefit from the resource scarcity, by being the leaders on the market and the easiness of establishing switching costs, the firms that are considered late entrants can use the benefit of market uncertainty and the fact that the first mover might hold some inertia and they can be much slower due to high performance (Robinson and Chiang, 2002) cit in (Chung et al., 2007).

It is all down to what an already grown start-up can do in a new market, if they will take advantage since they have already a considerable size and start gaining more easily the customer attention or, if an early stage company has the cunning to compete technologically against other competitors and gain advantage in the niche market first (Wiewel and Hunter, 1985) cit in(Chung et al., 2007).

H6: The geographical expansion as a strategy is positively correlated or not with start-up failure.

6.2.2 External Factors

6.2.2.1 Start-up failure by year and per industry

Cantamessa et al (2018) structured their research as well, based on the age of the start-ups, so they could tell if there is any pattern between this and their failure. Starting by seeing how many years they stayed active, it appears that 44% of them ran the activity for around two and three years, and 28% for about three and five years. About 14% failed in less than one year and, the same percentage as well, but regarding those who survived more than five years.

On the first year the two key reasons for start-up failure are the lack of business development, with 23%, and the business development with 28%. Along with these are the run out of cash (24%), no traction (24%) and an inexperience management (12%), which is not a surprise at all since it has more impact mostly in the younger start-ups (Cantamessa, Gatteschi, Perboli, & Rosano, 2018).

Comparing now with the second and third year of survival, the lack of business development (23%) has less relevance than the problems with the business model, which grows to 44% in the second year. Apart these issues, there are some to add, like the product/market fit and the availability of money, 24% and 20% (in this case is the percentage of cases that run out of cash) respectively. Problem after problem this leads to a snowball effect, where the lack of business model compromises the company's

profitability so, the economic structure of the start-up is going to get more impact from the running out of cash. In the fourth and fifth years, the competitors were more able and got more successful (18%) so, the lack of investment starts to be higher. However, the lack of business model remains a problem, which is sometimes consequence of the misalignment between the goals and the business made from the founders (Cantamessa et al., 2018).

Based on these start-ups reports, extracted from the databases of the Autopsy.io website and the CB Insights platform, (Cantamessa et al, 2018) found the sectors that had more failures, and those with highest percentage were the Social Media, with 12,3%, followed by Software and Service industry, with 9,3% and 8,3% respectively. In fourth and fifth place comes the industries of Entertainment (7%) and E-commerce (6%). The sectors with less failures represented in those databases were the Telecommunication, Security, Logistics/Delivering and Ed-Tech, all with 0,5%.

6.2.2.2 Lack of Funding

Lack of funding is one of the main problems for the younger companies. So, considering crowdfunding as a type of investment would be beneficial for the start-up to maintain and grow their company (Stemler, 2013) cit in (Paschen, 2017). Some of the benefits of crowdfunding are the validation of the overall business idea, the improvement of the product/service with potential customers by receiving their feedback, have a bigger picture of the product and how it is going to perform when launched and the promotion of the product by providing backers with a finished product.

In the case of NTBFs⁴, as the other start-up types, they suffer from funding gaps and, this problem can be minimized by approaching an internal investment and establish alliances with other companies, more like known firms. The first strategy allows the company to search for high skilled employees that will help them to improve their performance, and

⁴ New Technology Based Firms

this is helped by the fact that these NTBF firms have a wide network of contacts (Cohen & Levinthal, 1990) cit in (Colombo, M. G., & Piva, 2008). The second one, it's the establishment of alliances between the companies and other companies, as it happens on the VC financing, where their formation is mainly driven by the maximization of joint value (Zajac and Olsen, 1993) cit in (Colombo, M. G., & Piva, 2008). One important factor that leads these NTBFs to organizing an alliance are the deficit of their competencies, the greater the absence, the greater are the enticements to establish alliances with other companies to have access to the knowledge that those partners possess (Colombo, M. G., & Piva, 2006) cit in (Colombo, M. G., & Piva, 2008). Nevertheless, it's important to be aware that this might not be enough for the creation of an alliance, since that the benefits to candidate partners must go beyond the costs that they cause.

VCs⁵ are one of the best ways to start-ups at providing the sufficient networking that the companies need to do partnerships with players of the industry and so on with other essential stakeholders, helping them raising funding's (Kaplan & Stromberg) cit in (Di Pietro, Prencipe, & Majchrzak, 2018). However, VCs usually have the smallest possible size of investment, which are usually out of reach for those start-ups created by students. In fact, VC funding seems to be even less likely to be used in the early stages of student start-up development than it is for university spin-offs (Lockett and Wright, 2005) cit in (Wright, Siegel, & Mustar, 2017). Adding to this, Ventures Capitalists can be very dynamic regarding the business strategy of the start-up and will provide them some advice with how they should implement their strategy and, consequently, monitor and control their managerial operations to improve their performance. Basically, they are considered to be a "second voice" in the board of the start-up (MacMillan, 1989) cit in (Di Pietro et al., 2018), and will definitely increase the companies' reputation towards the stakeholders (Fried and Hisrich, 1995) cit in (Di Pietro et al., 2018). Besides the VCs, we also have the BAs⁶, which give more attention with feedback and a whole general advice

⁵ Venture Capitalists

⁶ Business Angels

about the company business, like helping hiring and recruiting specialized staff for the start-up (Mason and Harrison, 1996) cit in (Di Pietro et al., 2018).

Business angels are individuals who generally invest their own money in new and growing private ventures but, they frequently act as a group, stated as a network of business angels (Fraser et al. 2015) cit in (Wright et al., 2017). Studies from Ardichvili et al. (2002) cit in (Politis, 2008) found that the Business angels assist the companies with not only financial resources but also non-financial resources to the companies' portfolio by finding key personnel and to establish social networks as well. Many younger angel investors, especially in the Information technology fields, have had expertise as high-tech entrepreneurs so, Business angels would play a significant role in social entrepreneurship, which student entrepreneurs are very interested in. About a quarter of angels have invested in socially-impacted ventures (Wright et al. 2015) cit in (Wright et al., 2017).

Related to crowdfunding, there are essentially three types, which are the Donation Crowdfunding (includes Pure Donation and Reward Donation), the Lending Crowdfunding (includes Forgivable Loan, Presales and the Traditional Loan) and the Equity Crowdfunding (includes Investor-led and Entrepreneur-led). Paschen (2017) made a symbiose between the best crowdfunding type to each stage of a start-up.

According to their studies, in a Pre-Start-up Stage, the Donation Crowdfunding is the most viable, since the company doesn't have yet generated revenue, they're primary achievement is to generate a sustainable business plan and to test their products among their target and partners (Paschen, 2017). As Belleflamme (2014) cit in (Lukkarinen, 2016) stated, smaller funding targets are preferable in reward-based campaigns, and larger targets in equity crowdfunding. Another finding is the optimistic relationship that exists between the number of social media posts about rewards-based crowdfunding campaigns can forecast their success, which it may have a connection to the amount of early contributions in this type of crowdfunding (Etter et al, 2013) cit in (Lukkarinen, 2016). This might confirm the necessity to consolidate the lessons and provide the executives guidelines of how should be done a social media strategy for their organizations (Sultan, 2013) cit in (Ghezzi, 2016). Social media can achieve positive

results when having a team properly trained to gather customer related information (Martini, 2013) cit in (Ghezzi, 2016).

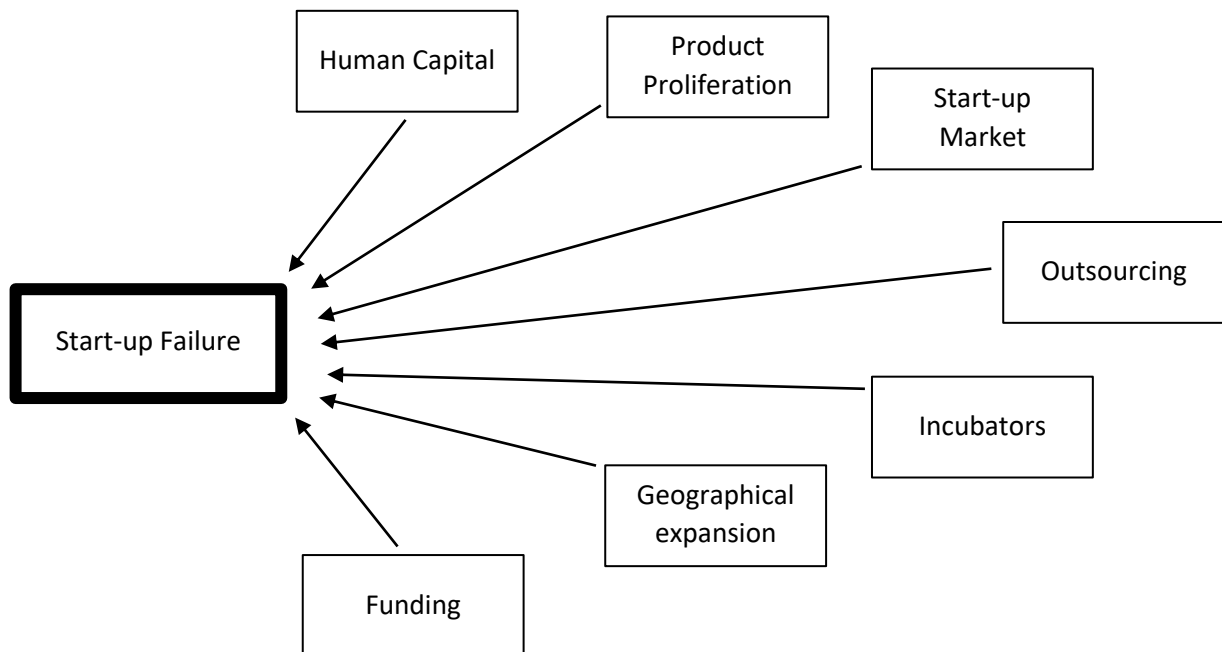
After the Pre-Start-up stage, comes the Start-up stage, where the main goal is to validate the product within the market, and it is ready to distribute. This will prove that the company has already some grip, which puts the company in a better position to offer tangible rewards like monetary interest. That is why the Lending Crowdfunding is the most suitable to this stage, allowing a real-life estimate of demand and how much is a consumer willing to pay for it. In a stage of maturity (Growth Stage), the start-up becomes efficient in almost everything, from financially healthy to an enough market penetration so, their focus is now to scale up their operations and processes. The capital required is higher, so the other types of crowdfunding is not suitable, making the Equity Crowdfunding ideal to this stage (Paschen, 2017).

The governments have also an important role in the creation of programs that can backing directly or indirectly the development of college graduates to pursue entrepreneurship, contributing with funds to help them develop their business. But, besides this government funds, there are other institutions, such as universities, that creates competitions where the entrepreneurs can pitch their business plans and the winners receive funding to back up their ideas and turn into start-ups. Mostly, these type of competitions and programs are sponsored by the universities themselves or other known companies (Honig and Karlsson, 2013) cit in (Wright, Siegel, & Mustar, 2017).

H7: Funding is positively correlated with the failure of most of the start-ups.

6.3 Concept Model

Illustration 1 - Concept model of the study



Source: Own elaboration

7 Methodology

7.1 Approach

The process of gathering the data related to the start-ups, either active or already went into failure, was firstly made by searching available databases on the internet with information related to that matter. Regarding the companies that are still growing, even if they have less than one year of the activity or more than three years, the search was mainly focused on the start-up incubators' website and to find information about those that were incubated there.

The filtering process started first to select the technology-based companies of the incubator and then to search the respective e-mail to contact the start-up but, if it was only possible to get the “general” e-mail of the company, a second approach was necessary to conduct to get the founders’ contact, such as the LinkedIn page. At some point, all this search process started to evolve into a “snowball effect”, where the start-ups responded to the survey knew about other companies and so on.

So, if the founders accepted to participate in this research, they had to respond a questionnaire with a set of questions regarding the variables explained in the previous chapter. However, due to the confidentiality of the information given on the questionnaire, it was asked during that contact if they permitted to share the name of the start-up or if they wanted to keep anonymous.

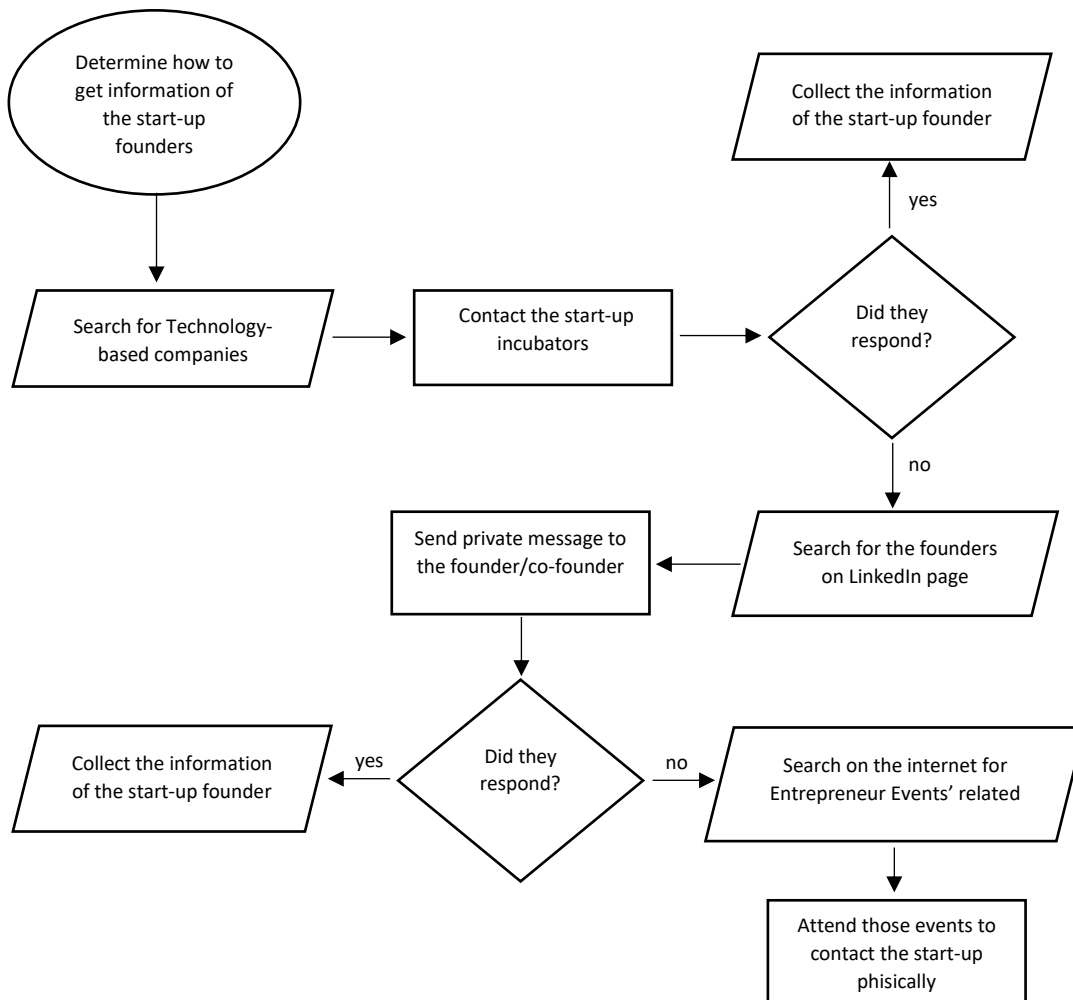
But this method was not always very effective since some percentage of the start-ups did not answer so, another step had to be taken, which was the personal contact with the companies, particularly with their founders or co-founders. This physical contact was essentially made by two alternative ways, one by visiting personally the headquarters of each incubator and attending some of the events that they carried about entrepreneurship, which concentrated some start-ups and was easier to make contact and to talk about the study that was being done. The other way was to attend these kinds of events was also possible, which was through the website “Meetup” where it was arranged several meetings between start-ups and other participants to exchange experience and knowledge. These technology incubators that participated in this study with some of their start-ups were from all over the country, such as UPTEC, Startup Braga, Startup Lisboa, Beta-I, Instituto Pedro Nunes and Audax ISCTE.

Related to the start-ups that were not successful, the process of reaching the start-up founders was a little bit more difficult because the information about them was scarcer. The process, in this case, was to find Portuguese news and reports that had information about those companies, such as founders’ giving interviews about their experience during the time that the company was active.

Secondly, was to find the name of the founder through the LinkedIn page and try to contact them through a private message. In case they did not answer the message, it was tried to contact the incubators to get some database that would give me information about companies that once were there. Moreover, in the last resort, I searched on Facebook groups related to entrepreneurship in Portugal, with the purpose of try to receive some responses from founders that had previous start-ups.

To help visualize this whole process of acquiring the founders' contacts, the following scheme helps to understand the different paths was taken to get both surveys answered by the founders.

Illustration 2 - Flowchart of the process to find Start-ups to be included in this study



Source: Own elaboration

7.2 Pre-test and sample

First, before delivering the questionnaire to the founders, which are mainly founders of tech start-ups, it was needed to do a “pre-test”. This test consisted of doing the survey to other people of the industry to receive feedback, in this case they were sent to five people, of what it would make sense to ask on the survey and if there were any mistakes, only after that it would be validated.

The number of founders that answered to the questionnaire were a total of 63. The number of start-ups still active that participated on this study were 39 and the companies that failed were 24.

7.3 Previous founders' interviews

The data gathered for this study originated from the response of two questionnaires made for the start-up founder's, both for those who got successful and those who failed, that created a company from 2005 until now. Each questionnaire had different questions, but with the same purpose of study, thus allowing research of the same variables so that they could be compared after, for further conclusions.

First, to support the questionnaire construction, a qualitative analysis was done by using past interviews to founder's that possessed start-ups in Portugal that were found on the internet. By knowing what the most difficulties for them were and what lead them to failure, this might contribute to this study to try to ask questions that can be correlated and, by preventing these topics, it could help to prevent the start-ups to fail. The past researches and articles about this matter don't consider some variables so, this study tries to explore more about it since it has so many limitations. Some of the interview's citations found on the internet, that led to the questions that appear on the questionnaire can be found below.

Table 1 - Samples of previous interviews with failed Portuguese start-up founders'

Problems mentioned	Founders' Quotes
<p>Founders cooperation during the creation of the company</p>	<p>“If I knew what I know today, I would never give 48% to a first investor. The inexperience drove us to give full confidence and to be grateful for the opportunity that was given”</p> <p>“I spoke with three international investors, all of them were interested to invest on the company but, when they realize that 2,5 out of the 3, they were investing was going to the venture capital, they backed up”</p>
<p>Misalignment between the founders and the staff</p>	<p>When we started (Start-up name), my co-founder was still doing his thesis. I understood how important finishing it was for him, so I gave him time to end it. Due to this, we didn't work together physically most of the time. (...) When starting a company, it is crucial for founders to work side by side every day. When creating something new, you will feel and be lonely most of the time. Don't underestimate it like I did.”</p> <p>“We weren't aligned with each other neither in terms of the academic level or professional experience”.</p>
<p>Start-up development and customers' feedback</p>	<p>“When you are thinking in a global scale, 5 thousand units it's a small quantity. We had to make the jump, for at least, 50 thousand to 100 thousand”.</p> <p>“I have in my team some advisers, some of them came from other countries. I felt the need of having someone to advise and guide me to not make the same mistakes”.</p>

	<p>“I couldn’t see our purpose, our mission. (...) A company without a mission is like a boat without a compass. I realized this after a one-week trip on San Francisco and Silicon Valley. It was another sign that we weren’t going the right way. A company without a mission is like a boat without a compass.”</p>
Partnerships problems	<p>"The pilot project was eventually cancelled due to the lack of timely response from the entity responsible for the Portugal 2020 program (IAPMEI) and the loss of interest from the partner"</p>
Staff Experience	<p>“What makes the product is not its certification, is the human know-how and their capability of execution”</p>
Entry timing	<p>“According to the founders, the results were due to the "resistance" they encountered in entering new solutions in the greenhouse market, and to the fact that the vertical farming market is "young" and "unable to support a Start-up like us"</p> <p>“But the crisis of 2008 got the company, going from 12 million to a passive income of 3,6 million in two weeks”</p>

Source: Portuguese founders’ interviews found on online news

After doing this analysis, the questionnaires were made based on these findings that are related to unsuccessful start-ups and to the studies that are found on the literature review that supports this thesis, covering then all the variables that this study intends to research and correlate. It was important to collect actual references of people that experienced already a start-up failure to understand what kind of reasons influences the most of them, but also to help to create an improved survey for the founders that still possess active companies to understand which topics should be focused.

8 Variables definition and sample selection

In this chapter it will be explained the variables selected that it will be used in this study, along with the explanation of how the variables are going to be measured on the prediction model.

8.1 Variables

To help deciding which variables should be used in this empirical research, a study conducted by Lussier (2001, 2010) was analysed. Another authors, such as van Gelder et al. (2007) and Carter et al. (2006) cit in (Lussier & Halabi, 2010) had previously studied models related to success and failure but, Lussier (1995) was the study with the most extensive model, identifying 15 variables, however, this model included only non-financial variables. All these variables were identified in previous literature to try to understand the impact that a certain resource has on Start-up (Lichtenstein and Brush, 2001) cit in (Lussier & Halabi, 2010). This study measurement was based on the profitability of the companies, being divided into two different points, success or failure. Those parameters were then evaluated by questionnaires in a Likert scale type responded by the founder of the companies in Chile (Lussier & Halabi, 2010).

In Chile, people think that the main factor that contributes to an entrepreneur to be successful is not the financial support from the state, but their skills. There is a quite large difference between the big corporate companies and the small businesses in the country, and those kinds of problems could have been solved if existed policymakers that would create a solution implying loans with less interest, leading consequently to a minimization of the undercapitalized starting point of an early stage company (Lussier & Halabi, 2010).

However, regarding this matter, the addition of other variables such as outsourcing and start-up incubators, revealed great importance in this study that was notd evaluated previously because of some limitations.

8.1.1 Dependent variable

The dependent variables in the current study is failure (fail). In the literature review chapter, the definition of failure was investigated to get some factors that might have influence in the business failure of the companies. It is considered an unsuccessful Stat-up the ones that did not remain active at least three years, even if the management of the company has changed, it will not be considered as failure. This dependent variable is considered a binary variable so, if it takes the value of one, the company will be considered unsuccessful, and zero if it is a successful company.

8.1.2 Independent variables

Some of the reasons that lead to companies' unsuccess were analysed in the literature review, and to sustain that, were selected 19 variables to see whether those determinants distress or not the companies' failure. The variables are related to the following topics: founder's age, management experience, founder's education, staff industry experience, team's size, HR practices, portfolio diversification, partnerships, feedback from customers, planning, outsourcing, start-up incubation, accelerator programs, professional advisory, geographical expansion, funding and economic timing.

All these variables presented on the study were clustered into five groups, which are: human capital, product proliferation, start-up market, outsourcing and incubation, and geographical expansion and funding.

Human capital

To test if the human capital has any substantial effect on the Portuguese start-up success, the current study uses the following variables: Founder age, management experience, founder education, staff industry experience, HR practices and size of the team.

For the variable *age*, it was created three groups: less than 28 years old, between 29 and 40 years old, more than 40 years old, which consequently can be represented as young age, middle age and old age, correspondingly. In this case, this variable has possible classes (p), but then, we need dummy classes $p-1$. Therefore, it was created two dummy variables related to *age*: founders with less than 28 years old, which represent a younger age (*less28y*), and founders with more than 40 years old, which represents the old age (*more40y*). These variables are quantified with the value one if the characteristic is verified, or zero if it's not.

Besides the founders' age, it is also important to consider their education and the knowledge that they possess, to analyse if these characteristics have any relevance when developing a new business. So, this variable was divided into five groups, which are presented in the questionnaire: high school diploma, bachelor's degree, master's degree and PhD. These five groups were then divided into a binary dummy variable called low education (*highschool*), which takes the value one if the founder education is less than the high school diploma, or zero, in case the founder has more than the high school diploma. Related to the experience, the variables presented in the study are the management experience, the staff industry experience and the HR practices, considering these are binary variables, if the founder possess this level of experience it will take the value of one, or zero otherwise. Starting with the management experience, this variable is introduced in the study to understand whether the founder's previous experience has any positive effect on the successfulness or failure of a Start-up. So, it was created the variable named of *founderexp*, where it would take the value of one if the founder had any previous experience in any company, or zero otherwise.

Focusing more on the staff industry experience, this variable, as it is verified in the literature review as an important evaluation indicator, is quite appropriate to this study to understand the influence that the other stakeholders have on the performance of a company. So, this variable assesses the skills that comes from the employees and the selection of experienced ones by the Start-up. So, it was created the dummy variable *staffexp* to measure it.

Another variable to be studied regarding the human capital topic is the existence of practices related to human resources. These can be very important to a company even if they are still in an early stage phase, since there are some practices that can be performed without a large amount of resources. Thus, it is created the dummy variable (*totprat*) to understand if having practices have any impact on a start-up to be more successful.

The last variable to be counted in the Human Capital is the “Size of the team”, which is considered a quantitative value and takes the variable name of *teamsize*.

Table 2 – Human Capital category

Variables included in the study correspondent to the Human Capital topic. Each of them with a correspondent dummy variable.

Original Variable	Variable Name	Dummy Variable
Founder’s Age: <ul style="list-style-type: none"> ➤ Less than 28 years old ➤ Between 29 and 40 ➤ More than 40 years old 	Founder’s age is less than 28 years old (Yes – 1 ; No – 0)	<i>less28y</i>
	Founder’s age is more than 40 years old (Yes – 1 ; No – 0)	<i>more40y</i>
Founder’s Education: <ul style="list-style-type: none"> ➤ High School Diploma ➤ Bachelor’s Degree ➤ Master’s Degree ➤ PhD 	Founders have High School Diploma (Yes – 1 ; No – 0)	<i>highschool</i>
Founders have management experience	Management knowledge (Yes – 1 ; No – 0)	<i>founderexp</i>
Staff industry experience: <ul style="list-style-type: none"> ➤ Less than 1 year ➤ Between 1 and 2 years ➤ More than 3 years 	Staff have less than 2 years of experience (Yes – 1 ; No – 0)	<i>staffexp</i>
Start-up adopted HR practices	Start-up is following one or less practices (Yes – 1 ; No – 0)	<i>totprat</i>
	Start-up is following 3 or more practices (Yes – 1 ; No – 0)	

Source: Own elaboration

Product Proliferation

Other important feature mentioned in the literature review was the relevance that the characteristic of a start-up has on their survival rate. Most of the times the failure does not rely only on the founder but on the lack of innovativeness of the product/service and when it should be launched. So, to test the second hypothesis, stated above, some variables were introduced to this study, which are: portfolio diversification, product innovation, partnerships and entry timing of the product/service.

The variable portfolio diversification (*ptfdiv*) represents whether the company has only one product/service, or if in their business model is included more than one. So, the variable takes the value of one if the company has more than one service/product, or zero otherwise.

Then, another important variable that might influence the successfulness of a company is their “alliances” with another entities, such as institutions or incumbent firms. This variable is called partnerships (*partners*), taking the value one if the start-up developed their product/service in collaboration with another known firm, or zero if otherwise.

Finally, we have the determinant entry timing to evaluate the impact that the market as on the survival of a start-up, since the saturation of the market (competitors) and the state of the economy of the country at that moment (recession or expansion). Following this, it was asked to the founders the time when it was created the company, whether during a recession or expansion period, creating consequently a dummy variable named (*mrktime*).

Table 3 – Product Proliferation category

Variables included in the study correspondent to the Product Proliferation topic. Each of them with a correspondent dummy variable.

Original Variable	Variable Name	Dummy Variable
Portfolio Diversification	Start-up has more than one product/service (Yes – 1 ; No – 0)	<i>ptfdiv</i>
Start-up partnerships	Collaboration with other entity (Yes – 1 ; No – 0)	<i>partners</i>
Entry Timing	Start-up create during economic crisis period (Yes – 1 ; No – 0)	<i>mrktime</i>

Source: Own elaboration

Start-up market

As it was stated on the introduction of this study, the lack of research by the companies on their potential customers/users happens with more frequency than it should. So, starting with one of the most important variables of this group, that determines whether a company has a purpose to offer to their customers, is the comprehension of the market, more precisely the feedback from its future customers (*feedcus*). This variable is created to mainly evaluate if a start-up considers the customer's thoughts and in which moments they do. This determinant takes the value of one if they follow the insights from their customers, or zero otherwise.

Another internal matter of a company is their guidelines and the constant updating of their business model that can change over time due to external changes, and the company must be always updated for those changes on the market. So, in the questionnaire is asked the

founders to evaluate from one to five their planning since the creation of the start-up, where the value one would indicate the founder does not think that planning is important in the company growth, and five indicates the whole process of planning and review the business model is important. The variable name is *busplan*.

Table 4 – Start-up Market category

Variables included in the study correspondent to the Start-up Market topic. Each of them with a correspondent dummy variable.

Original Variable	Variable Name	Dummy Variable
Feedback from customers	The start-up follows the insights from their customers (Yes – 1 ; No – 0)	<i>feedcus</i>

Source: Own elaboration

Outsourcing and Incubation

This study included outsourcing as an important feature in the development of a start-up since it tends to focus on the business core processes and do not have enough human resources for the development of the secondary processes. So, taking it as an essential characteristic, it was included in this study to understand if the founders used it as a strategy or if the company is not needing it. It was created the variable external sources (*extsour*), where this dummy variable will take the value of one if the company used external sources in their business processes, or zero otherwise.

Besides this variable, as stated previously on the chapter of the literature review, it is important to consider providing for the company external sources when they attempt to expand their business geographically since the initial costs of trying to establish some processes by their own can be quite expensive. Consequently, it was introduced to this study the variable outsourcing when expanding to other markets (*outex*), which takes the

value of one if the start-up developed a strategy based in outsourcing when they expanded geographically, or zero otherwise.

Any start-up in an early phase needs a place to start developing their ideas, whether they are based in a university or not. However, it does not mean that the companies that belong to Incubators have more propensity to be successful than others, and that is what this study will try to evaluate. So, the survey asked the start-up's founders, both to failed and active start-ups the importance for them of being incubated in a five-point scale, where one is not important, and 5 is very important in the development of a company. The variables name is *incrate*.

Moreover, when a company is based in an incubator it is expected to get advisory from it, so it was created the variable incubator advisory (*incadv*), which takes the value of one if the company had/has professional advisors, or zero otherwise.

Accelerator programs are made with the intention, not only to help monetarily, but also to allow the start-up to potentialize their business models and to approximate their product/service to the market. Subsequently, it was decided to ask the founder if they participated in a program, calling this the accelerator program variable, to evaluate whether they pursued into an accelerator program and, if yes, it would be divided into two groups: early stage (*earlstg*) and maturity stage (*matstg*).

Table 5 – Outsourcing and Incubation category

Variables included in the study correspondent to the Outsourcing and Incubation topic. Each of them with a correspondent dummy variable.

Original Variable	Variable Name	Dummy Variable
Outsourcing	Start-up used external sources in their business processes (Yes – 1 ; No – 0)	<i>extsource</i>
Outsourcing when expanding	Start-up used external sources when expanding to other markets (Yes – 1 ; No – 0)	<i>outexp</i>
Incubator advisory	Start-up had advisors while on the incubator (Yes – 1 ; No – 0)	<i>incadv</i>

Accelerator program	Start-up participated while in an early stage phase (Yes – 1 ; No – 0)	<i>earlstg</i>
	Start-up participated while in a maturity stage phase (Yes – 1 ; No – 0)	<i>matstg</i>

Source: Own elaboration

Geographical Expansion

Another strategy that some start-ups approach is the geographical expansion to other regions, does not need to be necessarily to other countries, to reach other customers. To understand how that would influence the survival of the company, it will be presented in this study by the variable geographic expansion. So, the goal was not only to ask the founders if the start-up followed an expansion but, if yes, ask what type of expansion they did, making the variable take the value of one if the company expanded, or zero otherwise. This variable is then divided in two classification groups: companies that expanded their business through online channel (*onlexpan*) and companies that expanded their business physically (*physexpan*).

Of course, it is very appetizing to expand to other markets however, to do so, the start-up need to have the resources, including human, that have the expertise to conduct an expansion strategy, so that the probabilities of failure can be minimized. Consequently, it was included a variable that would give to this study the opportunity to evaluate how an expansion previous experience influence a start-up, thus, creating the variable *expanexp*.

Funding

This topic was included in this study with the purpose of understanding if the companies received any type of funding, since Venture Capital to Crowdfunding, and if it causes any difference depending on the time the company receives the funding. It was created the binary variable funding to evaluate in which phase did the start-up received any kind of investment, followed by the three dummy variables: early stage funding (*earlfund*) and growth stage (*growfund*), if the evaluation was one or zero, respectively.

Besides the moment of funding, as it was stated on the incubators, the investors also have an important role which is being advisors of some of the decisions that the start-up needs to have when it comes to money decisions. Therefore, was created the variable investors advisory where it was rated in a scale from one to five, where one represents a complete lack of cooperation between the founder and the investor(s), and five a total cooperation between the two parties. It was named with the dummy variable of *investcoop*.

Table 6 – Expansion and Funding category

Variables included in the study correspondent to the Geographic expansion and Funding topic. Each of them with a correspondent dummy variable.

Original Variable	Variable Name	Dummy Variable
Geographical Expansion	The start-up expanded their business through online channel (Yes – 1 ; No – 0)	<i>onlexpan</i>
	The start-up expanded their business physically (Yes – 1 ; No – 0)	<i>physexpan</i>
Previous experience in expanding	The founder already had experience in expanding a business (Yes – 1 ; No – 0)	<i>expanexp</i>
Funding	Start-up received funding while it was in an early stage (Yes – 1 ; No – 0)	<i>earlfund</i>
	Start-up received funding while it was in a growth stage (Yes – 1 ; No – 0)	<i>growfund</i>

Source: Own elaboration

The variables presented in this chapter will be included as independent variables in the logit model which results will be analysed in the next chapters.

8.2 Logistic Regression

8.2.1 Previous Research

The results obtained on the model test done by (Lussier, 1996) can be considered accurate and reliable since it was verified in several countries with a reasonable sample, making it a model that can be applicable to other countries. But the fact that previous researches have been using the Lussier (1995) model, it makes harder to compare results with this study by not using the same model, due essentially to the wide discrepancy of variables that can predict success or failure (Lussier & Halabi, 2010).

Adding to this, using the logistic regression model to evaluate this kind of variables, only four studies actually developed a non-financial model the two types of start-ups, the other studies did not use any kind of models and logistical regression to determine factors of failure and success. (Marom & Lussier, 2014).

8.2.2 Logit models

A dependent variable can be dichotomous, and when that situation happens, the OLS (Ordinary Least Squares) can no longer produce the best linear unbiased estimator (BLUE) because it is biased and inefficient. So, other regression models can be applied for dichotomous dependent variables, such as, the logit and probit model. A logit model is a statistical approach which mainly uses the conditional probability when the dependent variable is qualitative and dichotomous, however, it is also done on dichotomous independent variables. When compared with probit regression, the logit regression is considered simple and easier to interpret. This model will provide a prediction always between 1 and 0 so it is possible to interpret the results as a valid probability.

Another advantage of using a logit model is the elimination of the disadvantages of discriminant analysis, and this happens because it does not assume normal distribution of

independent variables and homogeneity of variation-covariance matrices. Therefore, the logit regression was more suitable to be used in this study.

The general estimating equation could be written as follows:

$$Y_{i*} = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + u_i$$

Where:

Y_{i*} – represent the dependent variable;

$X_{1i}, X_{2i}, \dots, X_{ki}$ – represent the independent variables;

$\beta_0, \beta_1, \beta_2, \dots, \beta_k$ – represent the regression coefficients;

u_i – represent the error of the model, the disturbance term.

The rule for determining Y in Y * function is:

$$Y_i = \begin{cases} 0, & \text{se } Y_i^* > 0 \\ 1, & \text{se } Y_i^* \leq 0 \end{cases}$$

The following equations represent the literature review of this study and take into consideration the hypotheses developed on Chapter 2 so, it was tested the hypotheses concerning human capital (1), product proliferation (2), start-up market (3), incubation and Outsourcing (4), geographical expansion and funding (5) and the global equation with all the variables.

Human Capital_i

$$= \beta_0 + \beta_1 \text{less28}y_i + \beta_2 \text{more40}y_i + \beta_3 \text{highschool}_i + \beta_4 \text{founderexp}_i + \beta_5 \text{staffexp}_i + \beta_6 \text{totprat}_i + \beta_7 \text{teamsize}_i + u_i$$

(1)

$$Product\ Proliferation_i = \beta_0 + \beta_1 ptfdiv_i + \beta_2 partners_i + \beta_3 markttime_i + u_i \quad (2)$$

$$Startup\ Market_i = \beta_0 + \beta_1 feedcus_i + \beta_2 busplan_i + u_i \quad (3)$$

$$Incubation_i = \beta_0 + \beta_1 extsource + \beta_2 outexp_i + \beta_3 incrate_i + \beta_4 incadv_i + \beta_5 earlstg_i + \beta_6 matstg_i + u_i \quad (4)$$

$$External\ Sources_i = \beta_0 + \beta_1 onlexpan_i + \beta_2 physexpan_i + \beta_3 prevexp_i + \beta_4 earlfund_i + \beta_5 growfund_i + \beta_6 investcoop_i + u_i \quad (5)$$

Here I is related to each start-up ($I = 1 \dots N$) and the error terms are represented by u_i .

Y_i is a dummy variable which takes the value of one if the start-up has failed or the value of zero if the start-up is still in active.

Followed by these separated equations is the global equation with all the variables included.

$$Global\ _i = \beta_0 + \beta_1 less28y_i + \beta_2 more40y_i + \beta_3 highschool_i + \beta_4 founderexp_i + \beta_5 staffexp_i + \beta_6 totprat_i + \beta_7 teamsize_i + \beta_8 ptfdiv_i + \beta_9 partners_i + \beta_{10} markttime_i + \beta_{11} feedcus_i + \beta_{12} busplan_i + \beta_{13} extsource + \beta_{14} outexp_i + \beta_{15} incrate_i + \beta_{16} incadv_i + \beta_{17} earlstg_i + \beta_{18} matstg_i + \beta_{19} onlexpan_i + \beta_{20} physexpan_i + \beta_{21} prevexp_i + \beta_{22} earlfund_i + \beta_{23} growfund_i + \beta_{24} investcoop_i + u_i \quad (6)$$

9 Data Analysis

9.1 Empirical results

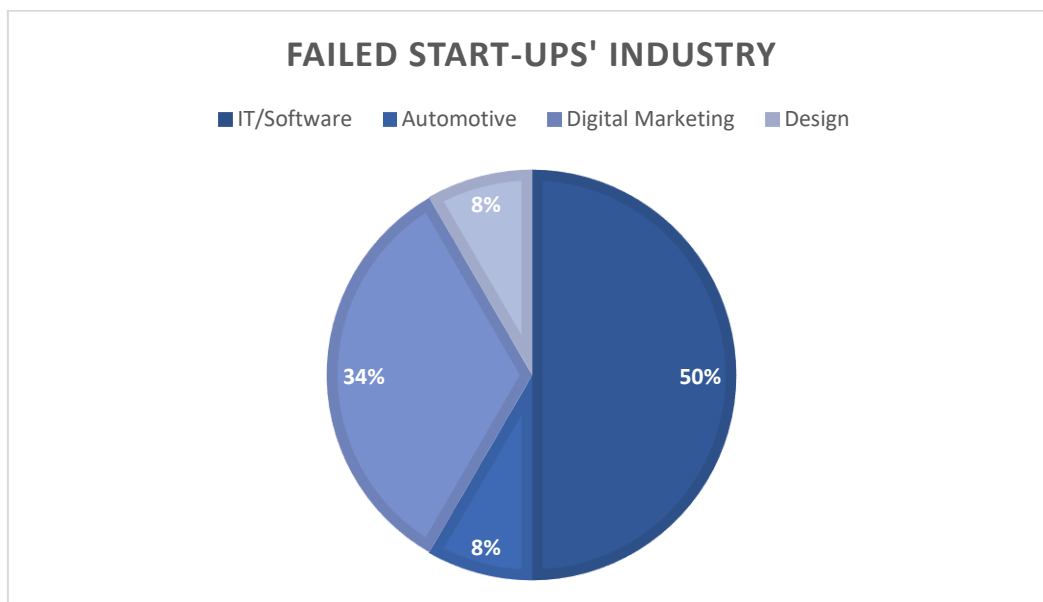
In this chapter it will be analysed and discussed the results obtained for this study. Firstly, in the section 9.2, it is conducted a descriptive statistics analysis with the aim of studying the factors which have an impact on the Portuguese start-ups. The logistic regression analysis, studied in the section 9.3, are then followed to discuss the hypotheses shown on the literature review. To help gather and present these results it was used the SPSS® software.

9.2 Descriptive Statistics

To help study all the information obtained from the start-ups, thirty-nine active and twenty-four failed, the variables were divided and grouped into five different categories to have an easier analysis.

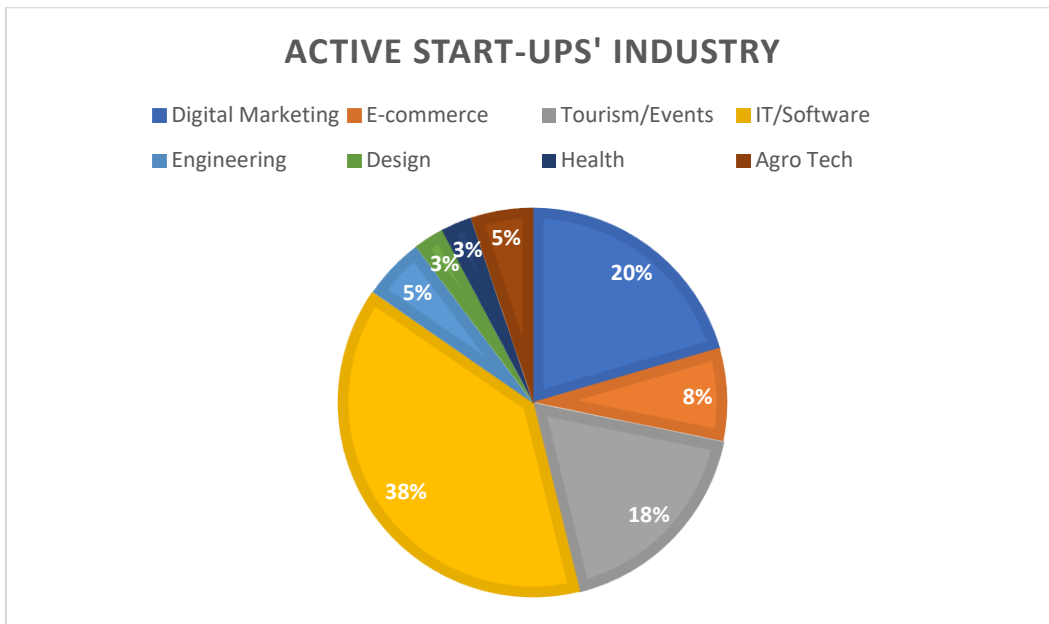
9.2.1 Start-ups' industry

Graphic 5 - Percentage of the different failed start-ups by industry (Sample number: 24)



Source: Own elaboration

Graphic 6 - Percentage of the different active start-ups by industry (Sample number: 39)



Source: Own elaboration

Overall, the companies' type of industry is mainly related with technology. Half of the failed start-ups are grouped in the IT/software category and 34%, the second largest category, corresponds to the Digital Marketing type of business. Although the active start-ups' industry with more percentage is also the IT/Software, the diversity is higher. Having companies in other areas such as, health, agriculture, tourism and engineering.

9.2.2 Human Capital

As shown in the table 7, both for active and failed start-ups, most of the founders have between 29 and 40 years old, being nor too old or too young. This can be related to the lack of previous management experience of the founders, both on the active and failed start-ups. Regarding their education, Bachelor and Master are the degrees that have higher percentage comparing to the other variables for active and failure start-ups, 74,3% and 83,3. Most failed start-ups survived between 1 and 2 years and, the active companies with

3 or more years have a higher percentage regarding their duration, considering them successful due to the longer years of activity.

Also, the previous professional experience of the staff in the active start-ups is higher, with a percentage of 53,8%, which could be an indicator of success as well. In general, most of the start-ups have between 1 and 10 collaborators. The literature review addresses that good practices gives to the company higher probabilities to be successful. In this study 30,8% of the Portuguese active start-ups do not have any kind of practices and 28,2% implemented at least 3 practices. However, the failed start-ups also had a considerable percentage of practices implemented (75%). The type of practices most implemented by the active start-ups were Compensations (not necessarily monetary) and Training, for the unsuccessful were Performance appraisal and Specialized selection (Appendix Table 1 to 5).

It was also conducted a Chi-Square test for each explanatory variable. The variables that have a sig < 0,05 means that there are a significant association between those variables and the two types of start-up. Therefore, the staff experience, the size of the team and the total number of practices are different between the two types of star-ups.

Table 7 – Human Capital Descriptive Statistics

This table reviews the descriptive statistics for the seven explanatory variables. All the variables are dummy variables which are linked with the Human Capital.

Variables		Active		Failed	
		N	%	N	%
Founder Age	Less than 28 years old	8	20,5	4	16,7
	Between 29 and 40 years old	25	64,1	12	50
	More than 40 years old	6	15,4	8	33,3
	Total	39	100	24	100
	P-value	0.253			
Academic Background	High School Diploma	3	7,7	2	8,3
	Bachelor's Degree	13	33,3	9	37,5

	Master's Degree	16	41	11	45,8
	PhD	7	17,9	2	8,3
	Total	39	100	24	100
	P-value	0.814			
Start-up duration	Less than 1 year	7	17,9	3	12,5
	Between 1 and 2 years	14	35,9	12	50
	More than 3 years	18	46,2	9	37,5
	Total	39	100	24	100
Founder experience	Yes	7	17,9	7	29,2
	No	32	82,1	17	70,8
	Total	39	100	24	100
	P-value	0.357			
Staff experience	Less than 1 year	7	17,9	8	33,3
	Between 1 and 2 years	11	28,2	13	54,2
	More than 3 years	21	53,8	3	12,5
	Total	39	100	24	100
	P-value	0.005			
Size of the team	Between 1 and 10	25	64,1	10	41,7
	Between 11 and 20	11	28,2	10	41,7
	Between 21 and 30	1	2,6	4	16,7
	More than 31	2	5,1
	Total	39	100	24	100
	Pearson Chi-Square	0.06			
Total of Practices	0	12	30,8	5	20,8
	1	6	15,4	1	4,2
	2	5	12,8	10	41,7
	3	11	28,2	8	33,3
	4	4	10,3	0	0
	5	1	2,6	0	0
	Total	39	100	24	100
	P-value	0.045			

Source: Own elaboration

9.2.3 Portfolio Diversification

Table 8 - Portfolio Diversification Descriptive Statistics

This table reviews the descriptive statistics for the three explanatory variables. All the variables are dummy variables which are linked with the Portfolio Diversification.

Variables		Active		Failed	
		N	%	N	%
Portfolio Diversification	Yes	22	56,4	8	47,6
	No	17	43,6	16	52,4
	Total	39	100	24	100
	P-value	0.119			
Partnerships	Yes	30	76,9	19	79,2
	No	9	23,1	5	20,8
	Total	39	100	24	100
	P-value	1			
Business model update	0	3	7,7	3	12,5
	2	0	0	1	4,2
	3	6	15,4	7	29,2
	4	15	38,5	12	50
	5	15	38,5	1	4,2
	Total	39	100	24	100
	P-value	0.02			

Source: Own elaboration

By the results shown on the Table 8, most of the active start-ups have multiple products/services (56,4%), instead of the failed start-ups where that does not happen (52,4%), however, 48% had portfolio diversification. Most of the companies did partnerships with various entities. Known firms and Private Venture Capital are the entities with more collaborations both with active and failed start-ups (Appendix Tables 6 to 9).

Regarding the business model, the founders of the active start-ups consider very important the constant updating (77%). This last variable after doing the Chi-Square test have a Sig of 0,02, which means that exist a significant relationship between this variable and the two types of companies.

All the founders received feedback from their customers although in different occasions. The founders of active start-ups received feedback mostly during the development of the product/service (69,2%). In the case of the failed start-up founders', they started to get feedback before the development and the creation of the start-up, both with 45,8% (Appendix Tables 10 to 12).

9.2.4 Outsourcing and Incubation

Table 9 - Outsourcing and Incubation Descriptive Statistics

This table reviews the descriptive statistics for the five explanatory variables. All the variables are dummy variables which are linked with Outsourcing and Incubation.

Variables		Active		Failed	
		N	%	N	%
External services usage	Yes	22	56,4	8	47,6
	No	17	43,6	16	52,4
	Total	39	100	24	100
	P-value	0.019			
Based on an Incubator	Yes	22	56,4	6	25
	No	10	25,6	18	75
	Was	7	17,9	0	0
	Total	39	100	24	100
	P-value	0			
Importance of an Incubator	0	10	25,6	18	75
	2	3	7,7	0	0
	3	11	28,2	3	12,5
	4	10	25,6	3	12,5
	5	5	12,8	0	0
	Total	39	100	24	100
	P-value	0.001			
Incubator advisory	Yes	19	65,5	4	66,7
	No	10	34,5	2	33,3
	Total	29	100	6	100
	P-value	0.001			
Accelerator program	Yes	14	35,9	14	58,3
	No	25	64,1	10	41,7
	Total	39	100	24	100
	P-value	0.118			

Source: Own elaboration

Introducing outsourcing services in a company to do the non-core business is, according to some authors, a way to reduce some internal costs and therefore increase the probability of survival. In the current study, 56,4% of the Portuguese start-ups that are still active use external services, while only 8 of the 24 failed companies outsourced (47,6%). Most of the active companies are or were based in Portuguese incubators (74,3%), instead of the 75% that failed and were not based in one. Also, more than half of the active start-up founders' that were based in one consider that an incubator is important in the development of the company, since they have internal advisory from professional (65,5%). At last, as it is shown in the Appendix (Table 13), all the start-ups participated on accelerator programs while they were in an early stage phase. 58,3% of the failed companies were in accelerator programs. It was verified after doing a Chi-Square test that every variable in the table above have a sig <0,05 apart from the "Accelerator program", meaning that the two type of companies are different regarding to these characteristics.

9.2.5 Expansion and Funding

Table 10 - Expansion and Funding Descriptive Statistics

This table reviews the descriptive statistics for the seven explanatory variables. All the variables are dummy variables which are linked with Expansion and Funding.

Variables		Active		Failed	
		N	%	N	%
Geographical Expansion	Yes	23	59	6	25
	No	16	41	18	75
	Total	39	100	24	100
	P-value	0.01			
Expansion channel	Online	12	52,2	4	66,7
	Physically	3	13	1	16,7
	Both	8	34,8	1	16,7
	Total	23	100	6	100
	P-value	0.83			
Expansion experience	Yes	14	60,9	1	16,7
	No	9	39,1	5	83,3

	Total	23	100	6	100
	P-value	0.001			
Funding Stage	Early Stage	28	71,8	13	54,2
	Growth Stage	4	10,3	4	16,7
	Both	7	17,9	7	29,2
	Total	39	100	24	100
	P-value	0.426			
Investors Cooperation	1	5	12,8	3	12,5
	2	2	5,1	4	16,7
	3	9	23,1	11	45,8
	4	8	20,5	4	16,7
	5	15	38,5	2	8,3
	Total	39	100	24	100
	P-value	0.046			
Market phase	Recession	15	38,5	8	33,3
	Expansion	24	61,5	16	66,7
	Total	39	100	24	100
	P-value	0.79			
Founder opinion on	Yes	21	53,8	8	33,3
	No	18	46,2	16	66,7
	Total	39	100	24	100
	P-value	0.128			

Source: Own elaboration

Almost 60% of the active start-ups expand their business geographically, which is the complete opposite with the failed companies. From those who expanded, for both type of start-ups, they preferred the online channel to do so, 52,2% for active and 66,7% for failed start-ups. Also, it is quite relevant the difference between the experience of the founders between the active and the failed start-ups. According to the Table 14 (Appendix), 11 of the 24 (45,8%) companies inquired failed because of the insufficient funding and the period where they receive more monetary resources is during their early stage. The Portuguese active start-ups are mainly funded by Personal and Venture Capital, and the failed are also essentially subsidized by Business Angels and Personal Capital, as it is seen on Tables 15 to 19 (Appendix). Another important information is that 38,5% of the active start-ups had a constant cooperation with their principal stakeholder, the investors.

Many of the companies were created when the market was “booming”, both for the active and the failed.

And at last, after doing the Chi-Square test, the variables “Geographical Expansion”, “Expansion Experience” and “Investors Cooperation” have a sig < 0,05, which means that there is a significant relationship between those variables and the two types of start-up.

9.3 Logit regression model results

With the objective to test which variables mentioned in this study influence the start-up failure, the equations (1), (2), (3), (4), (5) are assessed by using the logit regression. These five equations contribute to the initial point of this study. Afterward, it is analysed the global equation (6) that includes all the significant explanatory variables. All models were estimated using the Enter method to include the variable in the model, except to the estimation of the global model. This later model was estimated using the forward conditional, being included all the explanatory variables in the model considering the significance level of 0.10.

9.3.1 Human Capital

Table 11 – Regression Coefficients: Human Capital

This table presents the coefficients estimated with logistic regression. The dependent variable is Failure (fail) and the explanatory variables are younger founder (less28y), older founder (more40y), founder education (highschool), management experience (*founderexp*), staff experience (*staffexp*), HR practices implemented (*totprat*) and size of the team (*teamsize*). All these variables are dummy variables.

Regression Coefficients							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	less28y	-,327	,836	,153	1	,696	,721
	more40y	,469	,749	,392	1	,531	1,598
	highschool	,012	1,092	,000	1	,991	1,012
	founderexp	,267	,727	,135	1	,713	1,306
	staffexp	2,069	,733	7,979	1	,005	7,919

	totprat	,023	,268	,007	1	,931	1,023
	teamsize	,299	,417	,515	1	,473	1,349
	Constant	-2,556	,961	7,074	1	,008	,078
$R^2_{Cox \& Snell} = 0,203 ; R^2_{Nagelkerke} = 0,275$							

Source: Own elaboration

In the Table 29 is presented the results from the equation (1), that includes only the explanatory variables related to the Human Capital. As it was anticipated, the regression coefficient “Staff Experience” has a positive ($B = 2.069$) and significant ($Sig = 0.005$) influence in the Portuguese start-up failure. As it was stated by Cantamessa et al (2018), these results are consistent with the literature regarding to the need to have experienced staff to have a successful start-up. Therefore, the Hypothesis 1b cannot be confirmed by the results obtained as it was found insignificant correlations between the regression coefficient and the dependent variable.

Surprisingly, the previous management experience of the founder (*founderexp*), the size of the team (*teamsize*), the founder’s age (*less28y* and *more40y*), the HR practices adopted by the start-up (*totprat*) and the founder’s education (*highschool*) have a positive but not a significant influence on the failure of the Portuguese start-ups. Concluding that the Hypothesis 1a is partially confirmed by the results obtained.

It also can be observed that the adjusted Nagelkerke R-squared, being the best pseudo R-squared, has a value of 27,5%, which means that the Portuguese start-up failure can be explained in 27,5% by these explanatory variables.

9.3.2 Product Proliferation

Table 12 - Regression Coefficients: Product Proliferation

This table presents the coefficients estimated with logistic regression. The dependent variable is Failure (fail) and the explanatory variables are portfolio diversification (ptfdiv), partnerships (partners) and market entry timing (mrkctime). All these variables are dummy variables.

Regression Coefficients							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	ptfdiv	-1,026	,555	3,417	1	,065	,358
	partners	,382	,675	,321	1	,571	1,466
	mrkctime	,370	,578	,411	1	,521	1,448
	Constant	-,564	,750	,564	1	,453	,569
$R^2_{Cox \& Snell} = 0,059$; $R^2_{Nagelkerke} = 0,080$							

Source: Own elaboration

This other group corresponds to the product proliferation and the results were obtained by the equation (2), which includes only the explanatory variables regarding Product proliferation. Concerning the results presented in the table 30, it is possible to observe that the variables *partners* ($B = 0,382$), which represents the partnerships between a company and an entity, and *mrkctime* ($\beta = 0,370$), which represents the entry timing of the start-up regarding the economy, have not influence on the Portuguese stat-up failure. Some authors establish that partnerships increase the longevity of a company, but as it is observed, it is not consistent with the results. As well with the economic timing, which in the literature is mentioned that start-ups that are created during an economic expansion have higher probabilities to have success, but that cannot be verified in the study.

Regarding the variable *ptfdiv*, and considering a significance level of 10%, it is noticeable that it has a negative and significant influence on the dependent variable ($B = -1,026$; $Sig = 0,065$). Seeing this, it can be concluded that the more diversification of products/services a Portuguese company has, the less is the probability of failure. Therefore, the Hypothesis 2b can be partially confirmed by the results obtained in this logistic regression, which is not the case of the Hypothesis 2a.

Regarding the adjusted Nagelkerke R-squared, this pseudo square has a value of 0,080, meaning that the Portuguese start-up failure can be explained in 8% by these explanatory variables.

9.3.3 Start-up Market

Table 13 - Regression Coefficients: Start-up Market

This table presents the coefficients estimated with logistic regression. The dependent variable is Failure (fail) and the explanatory variables are feedback from customers (feedcus) and importance of business model (busplan). All these variables are dummy variables.

Regression Coefficients							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	busplan	-,402	,203	3,943	1	,047	,669
	Constant	,961	,779	1,523	1	,217	2,616

$R^2_{Cox \& Snell} = 0,068$; $R^2_{Nagelkerke} = 0,092$

Source: Own elaboration

In the following table 31 are the results obtained from the equation (3), correspondent to the Start-up Market explanatory variables. The variables *feedcus* does not appear in the regression because every founder responded “Yes”, so it has not any impact on the results. Thus, there is a unique explanatory variable which is *busplan* (B = -0,402; Sig = 0,047), and it has a negative and significant effect on the Portuguese start-up failure. That means the more constant is a business model updated, the less is the probability of failure of a Portuguese company. Moreover, according to Blank (2007), the importance of updating the business model is consistent with these findings.

Considering the adjusted Nagelkerke R-squared, it takes the value of 0,092, which means the unique explanatory variable explains 9,2% of the Portuguese start-up failure. So, being confirmed by the results shown, the Hypothesis 3 can be corroborated.

9.3.4 Incubation and Outsourcing

Table 14 - Regression Coefficients: Incubation and Outsourcing

This table presents the coefficients estimated with logistic regression. The dependent variable is Failure (fail) and the explanatory variables are external sources (extsource), incubator advisory (incadv), early stage (earlstg), importance of an incubator (incrate) and outsourcing when expanding (outexp). All these variables are dummy variables.

Regression Coefficients							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	extsource	-1,463	,671	4,748	1	,029	,232
	incadv	,286	1,075	,071	1	,790	1,331
	earlstg	,983	,647	2,308	1	,129	2,672
	incrate	-,667	,288	5,347	1	,021	,513
	outexp	,053	,956	,003	1	,955	1,055
	Constant	,949	,647	2,156	1	,142	2,584
$R_{Cox \& Snell}^2 = 0,305$; $R_{Nagelkerke}^2 = 0,415$							

Source: Own elaboration

The other group which has been recognized in this study to have influence in a start-up is the incubation and the outsourcing. In the table 32 are expressed the results from the equation (4), demonstrating with the explanatory variables and their coefficients.

The variables *extsource* (B = -1,463; Sig = 0,029) and *incrate* (B = -0,667; Sig = 0,021), which represents the use of external sources in the start-up and the importance of an incubator for a company, respectively, present a negative and significant connection with the Portuguese company failure. In the chapter of the literature review, Bustamante (2018) stated that the start-ups which choose to use external sources on their non-business processes tend to reduce the costs and, therefore, have more probability of success. Regarding the participation of the start-ups in incubators during their development, previous literature states that the companies tend to be more successful when they are incubated.

The adjusted Nagelkerke R-squared takes the value of 0,415, which means that 41,5% of the Portuguese start-up failure are explained by these explanatory variables. Therefore, the Hypothesis 4 and 5 can be partially verified.

9.3.5 Expansion and Funding

Table 15 - Regression Coefficients: Expansion and Funding

This table presents the coefficients estimated with logistic regression. The dependent variable is Failure (fail) and the explanatory variables are online expansion (onlexpan), physical expansion (physexpan), early funding (earlfund), maturity stage (growfund), expansion experience (expanexp) and investors cooperation (investcoop). All these variables are dummy variables.

Regression Coefficients							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	onlexpan	-,824	,851	,938	1	,333	,438
	physexpan	,548	1,607	,116	1	,733	1,730
	earlfund	-1,419	,831	2,919	1	,088*	,242
	growfund	,143	1,246	,013	1	,908	1,154
	expanexp	-3,351	1,273	6,933	1	,008	,035
	investcoop	-,351	,239	2,156	1	,142	,704
	Constant	2,336	1,101	4,504	1	,034	10,339
$R^2_{Cox \& Snell} = 0,301$; $R^2_{Nagelkerke} = 0,409$ *If we consider Sig < 0,10							

Source: Own elaboration

At last, the final group of this study is the geographical expansion and funding. From the equation (5) the results are shown below on the table 33, being presented the explanatory variables and their coefficients.

There are some of the variables that have a negative but insignificant influence within the dependent variable. This is the case of *onlexpan*, meaning the start-up expansion through an online channel does not influence the probability of start-up failure. It is stated by the literature review that the investors cooperation (*investcoop*) with a company is important to their business development, however, the current study shows that it is not enough to be significantly relevant for Portuguese start-ups (Sig = 0,142).

Now, regarding the variables that, not only cause a negative influence in the Portuguese start-up failure, but also, they are significant and valid as it is seen by the results from the regression. These variables are the *earlfund* ($B = -1,419$) and the *expanexp* ($B = -3,351$). Which means the start-ups that receive funding in an early stage and the founders that have previous experience in expanding a company geographically have a less probability of failure, respectively.

In this case, the adjusted Nagelkerke R-squared takes the value of 0,409, which means that these explanatory variables explain 40,9% of the Portuguese Start-up failure. Thus, the Hypothesis 6 and 7 can be partially verified by the results obtained.

9.3.6 Global model

Table 16 – Regression Coefficients: Global Model

This table presents the coefficients estimated with logistic regression. The dependent variable is Failure (*fail*) and the explanatory variables used are the variables that demonstrate a significant level in the models estimated previously: importance of an incubator, staff experience and expansion experience.

Regression Coefficients							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	incrate	-,582	,169	11,823	1	,001	,559
	Constant	,518	,383	1,831	1	,176	1,678
Step 2 ^b	incrate	-,661	,194	11,573	1	,001	,516
	staffexp	2,427	,794	9,347	1	,002	11,326
	Constant	-1,013	,671	2,281	1	,131	,363
Step 3 ^c	expanexp	-2,467	1,157	4,541	1	,033	,085
	incrate	-,535	,207	6,687	1	,010	,586
	staffexp	2,484	,818	9,217	1	,002	11,988
	Constant	-,801	,691	1,343	1	,247	,449
$R^2_{Cox \& Snell} = 0,205$; $R^2_{Nagelkerke} = 0,279$							
$R^2_{Cox \& Snell} = 0,345$; $R^2_{Nagelkerke} = 0,469$							
$R^2_{Cox \& Snell} = 0,410$; $R^2_{Nagelkerke} = 0,558$							

Source: Own elaboration

The table 34 shows the global model, taking only in consideration the significant variables. These results are consistent with the previous results, where the variables *expanexp* ($B = -2.467$; $Sig = 0,033$), *incrate* ($B = -0.535$; $Sig = 0.010$) and maintain a negative and significant influence with the Portuguese start-up failure, apart from *staffexp* ($B = 2.484$; $Sig = 0,002$) which has a positive influence. There are some variables, such as *ptfdiv*, *extsource* and *earlfund* that, contrarily to what was expected, were not included in the reduced model. These findings are understandable since the significance of the regression coefficients of those variables to the previous models were not strong. However, it is expressed in the literature review that the negative influence of these variables has an impact on the start-up failure.

Correspondingly, the adjusted Nagelkerke R-squared takes the value of 0.558, which means these significant explanatory variables, included in the model, explain 55.8% of the Portuguese start-up failure.

10 Main results and Discussion

In the last years, even decades, there were conducted several studies worldwide by some authors with the purpose to understand what drives these companies yet, there is still no standard list of variables that have an impact in their failure or success.

So, the aim of this study is to understand which factors contribute to the technology based Portuguese start-ups failure and success considering seven main categories: human capital, product proliferation, start-up market, outsourcing and incubation and the last one, geographic expansion and funding. To examine what affects the Portuguese start-ups, it was chosen the following explanatory variables according to the literature review: founder's age, management experience, founder's education, staff industry experience, team's size, HR practices, portfolio diversification, partnerships, feedback from customers, planning, outsourcing, start-up incubation, accelerator programs, professional advisory, geographical expansion, funding and economic timing. This study has a sample of sixty-three start-ups in total, thirty-nine successful cases and twenty-four unsuccessful

cases. The information collected was via a survey made to the founders of the start-ups. They were mainly contacted by start-up meetings, phone calls and emails sent to the incubators. In order to understand what drives the start-up success/unsuccess, the models were estimated by logistic regression.

Through the results obtained it is observed that, in general, the variables included in each category are verified partially. If we consider an isolated study of each estimated model category, only seven of the nineteen variables are relevant predictors of failure and success of Portuguese start-ups, these variables are staff experience, portfolio diversification, planning, external sources (outsourcing), importance of incubators, early funding and expansion experience. Although, from the global model, there are only three variables that have a negative but significant impact on the Portuguese start-up failure: staff experience, importance of incubators and previous expansion experience. This means that the higher the levels of these variables, the lower the likelihood of start-up unsuccess.

Some conclusions can be taken from the results such as, the fact that we can consider that an active company is going to be successful because the higher the experience, the higher the probability of success. And this can be verified by most of the founders having between twenty-nine and forty years old, both for the active and failed start-ups. These highly experienced founders and their previous experience of the founders in expansion can cause also an impact in the success of the start-ups. Likewise, the entry timing of the company on the market does not have an impact on the start-up success, in contrary of what is said in the literature review by Castaño (2015). The same happens with the creation of partnerships between the start-ups and some institutions, stated by Gimenez & Beukel (2017). Results of the current study stated that the Portuguese companies that have partnerships does not have advantage in terms of being more successful. The lack of funding in the Portuguese start-ups was not the principal cause of failure but, if the companies receive an early stage funding, that will help reduce the likelihood to fail.

Some previous researches made by Lussier (2010) showed that the industry experience, the founder management experience and the age of the owner are significant contributors

to failure and success. In his study in 1995, based on start-ups from Chile, he concluded that the successful companies have in fact more industry experience, more staff experience and a better economic entry-timing in the market. Comparing to this study, in Portugal, it seems that some of those results are similar but according to the economic timing it does not influence the start-ups.

To sum up, the global model R-squared is 55,8%, which represents a reasonable percentage to validate the variables that influence the Portuguese start-up ecosystem.

10.1 Limitations

Even though the findings were quite reasonable and presents an extensive model with nineteen variables to analyse the Portuguese start-up failure, it is important to mention that this study presents some limitations. Firstly, it is needed some thorough examination through the variables since most of them are based on self-judgement from the founders of the companies. The start-up community in Portugal is growing but it still does not have a big amplitude of companies so, the process of obtaining data in Portugal from active start-ups it is not that easy, and to approach a founder from a failed start-up is even harder. So, further studies made related to this topic may be developed with a bigger sample, essentially with more failed start-ups, and with more objective variables to measure.

10.2 Main contributions for management

Results obtained from this study might be useful for the current Portuguese entrepreneurship community, not only to the future entrepreneurs, but also to the other stakeholders, like investors and institutions that offer them capital, such as the universities and known firms. Some contributions that I would give to the future entrepreneurs would be to try to receive funding from investors in an early stage but, without giving to them more than half of the company shares, otherwise they would influence its management.

10.3 Perspective for future researches

For future studies based on this topic is recommended to have a bigger sample and collect more information from the start-ups, especially from the failed ones. It is recommended to use variables that are easier to measure and to compare between the two types of companies, such as the case of the importance for the founder that an incubator had on the start-up development and, for example, the level of innovation of the start-up' product/service and the impact that it has on the company. Also, in future studies the authors should consider to use other methods to gather information, such as interviews and the usage of databases with more quantitative information.

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(Visualized in 02/09/2019)

12 Appendix

Descriptive Analysis tables

HR Practices

Table 1

Performance appraisal		Frequency	Percentage
Active Start-up	Yes	14	51,9
	No	13	48,1
	Total	27	100
Failed Start-up	Yes	14	73,7
	No	5	26,3
	Total	19	100

Table 2

Compensations		Frequency	Percentage
Active Start-up	Yes	19	70,4
	No	8	29,6
	Total	27	100
Failed Start-up	Yes	11	57,9
	No	8	42,1
	Total	19	100

Table 3

Training		Frequency	Percentage
Active Start-up	Yes	15	55,6
	No	12	44,4
	Total	27	100
Failed Start-up	Yes	8	42,1
	No	11	57,9
	Total	19	100

Table 4

Team building activities		Frequency	Percentage
Active Start-up	Yes	14	51,9
	No	13	48,1
	Total	27	100
Failed Start-up	Yes	0	0
	No	0	0
	Total	0	0

Table 5

Specialized selection		Frequency	Percentage
Active Start-up	Yes	8	29,6
	No	19	70,4
	Total	27	100
Failed Start-up	Yes	12	63,2
	No	7	36,8
	Total	19	100

Type of Partnerships

Table 6

Public Institutions		Frequency	Percentage
Active Start-up	Yes	9	30
	No	21	70
	Total	30	100
Failed Start-up	Yes	2	10,5
	No	17	89,5
	Total	19	100

Table 7

Universities		Frequency	Percentage
Active Start-up	Yes	10	33,3
	No	20	66,7
	Total	30	100
Failed Start-up	Yes	7	36,8
	No	12	63,2
	Total	19	100

Table 8

Private Venture Capital		Frequency	Percentage
Active Start-up	Yes	13	43,3
	No	17	56,7
	Total	30	100
Failed Start-up	Yes	9	47,4
	No	10	52,6
	Total	19	100

Table 9

Known Firms		Frequency	Percentage
Active Start-up	Yes	22	73,3
	No	8	26,7
	Total	30	100
Failed Start-up	Yes	10	52,6
	No	9	47,4
	Total	19	100

When did the Start-up received feedback?

Table 10

Before the development of the product		Frequency	Percentage
Active Start-up	Yes	15	38,5
	No	24	61,5
	Total	39	100
Failed Start-up	Yes	11	45,8
	No	13	54,2
	Total	24	100

Table 11

During the development of the product		Frequency	Percentage
Active Start-up	Yes	27	69,2
	No	12	30,8
	Total	39	100
Failed Start-up	Yes	8	33,3

	No	16	66,7
	Total	24	100

Table 12

Since the creating of the company		Frequency	Percentage
Active Start-up	Yes	17	43,6
	No	22	56,4
	Total	39	100
Failed Start-up	Yes	11	45,8
	No	13	54,2
	Total	24	100

Table 13

Participation in Accelerator Programs		Frequency	Percentage
Active Start-up	In an early stage phase	14	100
	Total	14	100
Failed Start-up	In an early stage phase	14	100
	Total	14	100

Table 14

Start-up failed because of funding		Frequency	Percentage
Failed Start-up	Yes	11	45,8
	No	13	54,2
	Total	24	100

Table 15

Business Angel		Frequency	Percentage
Active Start-up	Yes	10	25,6
	No	29	74,4
	Total	39	100
Failed Start-up	Yes	11	45,8
	No	13	54,2
	Total	24	100

Table 16

Venture Capital		Frequency	Percentage
Active Start-up	Yes	11	28,2
	No	28	71,8
	Total	39	100
Failed Start-up	Yes	9	37,5
	No	15	62,5
	Total	24	100

Table 17

Crowdfunding		Frequency	Percentage
Active Start-up	Yes	1	2,6
	No	38	97,4
	Total	39	100
Failed Start-up	Yes	1	8,3
	No	22	91,7
	Total	24	100

Table 18

Personal Capital		Frequency	Percentage
Active Start-up	Yes	27	69,2
	No	12	30,8
	Total	39	100
Failed Start-up	Yes	16	66,7
	No	8	33,3
	Total	24	100

Table 19

Contest		Frequency	Percentage
Active Start-up	Yes	7	17,9
	No	32	82,1
	Total	39	100
Failed Start-up	Yes	3	12,5
	No	21	87,5
	Total	24	100

Questionnaire made to the failed Start-ups

Minimize the failure rate of Startups

My name is Miguel and I'm currently doing my MSc in Management at ISCTE-IUL. The purpose of this inquiry is to support my thesis, which has the aim to try to reduce start-ups failure and to discover the main factors that tend to affect them. By understanding the processes made by the successful startups, I will be able to see the errors made by Start-ups that failed. In Portugal, the percentage of companies created that were unsuccessful within 2 years of life is quite high. This research is important for that matter so that the companies understand how they should behave in the first years of existence and what they should avoid.

*Obrigatório

1. Founder's Age? *

Marcar apenas uma oval.

- Less than 28 years old
- Between 29 and 40 years old
- More than 40 years old

2. Academic background? *

Marcar apenas uma oval.

- High School Diploma
- Bachelor's Degree
- Master's Degree
- PhD

3. Start-up industry? *

4. For how long was the Start-up active? *

Marcar apenas uma oval.

- Less than 1 year
- Between 1 and 2 years
- More than 3 years

5. Have you created a Start-up previously? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 6.*
- No *Passe para a pergunta 7.*

Secção sem título

1. What was the reason for the failure? *

Marcar tudo o que for aplicável.

- Run out of funding
- Sold the Start-up
- Product/Service didn't fit the market
- Outra: _____

Secção sem título

2. Does the staff have previous experience in previous companies? *

Marcar apenas uma oval.

- Less than 1 year
- Between 1 and 2 years
- More than 3 years

3. Size of the team? *

Marcar apenas uma oval.

- Between 1 and 10
- Between 11 and 20
- Between 21 and 30
- More than 31

4. Did your Start-up use practices that might enhance the performance of the staff? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 10.*
- No *Passe para a pergunta 11.*

Secção sem título

5. If yes, what kind of practices? *

Marcar tudo o que for aplicável.

- Performance appraisal
- Compensations (Not necessarily monetary)
- Training
- Specialized selection
- Outra: _____

Is innovation a failure factor in a Start-up product/service?

6. Did your Start-up have a Portfolio diversification? *

Marcar apenas uma oval.

- Yes
- No

1. Have you created partnerships to help with the development of the company? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 13.*
 No *Passe para a pergunta 14.*

Secção sem título

2. If yes, with whom?

Marcar tudo o que for aplicável.

- Public Institutions
 Universities
 Private Venture Capital
 Known firms

Secção sem título

3. Your product/service didn't work because the innovation behind it was too complex? *

Marcar apenas uma oval.

- Yes
 No

Is lack of market related to Start-up failure?

4. Did you take into account the feedback from your potential customers? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 16.*
 No *Passe para a pergunta 17.*

Secção sem título

5. If yes, when? *

Marcar tudo o que for aplicável.

- Before the development of the product/service
 During the development of the product/service
 Since the creation of the company until its failure

Secção sem título

6. The Start-up was constantly updating its guidelines and planning all the processes? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 18.*
 No *Passe para a pergunta 19.*

Secção sem título

1. From 1 to 5, rate the importance of updating it *

Marcar apenas uma oval.

	1	2	3	4	5	
Not important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Important

Secção sem título

2. The lack of target was a problem for the survival of the Start-up? *

Marcar apenas uma oval.

- Yes
 No

3. The insucess of the company was due to the lack of sales/customers/users? *

Marcar apenas uma oval.

- Yes
 No

4. Do you think the entry timing of the product/service in the market was a problem? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 22.*
 No *Passe para a pergunta 23.*

Secção sem título

5. If yes, why? *

Marcar tudo o que for aplicável.

- The product/service was "ahead" of its time
 The product/service was too old for the targeted market
 There were a lot of competitors
 Outra: _____

Outsource as a company strategy

6. Did you use external services to help in the non-core business processes? *

Marcar apenas uma oval.

- Yes
 No

7. Did you expand geographically to other markets? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 25.*
 No *Passe para a pergunta 26.*

Secção sem título

1. **If yes, did you outsource? ***

Marcar apenas uma oval.

- Yes
 No

Do incubators influence a Start-up?

2. **Was your company based in a Start-up Incubator? ***

Marcar apenas uma oval.

- Yes *Passe para a pergunta 27.*
 No *Passe para a pergunta 31.*

Secção sem título

3. **From 1 to 5, rate the importance of being in an Incubator ***

Marcar apenas uma oval.

	1	2	3	4	5	
Not important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Important

Secção sem título

4. **Did you receive any professional advisory from the Incubator? ***

Marcar apenas uma oval.

- Yes
 No

Secção sem título

5. **Do you think that the incubator was a good strategy to leverage your company with minor social capital? ***

Marcar apenas uma oval.

- Yes
 No

6. **Do you think the Incubators are strategically positioned geographically? ***

Marcar apenas uma oval.

- Yes
 No

Secção sem título

7. **Was your Start-up involved in an "Accelerator Program"? ***

Marcar apenas uma oval.

- Yes *Passe para a pergunta 32.*
 No *Passe para a pergunta 33.*

Secção sem título

1. **If yes, When? ***

Marcar apenas uma oval.

- Early stage
 Maturity phase

Does geographical expansion increase the failure rate?

2. **Did your company expand to other markets besides your own country? ***

Marcar apenas uma oval.

- Yes *Passe para a pergunta 34.*
 No *Passe para a pergunta 36.*

Secção sem título

3. **How? ***

Marcar apenas uma oval.

- Online
 Phisically
 Both

Secção sem título

4. **Have you done that kind of expansion before? ***

Marcar apenas uma oval.

- Yes
 No

Lack of Funding

5. **Did your company failed because of funding? ***

Marcar apenas uma oval.

- Yes
 No

6. **What type of funding did the Start-up have? ***

Marcar tudo o que for aplicável.

- Business Angel
 Venture Capital
 Crowdfunding
 Personal Capital
 Contest
 Outra:

1. In what phase did the company received funding? *

Marcar tudo o que for aplicável.

- Early Stage
- Growth Stage
- Both

2. Did the funding investors cooperate with the company? *

Marcar apenas uma oval.

	1	2	3	4	5	
Not at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Always

Recession VS Expansion

3. When you created your company, at what stage was the market? *

Marcar apenas uma oval.

- Recession
- Expansion

4. Do you think that had any impact on the creation of the Start-up? *

Marcar apenas uma oval.

- Yes
- No

Questionnaire made to the active Start-ups

Minimize the failure rate of Startups

My name is Miguel and I'm currently doing my MSc in Management at ISCTE-IUL. The purpose of this inquiry is to support my thesis, which has the aim to try to reduce start-ups failure and to discover the main factors that tend to affect them. By understanding the processes made by the successful startups, I will be able to see the errors made by Start-ups that failed. In Portugal, the percentage of companies created that were unsuccessful within 2 years of life is quite high. This research is important for that matter so that the companies understand how they should behave in the first years of existence and what they should avoid.

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- High School Diploma
- Bachelor's Degree
- Master's Degree
- PhD

3. Start-up industry? *

4. How long is the Start-up active? *

Marcar apenas uma oval.

- Less than 1 year
- Between 1 and 2 years
- More than 3 years

5. Have you created a Start-up previously? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 6.*
- No *Passe para a pergunta 7.*

Secção sem título

1. What was the reason for abandoning it?

Marcar tudo o que for aplicável.

- Run out of funding
- Sold the Start-up
- Product/Service didn't fit the market
- Outra: _____

Secção sem título

2. Does the staff have previous experience in previous companies? *

Marcar apenas uma oval.

- Less than 1 year
- Between 1 and 2 years
- More than 3 years

3. Size of the team? *

Marcar apenas uma oval.

- Between 1 and 10
- Between 11 and 20
- Between 21 and 30
- More than 31

4. Does your Start-up use practices that might enhance the performance of the staff? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 10.*
- No *Passe para a pergunta 11.*

5. If yes, what kind of practices? *

Marcar tudo o que for aplicável.

- Performance appraisal
- Compensations (Not necessarily monetary)
- Training
- Team building activities
- Specialized selection
- Outra: _____

Is innovation a success factor in a Start-up product/service?

6. Does your Start-up have a Portfolio diversification? *

Marcar apenas uma oval.

- Yes
- No

1. Have you created partnerships to help with the development of the company? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 13.*
 No *Passe para a pergunta 14.*

Secção sem título

2. If yes, with whom? *

Marcar tudo o que for aplicável.

- Public Institutions
 Universities
 Private Venture Capital
 Known firms

Secção sem título

3. How innovative do you consider your Product/Service? *

Marcar apenas uma oval.

	1	2	3	4	5	
Not innovative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Completely innovative

4. Do you take into account the feedback from your customers? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 16.*
 No *Passe para a pergunta 17.*

Secção sem título

5. When? *

Marcar tudo o que for aplicável.

- Before the development of the product/service
 During the development of the product/service
 Since the creation of the company until its failure

Secção sem título

6. The Start-up was constantly updating its guidelines and planning all the processes? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 18.*
 No *Passe para a pergunta 19.*

Secção sem título

1. From 1 to 5, rate the importance of updating it *

Marcar apenas uma oval.

	1	2	3	4	5	
Not important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important

Secção sem título

2. When did you start having sales/customers/users? *

Marcar apenas uma oval.

- Less than 1 year of activity
- 1 year after the creation of the Start-up
- 2 years after the creation of the Start-up
- 3 years after the creation of the Start-up

3. Do you think the entry timing in the market was a success factor? *

Marcar apenas uma oval.

- Yes
- No
- Maybe

Outsourcing as a company strategy

4. Do you use external services to help in the non-core business processes? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 22.*
- No *Passe para a pergunta 23.*

Secção sem título

5. When did you start using external services? *

Marcar apenas uma oval.

- Since the beginning
- After 1 year of existence
- After 2 years of existence

Secção sem título

6. Did you expand geographically to other markets? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 24.*
- No *Passe para a pergunta 25.*

Secção sem título

1. If yes, did you outsource? *

Marcar apenas uma oval.

- Yes
 No

Do incubators influence a Start-up?

2. Is your company based on a Start-up Incubator? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 26.*
 No *Passe para a pergunta 28.*
 Was *Passe para a pergunta 26.*

Secção sem título

3. From 1 to 5, rate the importance of being in an Incubator *

Marcar apenas uma oval.

	1	2	3	4	5	
Not important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important

Secção sem título

4. Did you receive any professional advisory from the Incubator? *

Marcar apenas uma oval.

- Yes
 No

Secção sem título

5. Was your Start-up involved in an "Accelerator Program" *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 29.*
 No *Passe para a pergunta 30.*

Secção sem título

6. If yes, when? *

Marcar apenas uma oval.

- Early stage
 Maturity Stage

Does geographical expansion increase the survival rate?

1. Has your company expanded to other markets besides your own country? *

Marcar apenas uma oval.

- Yes *Passe para a pergunta 31.*
 No *Passe para a pergunta 33.*

Secção sem título

31. How? *

Marcar apenas uma oval.

- Online
 Phisically
 Both

Secção sem título

32. Have you done that kind of expansion before? *

Marcar apenas uma oval.

- Yes
 No

Sources of Funding

33. What type of funding did/does the Start-up have? *

Marcar tudo o que for aplicável.

- Business Angel
 Venture Capital
 Crowdfunding
 Personal Capital
 Contest
 Outra: _____

34. In what phase did the company received funding? *

Marcar apenas uma oval.

- Early Stage
 Growth Stage
 Both

35. Does the funding investors cooperate with the company? *

Marcar apenas uma oval.

- 1 2 3 4 5

Not at all Always

Recession VS Expansion

31. When you created your company, at what stage was the market? *

Marcar apenas uma oval.

Recession

Expansion

32. Do you think that had any impact on the creation of the Start-up? *

Marcar apenas uma oval.

Yes

No
