CATÓLICA LISBON
BUSINESS & ECONOMICS

TOWARDS A FRAMEWORK TO PREDICT START-UP'S BUSINESS MODEL SUCCESS POTENTIAL

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Dissertation written under the supervision of
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Abstract

(English)

The present master thesis regards the development a theoretical framework which is an algorithm with the goal of predicting start-ups business model's success potential. It was designed to support entrepreneurs understanding better what venture capitalists and business angels (VC/BA) take into consideration for predicting start-ups' success. ISC stands for *Idea*, *Story* and *Context* which are considered the main drivers towards start-ups' business model success prediction by the model. This study has tested this framework on three real case-study start-ups to compare how the framework rates the three start-ups in comparison with business savvy people, such as VC/BA investors and management students. For doing this study, the framework leveraged an online platform named Business Model Composer®, an online platform for communicating business models using state-of-the-art research on business models' topics. Finally, it is suggested how such algorithm could be integrated into an online tool to support entrepreneurs swiftly.

(Português)

A presente tese de mestrado centra-se no desenvolvimento de um algoritmo com o objetivo de prever o potencial de sucesso de um modelo de negócio de um start-up. O algoritmo foi concebido de forma a apoiar os empreendedores entenderem melhor o que capitalistas de risco (VC) e *business angels* (BA) têm em consideração para antever sucesso de *start-ups*. ISC significa *Idea*, *Story* e *Context* que são considerados pelo modelo os principais fatores conducentes à previsão de sucesso de um modelo de negócio de uma *start-up*. Este estudo testou essa estrutura em três casos de estudo *start-ups* reais, afim de comparar a forma como a *framework* classifica estas três *start-ups vis-à-vis* com pessoas experientes em negócios, como investidores VC/BA e estudantes de gestão. Para fazer este estudo, o algoritmo aproveitou uma plataforma online chamada Business Model Composer® que visa comunicar modelos de negócio e que se baseia em investigação na área de modelos de negócios. Por fim, sugere-se como poderia tal algoritmo ser integrado numa ferramenta online para ajudar empreendedores de forma clara e imediata.

Preface

Entrepreneurship has been part my daily activity, as I've been part of BET – Bring Entrepreneurs Together, an association that helps young entrepreneurs launching new business ventures, for more than three years. So this thesis topic was a very exciting opportunity for me as it really was intellectually meaningful for me, but also since I felt that that the result of the dissertation could also be meaningful for entrepreneurs. For that I have to thank René Bohnsack, as he has suggested this thesis' topic but also he's also accepted to be my thesis supervisor and his guidance and support throughout the process of writing this dissertation were crucial for its completion.

Furthermore, I'd like to thank Ricardo Jacinto, Diogo Alves, Stephan Morais and João Freire de Andrade for their contributions, based on their professional knowledge as VC/BA investors, towards the development of the ISC Algorithm (explained in Chapter 3.2.).

Despite the intellectual joy of writing this thesis, it was very challenging for me to write this dissertation, so my family and friends were very important for continuing my journey writing it through their advice and support. I'd like to thank especially to José Barros, Ricardo Simões, Vasco Peixoto, Teresa Teixeira, Afonso Leme, Diogo Pessoa and to my father, mother and four sisters for their amazing help.

Last, but not least, this thesis is also the last part of my master of science in business management, with a major in business strategy, and I'd like to thank to my parents for giving me this opportunity which will give me a privileged starting point of my professional career.

Table of Content

1. Introduction

Entrepreneurs who want to start-up or grow their businesses depend on the financial support so as to build or enhance competitive advantage to outpace their direct competition in their chosen market/s. In most cases, most importantly on early stage investment, the language of investors and entrepreneurs are not aligned and, as a result, investors' business decision main concerns are not properly communicated by entrepreneurs (Villalobos, 2007). This is a rather important issue since seed stage investment is increasingly growing (Kolodny, 2015) and understanding what investors are interested in is key for entrepreneurs. A key (though not only) element of a successful entrepreneur-investor communication is the (preparation and) presentation of a BM that is structured in a manner that meets investors' expectations and interest.

This master thesis intends to contribute to strengthen the entrepreneur-investor dialogue through the development of an algorithm that aims, on one hand, entrepreneurs to assess what affects their BM's success potential and, on the other hand, delivers investors better structured BMs to hopefully allowing them to reach faster and better investment decisions.

In order to address the issue discussed above this study will address the following problem statement:
How can we do online evaluation of BMs without relying on other interactions?
I believe that this problem statement is adequately responded if the following three research questions (RQs) are properly dealt with:

1) *What is a suitable algorithm to evaluate the success potential of start-up BMs?*
2) *How does such an algorithm compare to the assessment of business savvy people such as venture capitalists (VCs) or management students?*
3) *How could such an algorithm be integrated in an online tool?*

I trust that grounded on earlier papers on BMs I was able to identify the critical questions and respective answers' quality and, with the support of experienced investors, appropriately rate such responses. And given this, I've built the ISC algorithm which works as a predictive function that includes several start-up-related variables that VCs consider in the investment decisions process. The ISC framework works as a self-evaluation questionnaire that scores entrepreneurs answers in accordance with the quality of their answers. This should deal with RQ 1.

To address RQ 2, I initiated a process of validation by comparison of the ISC framework with other existing measurement processes. The results are yet inconclusive and further research is welcome, however the is already some degree of evidence that the ISC framework will be most welcome by VCs.

Having addressed RQ 1, I was able to set the logic (i.e. algorithm) that may be translated into an online platform. Having looked into existing online platforms that might, through an upgrade, include usefully the ISC framework, I decided to select the Business Model Composer(R) as it already addresses similar BM matters.

Roadmap

To test the ISC framework coherently with the RQs, three real start-ups were selected to compare the ISC framework's score with investors' and management students' opinions. To get access to data from both students and investors, the study has leveraged a *state-of-the-art* BM sharing platform named Business Model Composer (BMC).

Both investors and students have answered to surveys for evaluating each start-up using two information sources, a BMC website *per* start-up and each start-up's answers to the ISC framework's questions.

Based on the Literature Review, the algorithm already included questions, answers and scores, for each answer. But it still needed to have given weightings to quantify each question's importance on the algorithm, in order to generate a *success potential* score. Those weighting were given by four VCs/BAs from some of the most active and diverse venture capital firms and business angels through personal interviews. After getting access to the weightings given by the investors, I reached a point in which I could compare the ISC algorithm scores to students and investors' ratings on the same start-ups.

The results of this work lead to conclude that this framework is an opportunity to put entrepreneurs thinking about "most of investors' decision-making variables" so that whenever they look for an investment they can be better prepared when approaching investors, but it could also help entrepreneurs understanding if a determined BM opportunity is worth continuing to pursue or if they should quit it, at an early stage.

2. Literature Review

This LR will be divided into two parts. First, studies from the academy that address BM quality. Secondly, venture capital literature on how VCs regard investment opportunities and the position of BMs in the process of screening good investment opportunities.

2.1. Business models

I have structured the LR by, first, focusing on the concept of BM, second, to differentiate BM design (BMD) and BM reconfiguration (BMR), thirdly, an overview of some of the most important literature on BM quality and, finally, and possibly the most relevant, understanding how the academy suggests BMs can be evaluated.

2.1.1. What are business models?

The concept of BM does not yet have a unanimous definition, but Magretta (2002), says that the BM is a story that answers to the questions that Peter Drucker has launched: “(1) who is the customer?, (2) what does the customer value?, (3) how do we make money in this business?, and (4) what is the economic logic that explains how we can deliver value to customers at an appropriate cost?”. By 2010, Teece had his say when stating that BMs "articulate the logic and provides data and other evidence that demonstrate how a business creates and delivers value to customers" while it also "outlines the architecture of revenues, costs, and profits associated with the business enterprise delivering that value". Another conceptualization, from Amit & Zott (2001), tentatively defines BM more resource-oriented by stating that a “BM depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities”. More recently, Massa and Tucci (2014) tried to reach a more elastic BM concept which is “the rationale of how organizations (a firm or other type of organization) creates, delivers, and captures value (economic, social, or other forms of value) in relationship with a network of exchange partners” (Afuah and Tucci, 2001; Zott et al., 2011; Osterwalder et al., 2005).

2.1.2. Business model design and business model reconfiguration

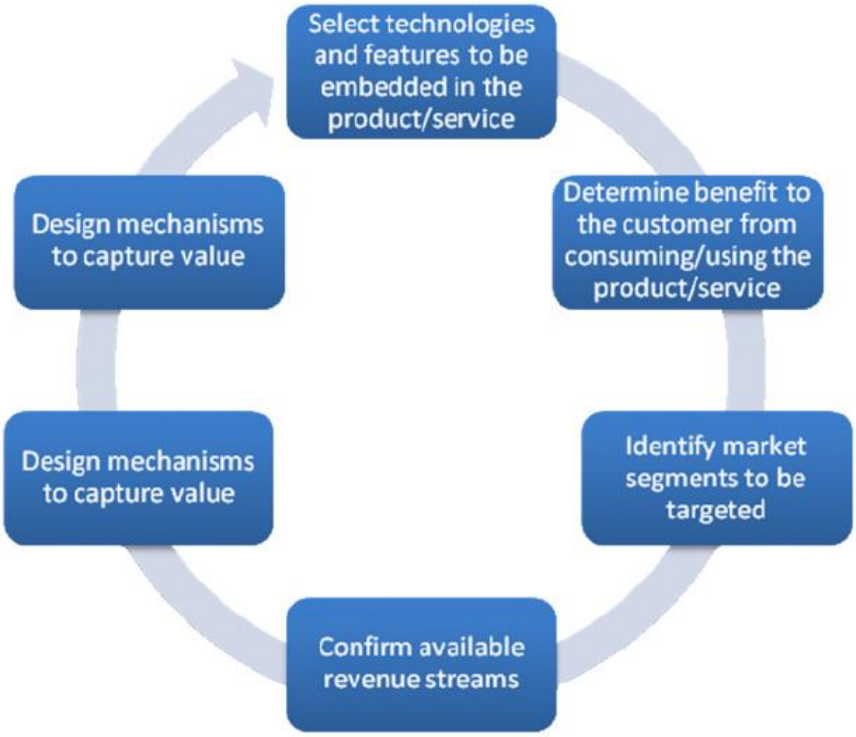


Exhibit 1 - Elements of BMD (Teece, 2010)

There are two main distinct levels at which BMs can be innovated: BMD and BMR levels (Massa & Tucci, 2014). This dissertation focusses on assisting entrepreneurs understanding better if their BMD - "an entrepreneurial activity of creating, implementing and validating a BM" (Massa & Tucci, 2014) - is good, or not, as this is a key issue that any entrepreneur has to deal with when building a new venture (Zott & Amit, 2010). Despite this focus, a successful entrepreneur will also need to do BMR which is the continuous process of reconfiguring specific firm's BM in order to maintain or conquer future competitive advantage. It needs to be done because markets are dynamic and new players/ incumbents might compete with new BMs and it is important for a company to have the continuous ability to adapt those dynamics (Massa & Tucci, 2014).

The BMD process was clarified by Teece (2010) when he has defined the elements of BMD which are exposed in exhibit 1. As visualised, firstly, it is important to select technologies and features to be embedded in the product/service, the second step is about determining the benefit to the customer from consuming/using the product/service. Afterwards it's important to identify market segments to be targeted, then confirm if there are available revenue streams and finally it is needed to design mechanisms to capture value. By following this process of BMD, Teece suggests the right way to create value to customers, entice payments and to turn those payments into profits. Those elements related to a good BMD process are all interlinked, and "lie at the core of the fundamental questions

asked by business strategists - how does one build a sustainable competitive advantage and turn a super normal profit?", according to Teece (2010). According to Teece, in order to yield profits from innovation, the business needs to excel not only at product innovation but also at the BMD by comprehending what type of BMD options exist, on one hand, and, on other hand, what are the customers' needs and technological trends.

Designing a successful BM is insufficient to assure competitive advantage as imitation is often easy, but a differentiated BM is more likely to yield profits at the strategic level, i.e. in the long run, and it is a mean for defining tactics for winning competitive advantage on the short-term (Teece, 2010).

2.1.3. What is a good business model?

According to Loock (2016), an unanimously accepted concept of BM quality is yet to be set. He proposes that BM quality can be assessed in four different ways: BM as a text - readability being a quality claim; BM as a tool - fulfillment of a purpose being a quality claim; BM as a taxonomy - completeness and proximity to ideal-type being a quality claim; and BM as a (cognitive) process - optimisation being a quality claim.

In addition to Loock's suggested variables of BM quality analysis, Clauss (2016) has suggested a fifth BM quality element: innovativeness of BM as a measurement of quality.

Table 1 below demonstrates what studies have been realised that comply with the referred BM quality assessment models.

Table 1	Overview on studies regarding the analysis of BM quality				
	BM as text, and readability as quality measurement	BM as a tool that fulfils a purpose as quality measurement	BM as taxonomy and competencies. The proximity to ideal-type as quality measurement	BM as a (cognitive) process with optimization as quality measurement	BM with innovation as quality measurement
Achtenhagen et al. (2013)				X	
Baden-fuller & Haeflinger (2013)			X		
Baden-Fuller & Morgan (2010)			X		
Clauss (2016)					X
Johnson (2008)			X		
Kaplan (2012)					X
Konde (2009)		X			
Loock (2016)	X	X	X	X	
Martins et al. (2015)					X
McGrath (2010)				X	
Mclaughing (1969)	X				
Osterwalder (2010)			X		
Teece (2010)				X	
Zott & Amit (2007)		X			

Table 1 - Overview on studies regarding analysis of BM quality

Table 1 shows that no less than two studies support each type of BM quality analysis. Below I make an in-depth review of all BM quality assessment elements.

BM as a text and readability as quality

As Magretta (2002) says, BMs are "stories that explain how enterprises work" and Loock (2016) suggests that if they are explained in-text then it is needed to understand how readable (i.e. comprehensive) is the BM written story for a reader. The idea is that the better explained the BM is (text wise), the higher is the probability that a BM is going to be understood (Friedman & Hoffman-Goetz, 2006) as expected by the writer.

SMOG Grading

1. *Count 10 consecutive sentences near the beginning of the text to be assessed, 10 in the middle and 10 near the end.* Count as a sentence any string of words ending with a period, question mark or exclamation point.
2. *In the 30 selected sentences count every word of three or more syllables.* Any string of letters or numerals beginning and ending with a space or punctuation mark should be counted if you can distinguish at least three syllables when you read it aloud in context. If a polysyllabic word is repeated, count each repetition.
3. *Estimate the square root of the number of polysyllabic words counted.* This is done by taking the square root of the nearest perfect square. For example, if the count is 95, the nearest perfect square is 100, which yields a square root of 10. If the count lies roughly between two perfect squares, choose the lower number. For instance, if the count is 110, take the square root of 100 rather than that of 121.
4. *Add 3 to the approximate square root. This gives the SMOG Grade, which is the reading grade that a person must have reached if he is to understand fully the text assessed.*

Exhibit 2 - SMOG Grading criteria (Mclaughing, 1969)

In order to understand the quality of text (readability) Mclaughing (1969) has created the SMOG grading index. This index tells how understandable the text is in alignment with school grades. For instance, if a text is simple and concise the school grade needed to understand should be much lower than another text that is long and with complex wording. The SMOG grading, evaluates with rough certainty that for instance a 6th grade educated person should understand a determined text. According Friedman & Hoffman-Goetz (2006) it is very important that people with different levels of education can both understand each other text-wise as it support quality communication and unlocks synergic opportunities, such as developing partnerships or finding investors.

BM as a tool and fulfilment of a purpose as a quality measurement

The second form to know if a BM is good is understanding if it answers positively to the purpose of its existence. For example if a company's purpose is to getting a good financial performance, the right BM should fulfill this goal. Supporting this vision of quality are Chesbrough & Rosenbloom (2002) who both support that BMs should be regarded as a "mediator between a technology and economic value creation". Another study has been done by Zott & Amit (2007) which regards what kind of BMDs are related with entrepreneurial firms' performance and they find that an entrepreneurial firm's good performance is better related to novelty-oriented BMDs against efficiency BMDs.

BM as a taxonomy and completeness and proximity to ideal-type as quality measurement

Scholars have been popularizing modular approaches on BMs, such as the "business model canvas" from Osterwalder & Pigneur (2010), which are frameworks that use different BM elements and, if all BMDs elements are explained concerning one firm, then the BM may be considered complete - hence a good BM. Beyond that approach scholars have also found out that the proximity to an ideal-type of BM, i.e. BMDs with strong reputation, can also be considered as good BMs (Baden-Fuller & Morgan, 2010). Regarding the modular approach - in practice, the most used - I highlight three frameworks that, when completed, are considered good BMs accordingly with this perspective of quality.

The first is Baden-Fuller & Haeflinger's framework (2013) which suggests that BMs are a means to bridge technology to firm performance, being a "stand-alone concept" in relation with strategy and technology that impacts companies' performance. It has four main BM components: Identifying Customers - i.e. customer segments; Customer Engagement - defining the value proposition for each of customer segment; Value Delivery; and Monetization. The second framework, that is probably the most well-known is the business model canvas, proposed by Osterwalder & Pigneur (2010), "explain[s] the rationale of how an organization creates, delivers and captures value". It has nine "building blocks": revenue streams; cost structure; customer segments; channels; customer relationship; value proposition; key resources; key activities; partners. The third and last framework was proposed by Johnson (2010) and suggests that entrepreneurs or companies should use it for "seizing a white space" by fulfilling the following four inter-related BM elements: Customer Value Proposition; Profit Formulae; Key Processes; and Key Resources.

Business model as a (cognitive) process and optimization as a quality measurement

This notion of BM quality says that there is never a definitive BM format and it should always be adapted because, for example, as markets are dynamic, a BM that works today might not work tomorrow. BMs ahould therefore be adapted. Accordingly, McGrath (2010) says that BMs should be part of a discovery-driven path by exposing BMs to continuous experimentation situations for further learning opportunities and BM adaptation or development of new BMDs.

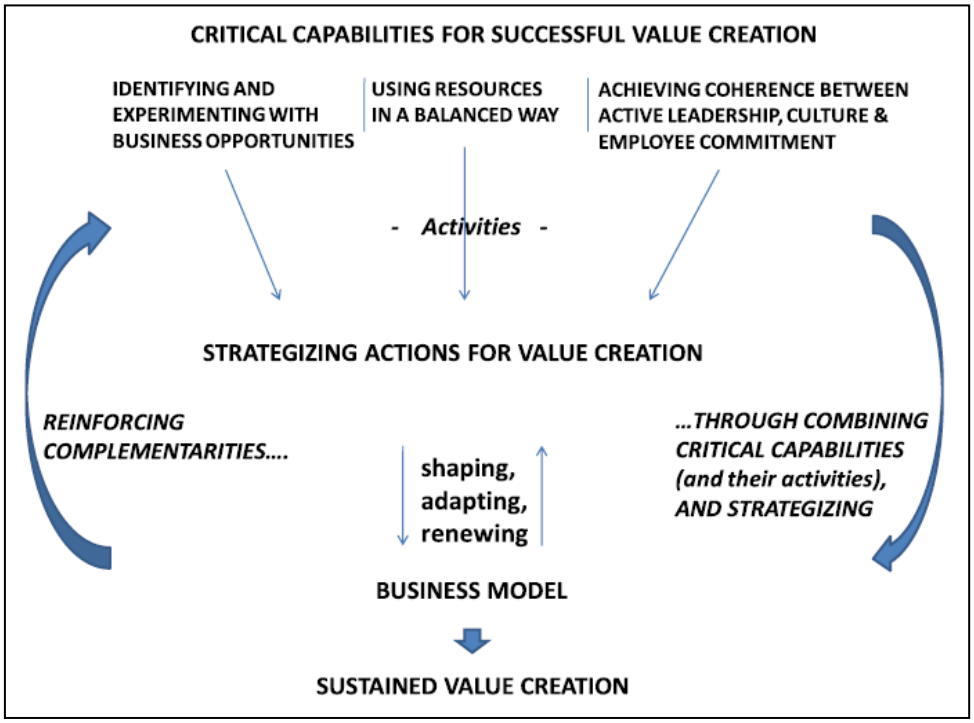


Exhibit 3 - An integrative framework for acheiving BM change for sustained value creation (Achtenhagen et al., 2013)

Supporting what McGrath (2010) and Loock (2016) say, Achtenhagen et al. (2013) believe that companies that manage to create value throughout long periods of time do "shape, adapt and renew their BMs" to enhance their value creation. In order to gain that ability, Actenhagen et al. (2013) suggest a process (seen in Exhibit 3, above) which include developing three important capabilities: 1- Experimenting business opportunities; 2- having a balanced use of resources; 3- achieving coherence between leadership, culture and employee's commitment, for carrying out activities that need to be aligned with "strategizing actions". If companies build those capabilities within strategizing actions, the company will be ready shape, adapt and renew its BMs and achieve sustained value creation.

Business model innovation (BMI) as quality measurement

In addition to the four preceding quality measurement elements, Loock (2016) and Clauss (2016) have proposed a fifth quality measurement element to evaluate BM quality: the BM's innovativeness level. They developed a quantitatively validated measurement approach for BMI by suggesting a 3 levels scale for the BMI, as seen in exhibit 4 below. This BMI scale approach can assess the BM's overall BMI, but also the innovativeness level in each of the three key dimensions of BMs: Value Proposition, Value Creation and Value Capture, and respective sub-levels.

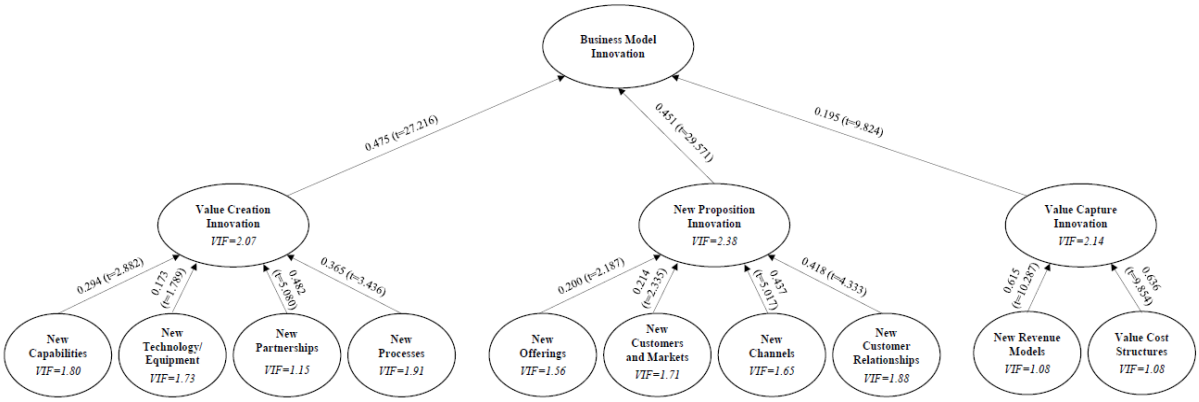


Exhibit 4 - Scale development of **BMI** analysis (Clauss, 2016)

2.1.4. Literature overview regarding the analysis of BM quality

Author & Year	Classification Criteria	Number and names of business model Categories	When is the business model good?
Amit & Zott (2001)	Source of Value Creation	• Efficiency-centered business model • Novelty-centered business model	-
Baden-fuller & Haeflinger (2013)	Business model Framework with four dimensions of business models (each dimension relates to its: value creation; Value capture; or Both)	• Identifying Customers • Customer Engagement (Value proposition / segment) • Monetization • Value Chain and Linkages	Fulfilling all the components
Bieger & Lottenbach (2001)	Business model Framework	• Product/service concept • Communication concept • Revenue concept • Growth concept • Competence configuration • Organisational form • Cooperation concept • Coordination concept	Fulfilling all the components
Chesbrough & Rosenbloom (2001)	Business Model Framework	• Articulate the Value Proposition • Identify market segment • Define Value Chain and determine assets to support company's position in the value chain • Estimate cost strucure and Profit potential • Position in the value network • Competitive strategy towards competitive advantage	Fulfilling all the components
Chesbrough et al. (2006)	Depth of investment made to support the Business model Openness of the business model	• Undifferentiated / differentiated business model • Segmented business model • Externally aware business model • Integrated business model • Adaptive business model	-
Clauss (2016)	Measuring Business Model Innovation: • Conceptualization • Scale development • Performnance proof	**Business model Innovation analysis** **Value Creation** • New Capabilities • New Technologies/Equipment • New Processes/ Structures • New Partnerships **Value Proposition** • New Offerings	When it's innovative

Demil & Lecoq (2010)		• New customer segments/markets • New channel • New Customer relationships **Value Capture** • New revenues models • New price / cost structures	
	RCOV Business Model Framework	• **Components:** • Resources and Competences • Organizational structure • Value Proposition choices	-
Eisenmann (2011)	Business model Analysis for entrepreneurs	**Answering questions regarding for main dimensions** • Customer Value Proposition • Go-to-market plan • Technology & Operations Management • Profit formula	The business model should answer well all the questions related to each dimension to be a quality business model
Giesen et al (2007)	Source of new business model innovation	• Industry model innovation • Enterprise model innovation • Revenue model innovation	-
Huarng (2013)	The two-tier business model view: Conceptual model (1st level)	• Innovation (What) • Resource (How) • Market (Who) • Value (Why)	Fulfilling all the components
	Financial model (2nd level)	• Cost: Monetizing all resources • Revenues (from the market) • Profit (from the added value)	
Johnson et al (2008)	Elements of a successful business model	**Customer Value Proposition** • Target customer • Job to be done to solve an important problem • Offering that fulfills the need **Profit Formula** • Revenue model • Cost structure • Margin model • Resource velocity **Key resources** • people, technology/product, equipment, information, channels, partnerships, alliances, brand	Fulfilling all the components
Kaplan (2012)	How to create value	**Connect** • Catalyze something bigger • Enable random collisions • Encourage collaboration • Build purposeful networks • Let customers design future	Fulfilling all the components will tell the level of innovativeness of a business model
	How to deliver that value	**Inspire** • Embed stories • Make systems sexy • Transformation is creative • Exceed your expectations • Accelerate inspiration	
	How do you capture value	**Transform** • Tweaks won't do it • Experiment all the time • Into the real world • Design for your users • Don't waste time	
Morris et al. (2005)	Business model framework	**Foundation level: defining basic components** • How do we create value? • Who do we create value for? • What is our source of competence? • How do we competitively position ourselves? • How we make money? • What are our time, scope and size ambitions? **Proprietary Level: Creating unique combinations** **Rules: Establishing guiding principles**	Fulfilling all the components of the business model

Osterwalder et al (2004)	Business model framework: 9 building blocks	**Product** • Value proposition **Customer interface** • Target customer • Distribution channel • Relationship **Infrastructure Management** • Value configuration • Capability • Partnership **Financial aspects** • Cost structure • Revenue Model	Fulfilling all the components of the business model to reach business model innovation quality
Resch et al. (2011)	Business model Framework	**Product** • Value Proposition **Marketing** • Customer • Communication **Internal Management** • Organisation (Internal Acrchitecture) • Partner network • Competencies **Finance** • Revenue Model **Outlook** • Growth Concept/ Strategy	Fulfilling all the components
Shafer et al (2005)	Components of BMs	**Four primary components** • Strategic choices • Value network • Creating value • Capturing value	Fulfilling all the components of business model
	Problems of Business models	**Problems of Business models** • Flawed assumptions underlying the core logic • Limitations in strategic choices considered • Misunderstanding about value creation • Relying on flawed assumptions about the value network	
Teece (2010)	Elements of business model design	• Select technologies and features to be embedded in the product/service • Determine benefits to the customer from consuming/using the product/service • Identify market segments to be targeted • Confirm available revenue streams • Design mechanisms to capture value	-
	Steps to achieve sustainable business models	• Segment the market • Create a Value proposition per segment • Design and implement mechanisms to capture value per segment • Figure out and implement "isolating mechanisms" to hinder or block imitation by competitors, and disintermediation by customers and suppliers	Fulfilling the steps to sustainable business models
Zott & Amit (2007)	Business Model Designs relation with entrepreneurial Firm Performance	• Novelty-centered Business model • Efficiency-centered Business model • Efficiency- and Novelty-centered business model	Novelty-centered business model designs make more sense towards building new firms
Zott & Amit (2008)	Implications of business model designs and product market strategy on firm perfomance	**Relation of novelty-centered business model and Product market strategy choices:** • Cost leadership • Differentiation • timing to entry into a market	-
	Relation between business models and product market strategy	**Relation of efficiency-centered business model and Product market strategy choices:** • Cost leadership • Differentiation • timing to entry into a market	

Zott & Amit (2010)	Activity system business model framework:	**Design elements:** **Activity system content** • What activities should be performed **Activity system structure** • How should they be linked and sequenced **Activity system governance** • Who should perform them, and where?	-
	Gives insights by: • Giving BM design a language, concept and tools • Highlighting BMD as a key managerial/entrepreneurial task • Highlighting BMD as a key managerial/ entrepreneurial task • Emphasizing system-level design over partial optimization	**Business model design themes:** • Novelty-centered business model • Lock-in-centered business model • Complementary-centered business model • Efficiency-centered business model	

Table 2 - Overview on the business model literature

I built a matrix summarizing an overview of the Literature on the BM Domain, table 2. This summary capturing some of the most relevant BM-related papers, demonstrates that in-depth studies on BM quality assessment are yet scarce, as these studies are more focused on BMD frameworks that assess directly the quality of BMs based mostly, if not only, on the completeness of all BMD elements (Teece, 2010) and respective completeness as quality criteria - one out of five quality measurement elements discussed above in chapter 2.1.3..

Author & Year	Industry Focus	Classification Criteria	Names of Business model categories	Example of business model quality
Bigliardi et al. (2005)	Biotechnology Industry	Cluster Analysis of: • Age • Size • Degree of newness of the biotech used • Level of R&D Integration	- Service companies - Small research companies - Traditional integrated firms - Industrialized Integrated firms	Integrated companies should be: - Age: older (older than 10 years) - Size: Medium and big (20+ employees) - Newness: traditional and new - R&D integration level: low - Level of industrialization: medium
		Level of Industrialization/services of the sector		
Bonaccorsi & Rossi (2006)	Open Source Software	The full profile of offering (continuum between product and services)	• More Open Source Oriented (MOSS)	-
		The relative importance of OS versus proprietary software (Degree for openness to Open Software)	• Less Open Source Oriented (LOSS)	
Brea-Solís, et al. (2015)	Walmart Retail Industry	The link between a firm's business model choices and their profit consequences	• Impact on changes in Price	-
		Quantifying sources of advantage over time	• Impact on changes in quantities	

Clauss (2016)	Manufacturing Industry	Measuring Business Model Innovation: • Conceptualization • Scale development • Performance proof	Business model Innovation analysis • **Value Creation** - New Capabilities - New Technologies/Equipment - New Processes/ Structures - New Partnerships • **Value Proposition** - New Offerings - New customer segments/markets - New channel - New Customer relationships • **Value Capture** - New revenues models - New price / cost structures	Business model innovation is impacted: - 40.2% by value creation innovation - 42.4% by Value proposition innovation - 17.4% by value capture innovation
Konde (2009)	Biotechnology Industry	Integration in the value chain	- Vertical fully integrated pharmaceutical company (FIPCO) - Hybrid - Product - Platform	-
Nosella et al. (2005)	Biotechnology Industry	Types of companies based on their activities Types of Biotechnology	Types of companies based on their activities: • New biotechnology firms • Integrated • Production Types of biotechnology: • Traditional • New • New and traditional	-
Resch et al. (2011)	Art Galleries Industry	Bieger et al. Business Model Framework related to economic performance	Product • Value Proposition Marketing • Customer • Communication Internal Management • Organization (Internal Architecture) • Partner network • Competencies Finance • Revenue Model Outlook • Growth Concept/ Strategy	Organizational concept has a strong a positive correlation with economic performance of firms, while being the most significant variable to analyse the economic performance of art galleries.
Zott & Amit (2007)	E-business	Business Model Designs relation with entrepreneurial Firm Performance	• Novelty-centered Business model • Efficiency-centered Business model • Efficiency- and Novelty-centered business model	- Novelty-centered business models correlate significantly to entrepreneurial firms performance.
Zott & Amit (2008)	E-business	Implications of business model designs and product market strategy on firm perfomance	Relation of novelty-centered business model and Product market strategy choices: • Cost leadership • Differentiation • timing to entry into a market	-
		Relation between business models and product market strategy	Relation of efficiency-centered business model and Product market strategy choices: • Cost leadership • Differentiation • Timing to entry into a market	-
Wei et. al (2014)	NA	Exploratory and Exploitative Innovation on firm growth	• Exploitative innovation has negative impact on firm growth • Explorative innovation has positive impact on firm growth	-

Table 3 - Overview on quantitative research related to the business model domain

I have in addition summarised in table 3, the ten quantitative studies on BM I have been able to identify in my research, which seems to indicate that there is still room for BM quantitative analysis.

When analysing that table and focusing on BM quality, it's difficult to find BM quality analysis examples.

Given the analysis to the literature I can only reinforce Loock's (2016) claim supporting that “the literature on the assessment of BM quality is lacking efforts".

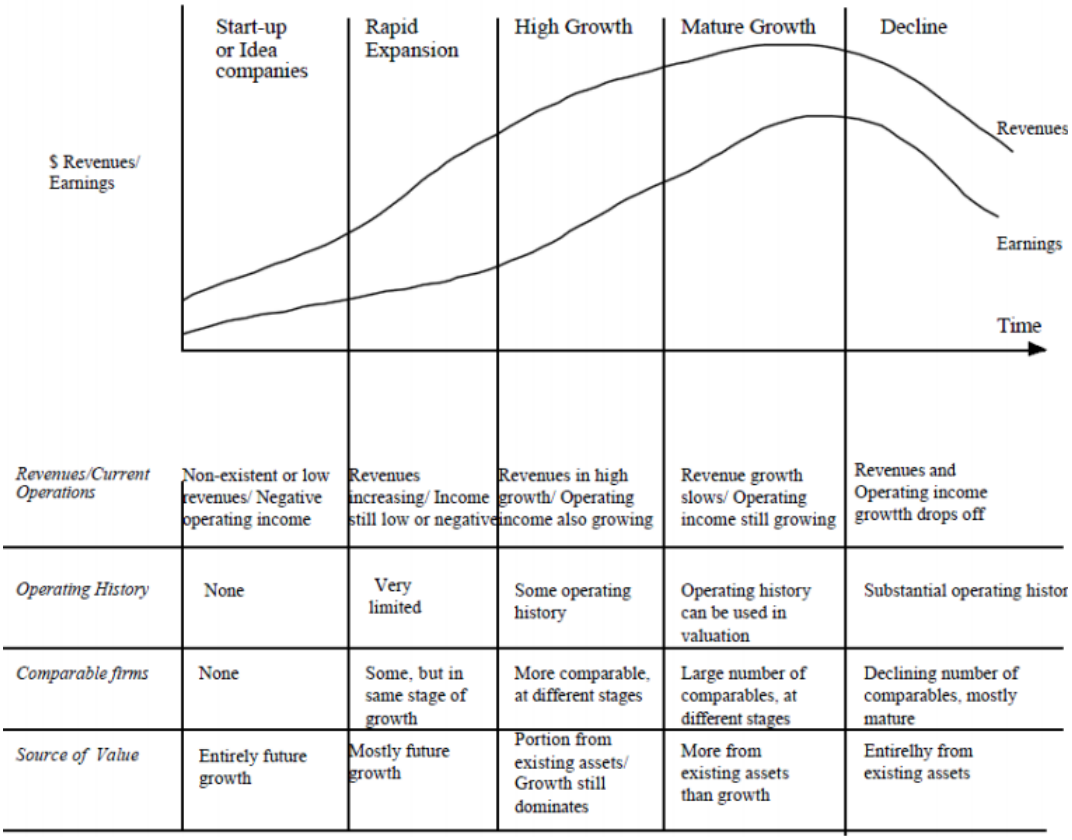
2.2. Start-up and Venture Capital Literature

There is still small quantity of quantified studies in order to evaluate BM quality, and there's still a lot to be done (Loock, 2016). However, investors (e.g. VCs) are evaluating start-ups and are getting good returns from their investments and, according to Roberts & Barley (2004), the analysis of start-ups’ success prediction include BM analysis as one of the most relevant decision-making variables when markets are well known. As BM analysis is not the only variable considered by investors, it might be interesting to understand the other variables that support the analysis of BM's quality by investors.

I believe it makes sense to, accordingly with the literature, first, analyse what are start-ups and VCs and, later, identify and structure what are the main decision variables that VCs consider when considering to invest or not. In the end of this LR, I will share some methods that VCs use when evaluating start-up's success predictability.

2.2.1. What are start-ups?

Start-ups are young organizations that have possibility to reach a significant size and level of profitability (Bhide, A. 2000). A typical start-up concept is easily fitted in the life cycle of the company, if one categorises companies in five stages (see exhibit 5 below): Start-up, Rapid Expansion, High Growth, Mature Growth and Decline (Damodaran, 2002). The “Start-up" stage "represents the initial stage after a business has been formed" (Damodaran, 2002) and the product is usually still untested and neither has an established market. A firm in this stage has short operations resources, no operating history neither comparable companies, and the value of a start-up is entirely "dependent on its future growth potential” (Damodaran, 2002).



Revenues/Current Operations	Non-existent or low revenues/ Negative operating income	Revenues increasing/ Income still low or negative	Revenues in high growth/ Operating income also growing	Revenue growth slows/ Operating income still growing	Revenues and Operating income growtth drops off
Operating History	None	Very limited	Some operating history	Operating history can be used in valuation	Substantial operating histor
Comparable firms	None	Some, but in same stage of growth	More comparable, at different stages	Large number of comparables, at different stages	Declining number of comparables, mostly mature
Source of Value	Entirely future growth	Mostly future growth	Portion from existing assets/ Growth still dominates	More from existing assets than growth	Entirelhy from existing assets

Exhibit 5 - Financing choices and firm's life cycle (Damodaran, 2002)

The other four company stages (i.e. *Rapid Growth*, *High Growth*, *Mature Growth* and *Decline*) have different characteristics concerning the four main criteria used for the company life cycle analysis: *Revenue/Current operations*; *Operating history*; *Comparable firms*; and *Source of Value*, which can be understood by visualizing exhibit 5. Finally, Blank (2006) has defined start-ups as the phase of a company in which it is looking for its right BM, while discovering their real customers, so that then it can start focusing on execution of the best market-fit BM.

2.2.2. What are VCs?

Venture Capital is a source of financing for new businesses. Venture capital funds pool investors' cash and loan it to start-up firms and small businesses with perceived long-term growth potential. This is a very important source of funding for start-ups that do not have access to other capital and it typically entails high risk (and potentially high returns) for investors (Investopedia, 2016). These investors act in several investment stages, but this thesis focus on the seed-stage investment. This stage regards investing on a firm that doesn't have yet commercial operations and the funding is used towards research and product development (Investopedia, 2016), which correspond to the companies on the start-up stage (Damodaran, 2002)

2.2.3. Start-up investment decision criteria

In order to understand why VCs invest in start-ups it is needed to understand what is their investment criteria. As it can be seen in table 4 there are 17 aggregated decision variables that VCs consider, which are: Management team quality; Market; Financial Analyses; Timing; BM analysis; Product/Technology; Prospect of exit; Customer adoption likelihood; Competition; Barriers to entry; Business stage; Sales channels; Funding required; Business strategy; Portfolio fit & Monitoring cost; Other investors' influence; and Performance-to-date. There seems to exist start-up dependent decision-variables and non-start-up dependent decision-variables (which I consider: "Other investors' influence" and "Portfolio fit & monitoring cost").

According to Roberts & Barley (2004), if VCs could divide their decision-making analysis into two main variables, they should be management team quality and business opportunity. Given this analogy, I start by focusing on management team quality (the first decision variable in table 4, below) and then I focus on what is important on the regards of opportunity analysis done by investors.

Table 4 - Start-up investment decision variables according to the literature

Table 4	Start-up investment decision variables														
	Mgt. Team quality	Market Size	Financial Analyses	Timing	BM Analysis	Product/ Tech	Prospect of Exit	Customer adoption likelihood	Competition	Barriers to entry	Business stage	Sales channels	Funding required	Business Strategy	Portfolio Fit & Monitoring Cost	Other Investors Influence	Performance to date
Roberts & Barley (2004)	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X
Villalobos (2007)	X	X	X			X		X	X	X	X	X	X	X			
Goldman (2008)	X	X	X	X	X	X	X		X	X	X			X			X
Kaplan & Strömberg (2004)	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X
Kaplan (2007)	X	X	X	X		X	X	X	X	X			X	X			

2.2.3.1. Management team quality analysis

Team importance in a Start-up

According to Andrade (2012), the management team "plays a crucial role in the start-up success and in the confidence deposited by the investor in the firm". Villalobos (2007) says that a valuation of a pre-revenue start-up is done weighting by 30% the quality of the team, which complements the quality of BMs, which Roberts & Barley (2004) recognise as the opportunity in "somewhat known markets". Goldman (2008) goes even further when he says that "estimates of the company's growth potential are often based on the valuator's assessment of the competence of the management team and their ability to successfully exploit their opportunities. The best place to start, therefore, is with a critical look at the management team". Kaplan (2007) support that the opportunity is more important than the team as team members are easier to change than changing finding a new and more promising business opportunity for a good team, and Goldman (2008) tells that this one of the major factors that contribute towards reducing the levels of uncertainty about companies' future. It's also interesting to highlight that the importance of management team in the investment decision-making process doesn't have a standardised answer as investors vary in the way they perceive its weight in order to invest or not on a start-up.

Management team analysis

Given the importance of the management team it is therefore important to analyse the management team's quality. Blank (2013) says that a founding team should join at least "a hustler, an engineer and a designer", recalling on the need of high complementarities that a start-up management team should have. Some years earlier Villalobos (2007) has created a framework which demonstrates that teams should be evaluated both at an individual member quality level and at the team complementarity level, as it can be seen in Table 5 below. One first thing can be noted about this method for team-quality analysis is that a single team-member can be a "deal-killer" for an investment possibility, according to Villalobos (2007).

Weighted Ranking	Factors and Issues Impacting Valuation of Pre-revenue, Start-up Companies	
0-30%	***Strength of Management Team***	
	Impact	**What is founder's experience?**
	+	Many years business experience
	++	Experience in this business sector
	+++	Experience as a CEO
	++	Experience as a COO, CTO, CFO
	+	Experience as a product manager
	-	Experience only as a salesperson of technologist
	--	Straight out of school
	Impact	**Is the founder willing to step aside, if necessary, for a new CEO?**
	deal killer	Unwilling
	-	Difficult to convince
	0	Neutral
	+	Willing
	++	Key part of the plan
	Impact	**Is the founder coachable?**
	0	Yes
	deal killer	No
	Impact	**How complete is the management team?**
	--	Very incomplete (none identified)
	-	Somewhat incomplete
	0	Good start
	+	Rather complete team
	++	A complete and experienced management team

Table 5 - Strength of Management Team: one of the factors and issues impacting valuation in pre-revenue start-up companies (Villalobos, 2007)

According to Villalobos, to analyse the team quality of a Start-up, he has created a points' system to analyse each of what he considered important questions that need to be answered. The quality of answers could be pointed up to "+++", or when the answer is bad to his performance he can evaluate an answer as a "--" or "deal killer" (this second possible answer means that there should be no more interest in investing on the start-up).

Analysis of individual management team members

According to Villalobos (2007) the team-members' experience can be a quite important factor as for instance he believes accordingly to his framework that, in general, a person straight from university will probably destroy value in the perspective of an investment *vs* the possibility of not having that person in the team. This might mean in practice, in comparison to other members, Villalobos correlates negatively the level of inexperience with the growth of a start-up, possibly due to potential proneness to commit mistakes based on inexperience in the business and the fact that start-ups have low margin to commit mistakes (as they are already very short on assets). Beyond this factor, Villalobos (2007) also tells that the willingness of a founding team-member to step aside of the start-up's way to let the company continue growing is very good because this way it won't be a barrier to substitute him, if needed, by new and better members. And on the other side, if a member isn't willing to leave, if needed, it should be seen as a "deal killer". And finally Villalobos (2007) says that a

founding-member needs to be coachable, i.e. needs to be able to learn with the investor support, if needed, otherwise it shall be seen also as a "deal killer" towards a VC investment opportunity.

Variable	Parameter value 1	Parameter value 2	Parameter value 3
relevant industry experience	0.8% none	25.5% some	35.9% all
field of education	12.4% all management	38.9% some management, some engineering	11.5% all engineering
experience in leading teams (5 to 10 people)	6.5% none	24.9% some	26.6% all
acquaintance among team members	17.1% brief	16.8% for a longer time, privately	27.1% for a longer time, professionally
level of education: university degree	7.5% none of the team members	27.2% some team members	23.5% all team members
Age of team members	12.4% 25-35 years	33.7% 35-45 years	15.4% 25-45 years
prior job experience: type of firm	15.0% mostly large firms	24.5% some large firms, some start-up	22.2% mostly start-up

Table 6 - Percentage of teams with a given parameter value that are ranked in the top quintile (Franke et al., 2008)

Beyond what Villalobos (2007) says, Franke et al. (2008) have done a summary on start-up teams investigation, demonstrated in table 6, which when interpreted can lead to believe that, beyond other variables, VCs look at "industry experience" and they expect that all members should have industry experience. Regarding field of education, itis mostly expected complementary teams with knowledge of management and engineering, at least some members are expected to have university education. Experience of team leadership with the team seems to be very important. VCs would prefer to find team-members that know each other well, based on past experience working together. The age of entrepreneurs is mostly between 35 and 45 years. Most of the entrepreneurs have some start-up experience at least.

To finish, Blank (2013) says that entrepreneurs within the founding teams need to have key attributes such as "passion, determination, resilience, tenacity, agility and curiosity" and beyond good at an individual level Blank (2013) has also written that founding team-members need to trust each other, that is they should have already worked together previously to the present start-up, since many start-ups fail due to non-trustworthy founding members.

Testing team complementarity

According to Blank (2013), team complementarity is an important part of a founding team and that complementarity in team has been difficult to characterize, therefore a team would never know if they should have a new founding member or not. To answer this difficult task, Blank (2013) suggests that it's known if it's needed a new founding member when an earlier founding member asks himself "Do we have a company without them?" and "Can we find someone else just like them?", and if the answers are "no", then it is a needed founding member who has knowledge and skills that the company will need to survive. Back to Villalobos' (2007) theory on team quality assessment, it has also a part of team complementarity level testing. By giving more, or less, points regarding levels of complementarity that can be supported by Blank (2013) theory said in the paragraph above, that is also endorsed by the average experience level of the founding-members. Based on that, Villalobos (2007) has created a scale for levels of completeness of teams, from worse to the best: a) Very incomplete; b) somewhat incomplete; c) Good start; d) Rather Complete Team; and e) Complete and Experienced Team.

2.2.3.2. Opportunity analysis

Recalling the decision-variables from VCs on Table 4, the opportunity analysis includes all investors' decision factors except team quality analysis, which are in fact 16 other variables that investors consider for deciding whether they should invest or not on a start-up (explained in APPENDIX I**)**. Those factors can be sub-divided into investors-related and start-ups-related factors. The start-up related are, of course the great majority: *Market size*; *Financial analyses*; *Timing*; *BM analysis*; *Product/technology*; *Prospect of exit*; *Customer adoption likelihood*; *Competition*; *Barriers to entry*; *Business stage*; *Sales channels*; *Funding required*; *Business strategy* and; *Performance-to-date*. To sum all investors' decision variables, there are also two investor-dependent decision variables which are *portfolio-fit & monitoring costs* and *other investors' influence***.**

2.2.4. How investors decide whether to invest or not?

2.2.4.1. Weighting decision-making variables that affect decisions

Weighted Ranking	Factors and Issues Impacting Valuation of Pre-revenue, Start-up Companies	
0-30%	***Strength of Management Team***	
	Impact	**What is founder's experience?**
	+	Many years business experience
	++	Experience in this business sector
	+++	Experience as a CEO
	++	Experience as a COO, CTO, CFO
	+	Experience as a product manager
	-	Experience only as a salesperson of technologist
	--	Straight out of school
	Impact	**Is the founder willing to step aside, if necessary, for a new CEO?**
	deal killer	Unwilling
	-	Difficult to convince
	0	Neutral
	+	Willing
	++	Key part of the plan
	Impact	**Is the founder coachable?**
	0	Yes
	deal killer	No
	Impact	**How complete is the management team?**
	--	Very incomplete (none identified)
	-	Somewhat incomplete
	0	Good start
	+	Rather complete team
	++	A complete and experienced management team
0-25%	***Size of the Opportunity***	
	Impact	**What size is the specific market for the company's product/service?**
	deal killer	<$50,000,000
	0	$100,000,000
	++	>$500,000,000
	Impact	**What is the potential for revenues in five years?**
	deal killer	<$30,000,000
	0	$50,000,000
	++	>$100,000,000
0-15%	***Competitive Landscape***	
	Impact	**What is the status of the IP (intellectual property)?**
	0	Trade secrets only
	+	Core patents pending
	++	Core patents issued
	+++	Complete patent estate
	Impact	**What is the strength of competitors in this marketplace?**
	--	Very strong
	-	Strong
	0	Fragmented
	+	Weak
	++	Very weak
	Competitive Landscape and rest of table continued below.	

Table 7 - Factors and issues impacting the valuation of pre-revenue start-up companies

(Villalobos, 2007)

	Competitive Landscape (continued)	
	Impact	**How large are the barriers to entry?**
	--	Very low
	-	Low
	0	Modest
	+	High
	++	Very high
0-10%		***Sales Channels***
	Impact	**What channels of sales are in place?**
	--	Haven't even considered
	-	Many possibilities identified
	0	Narrowed to one or two channels
	+	Initial channels verified
	+++	Channels established
0-10%		***Business Stage***
	Impact	**In what stage of business is the company?**
	--	Only have a plan
	-	Writing code/in product development
	0	Product ready for customer evaluation
	++	Positive, verifiable customer acceptance by beta site
	+++	Customer lined up
0-10%		***Funding Required***
	Impact	**What amount of funding is required?**
	++	$250,000 to $750,000
	+	$750,000 to $1,500,000
	0	$1,500,000 to $20,000,000 (depends on availability of VC capital in region)

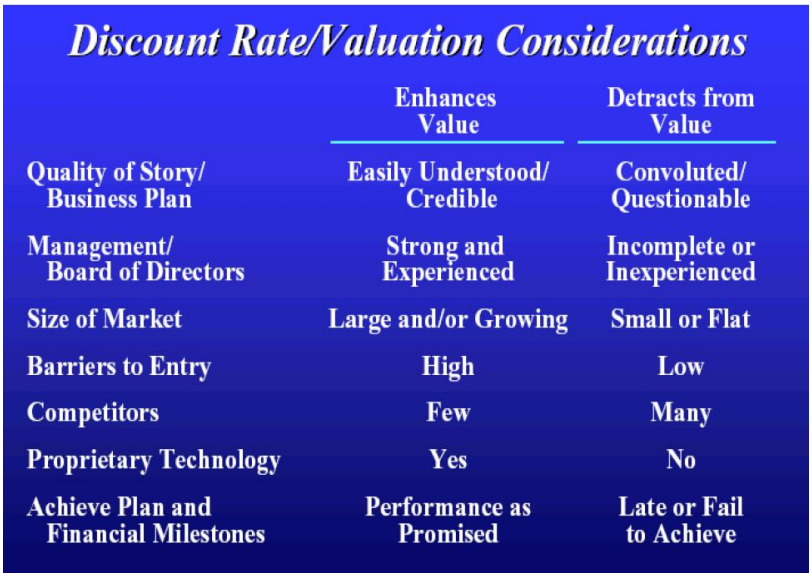
Table 7 (continued) - Factors and issues impacting the valuation of pre-revenue start-up companies (Villalobos, 2007)

This board (table 7) is a point system that Villalobos has created to analyse all the variables related to the investment decision on a seed-stage start-up. By following it, and having the answer to several types of important questions according to the important question marks regarding a start-up, it should tell how likely it would be investing on a start-up based on the quantity of points: the more points a start-up would have, the higher would be the possibility of pre-revenue start-ups to get funding.

2.2.4.2. Valuation of Startup and Early-Stage Companies

Goldman supports that valuations should consider variables such as market size, barriers to entry, quality of BM story, competitors, team quality, Technology IP appropriation, and good business plan aligned with milestones, accordingly to what Exhibit 6 shows below.

Knowing all the valuation considerations Goldman (2008) focuses his attention on valuating a start-up based on two main variables: management team quality and financial projections.



Discount Rate/Valuation Considerations

	Enhances Value	Detracts from Value
Quality of Story/ Business Plan	Easily Understood/ Credible	Convoluted/ Questionable
Management/ Board of Directors	Strong and Experienced	Incomplete or Inexperienced
Size of Market	Large and/or Growing	Small or Flat
Barriers to Entry	High	Low
Competitors	Few	Many
Proprietary Technology	Yes	No
Achieve Plan and Financial Milestones	Performance as Promised	Late or Fail to Achieve

Exhibit 6 - Discount Rate/Valuation Considerations (Goldman, 2008)

To evaluate the management team competence to *successfully exploit their opportunities* Goldman (2008) regards the following traits that the management should have:

- Strong focus and attention to cash flow;
- Willingness to admit mistakes and adjust;
- Adherence to a clearly defined action plan with timetables and performanc benchmarks;
- Ability to design effective information systems and use them for decision making
- Creativity and “can do” attitude. Start-up managers will usually be more optimisti than those we usually see in more staid organizations;
- Understanding of and reliance on risk analysis;
- Leadership skills that provide guidance, motivate behavior, and set standards c conduct;

- Organizational skills that blend team skills and maintain high productivity;
- Clear goals and objectives, and a desire to seek new opportunities;
- Strong functional and technical competencies;
- Relevant experience and contacts;
- The network of advisors, potential customers, potential suppliers, and people wh know people can be an invaluable asset to the management team.

The analysis of the financial projections must be done in accordance with the market potential, resources of the business, management team, financial characteristics of the guideline public companies, and other factors. Goldman (2008) supports the idea that start-ups which do not grow rapidly enough to become cash-flow-positive before investors quit will not continue to exist. But start-ups that grow quickly usually have operating expenses and investment needs that exceed revenues, at least until the growth starts to slow down, and the resource needs of more people, more money, and more physical assets begin to stabilize (Goldman, 2008).

Given this, long-run projections - *all the way out to the time when the business has sustainable positive operating margins and cash flows* - have to be prepared. And they will depend on the quality growth-related assumptions.

2.2.4.3. Investment risks and opportunities in VC analyses

Kaplan & Strömberg (2004) have built a way of analysing future ventures by doing a "Reason to invest" *vs* "Risk of investment" analysis in three perspectives (Exhibit 7). The first perspective is internal factors that affect start-ups performance: Management, previous performance (of the firm), funds at risk, other investors' effect, the valuation of the company and the fit of the start-up into VCs portfolio.

Investment Theses and Risks in Venture Capitalist Analyses

Explicitly mentioned (1) reasons for investing and (2) risks of investment, according to venture capitalist analyses for investments in 67 portfolio companies by 11 venture capital partnerships. Investments were made between 1987 and 1999.

	Reason to Invest/Strength			Risk of Investment/Weakness		
	N	%	Examples	N	%	Examples
A. Internal Factors: Management, Previous Performance, Funds at Risk, Other Investors						
Quality of management	40	59.7	• Management team has extensive internet and website management experience. • Management team is believed to be good in science, and at raising and conserving money. • Experienced managers out of successful venture backed company. • Highly sought-after entrepreneur/founder, who co-founded company that went public. • Experienced, proven and high-profile CEO. • Founder has high marks from existing investors • Known CEO for a long time. • Team has acquired significant level of penetration and relationships in a fairly short time. • CEO/founder is capable of attracting necessary employees. Has developed excellent product while consuming modest amounts of capital. • CEO is very frugal and will not spend unwisely. • Founder very committed: quit job at competitor and mortgaged his house. • Team is well-balanced, young and aggressive.	41	61.2	• CEO is a "rather difficult person." Active involvement of chairman will be crucial. • CEO/founder has a strong desire for acquisitions. VCs have to devote substantial time evaluate. • Management has not shown in the past that it can effectively forecast financial progress. • Company is in many seemingly disparate businesses; a reflection of management's lack of focus? • Will management be able to integrate acquisitions? • The CEO's choice of past companies questionable. • Management is young and relatively inexperienced. • Management team is incomplete. • Company is highly reliant on one individual (the CEO). • Company needs CEO, CFO, COO, and control (operating, reporting, and billing) systems. • Need seasoned industry executive. • Incomplete management team. A milestone for further funding is hiring VP of sales and marketing. • Must strengthen management and ensure involvement of VC as chairman. Will have to hire CEO.
Performance to date	18	26.9	• Demonstrated profitability of business model. • Company has a manageable cash burn rate and is expected to be cash-flow break-even in 12 months. • Significant sales growth and momentum. • Has developed product, well-positioned to achieve revenue target.	5	7.5	• Company is making losses and performing below plan. • Bad debt problem, which significantly changed the profitability of the company, because of past business procedures.
Funds at risk/ downside	13	19.4	• Participating preferred protects VC if mediocre performance. • Equipment can be funded with debt. • Investors have ability to control growth. • Minimize downside by only providing limited funds until milestones met. • VC commitment will be invested over time. • Cash-efficient early stage thanks to future company acquisitions with stock. • Can take company to leading industry position with a minimum of capital.	9	13.4	• Uncertainty about what proper milestones should be. • Large amount of capital for a start-up enterprise. Will require strong management oversight. • Aggressive bank loan assumptions. Might require either slower expansion or more equity capital. • Company has little in the way of underlying asset value and thus offers limited downside protection. • Company expects to need additional financing next year. No assets of value except for employees. • Need sufficient checks and balances regarding drawdown of funds.
Influence of other investors	4	6.0	• Investing partners include investors who previously invested early in some extremely successful companies. • Co-investor also involved as active chairman and interim CEO.	4	6.0	• Lead VC will not have unilateral control, but have to reach agreement with three other VCs. • Previous investor (who is selling all shares to VCs) is anxious to get out at a deep discount. • Other VC previously decided not to finance deal.
VC portfolio fit and monitoring cost	12	17.9	• Adds additional breadth to VC portfolio within this market segment. • VC is strong in this geographic region. • Good strategic fit with VC. • VC has board seat on company in complementary business; marketing partnership possible.	10	14.9	• Complicated legal and financial due diligence needed. • May require too much time from VC. • Geographical risk—US corporate and overseas R&D. • VCs have to devote substantial time to evaluate acquisitions.

Exhibit 7 - Theses and risks in VC analyses (Kaplan & Strömberg, 2004)

			• New market segment for VC, which should stimulate some additional opportunities. • Potential for (Non-California) VC to lead a Silicon Valley deal.			• Heavy involvement of investor as interim CEO, (replacing founder) is critical to success. • Have to ensure active involvement of one of VC investors as chairman.
Valuation	14	20.9	• Low valuation: IRR of 46% in conservative case. • Exit multiples are shooting up.	13	19.4	• Are the valuation and financial projections realistic? • High valuation because of competition between VCs.
B. External Factors: Market Size, Competition, Customers, Financial Markets, and Exit Conditions.						
Market size and growth	46	68.7%	• Large market amenable to rapid growth. • Very large market in which incumbents earn high profit margins. • Company could dramatically impact the evolution of the computer industry.	21	31.3%	• Regulatory uncertainty. • Country risk. • Currency risk. • New, largely unproven, marketplace. • General downturn in industry.
Competition and barriers to entry	22	32.8%	• Strong proprietary and patent position. • Company is targeting a significant market segment that is underserved by incumbents. • Early mover advantages from being pioneer of concept and largest player. • Highly fragmented industry, which makes it ripe for consolidation. • No competitors. • There is more than enough room for several competitors.	27	40.3%	• Customers might become competitors once they learn company's business model • Patent protection alone might not provide enough barriers to entry. • Many new entrants-price competition could drive down margins. • Competitive and tight labor market, competing with larger established firms for employees. • New technology might be long-term threat. • Low barriers to entry. Low switching costs. • Product can be copied by large entrenched firms.
Likelihood of customer adoption	20	29.9%	• Conceptual acceptance by professional community. • Beta arrangements with large customers. • Solid base of customers. • Customers are positive regarding the product and the management team.	15	22.4%	• Uncertain whether can convince customers to bet on an unproven technology. • Customers may not want to pay enough of a premium for product. • Target customers have not historically been speedy adopters. • Financial viability of customers and existing contracts questionable. • Challenge is to broaden the product beyond the initial customer segment.
Financial market and exit conditions	11	16.4%	• If successful, possibility for early exit or acquisition. • Expect to have access to both public debt and equity on attractive terms. • Quick flip potential for the investment. • Many strategic buyers available. • Recent public market enthusiasm for e-commerce companies might enable public equity financing to mitigate future financing risks. • Given the size of the market opportunity and company's strategy, capital markets will be receptive given that company achieves business plan. Also, a consolidation trend should emerge in industry as more companies enter market.	5	7.5%	• What will the leverage be and what happens to leverage if the IPO is delayed? • Would maybe be better to sell company. • Financial market and political fluctuations. • How will public markets treat the company?
C. Difficulty of Execution: Product and Technology, Strategy						
Product and/or technology	27	40.3	• Late stages of product development (first product launch planned in 15–18 months). • Superior technology with large market potential. • Revolutionary new technology. • Has developed excellent product. • Has built a robust, scalable system that can meet the current market demands. • Best product on the market. • Well tested technology/product. • Early-stage company with post-beta product with competent/experienced technology team.	21	31.3	• Outcome of clinical tests and development: Must prove that technology is superior to other marketed alternatives, in terms of efficiency and side effects. • Early stage research project: Project is elegant, ambitious and, consequently, difficult. • Ability to make technology work at target cost point. • No guarantee product will work in a full production environment. • Identification and development of a more compelling product. • Product scalability is to be fully tested.
Business strategy/ model	36	53.7	• Company significantly reduces costs while maintaining quality. • Compelling business strategy. Presence or likelihood of validating corporate alliances. • Outsourcing means less for company to manage. • Attractive and demonstrated profitability of business model. • Excellent new concept. • Favorable acquisition opportunities, which will be driver of growth. • Distinctive strategy. • High value-added, high margin strategy for very little capital upfront. • "Lean and mean" operation with few employees and good customer focus. • Pure play/focused.	34	50.7	• Real sales effort needs to be mounted, which is very reliant on management team's experience to manage profitably. Transferability of business model to other markets? • Are there enough candidates available for acquisition? • Will company be able to ensure quality while pursuing a growth-through-acquisition strategy? • How scalable is the business? Is there any operating leverage in the business model? • Lack of focus. • Vulnerable strategy. • Execution of business model has yet to be proven. • Will company be able to attract employees? • VC due diligence showed that margins and expense percentages of existing stores have to be brought into line with prototype model. • Key partnerships not nailed down. • Geographical risk—U.S. corporate and foreign R&D.

Exhibit 7 (continued) - Theses and risks in VC analyses (Kaplan & Strömberg, 2004)

The second perspective of analysis is external factors to start-ups such as: competition and barriers to entry; market size and growth; likelihood of customer adoption; and the financial market and exit conditions. The third and last perspective of analysis is the degree of difficulty of execution which regards the product and/or technology, BM and strategy.

2.2.4.4. OUTSIDE- IMPACTS. Framework

- (O) Opportunity: Is this a positive present value opportunity? (Does it have IMPACTS?)
  - (I) What is the idea / industry?
  - (M) Is the target market large enough to support substantia growth / valuation?
  - (P) Why does the opportunity generate a positive present value? What is unique?
  - (A) Acceptance: Will customers in that market accept / bu this new product / service?
  - (C) Why won't the value be competed away?
  - (T) Why is this a good time to enter?
  - (S) Speed? How quickly can this be implemented?

- (I) What is the idea / industry?
  - » Explain the idea / opportunity clearly and succinctly.
- (M) Is the target market large enough to support substantia growth / valuation?
  - » How large is the overall market?
  - » How large is the market segment you are targeting?
    - Provide solid support for your analysis.
  - » Are there additional opportunities?
- (P) Why does the opportunity generate a positive present value? What is unique? What is differentiating (Ryan)?
  - » The answer to this should be implicit in other parts of OUTSIDE-IMPACTS. But, doesn't hurt to be explicit.
  - » Why will you make money?
  - » How will you make money?

- (A) Acceptance: Will customers in that market accept / buy this new product / service?
  - » **Who is the customer in the target segment? Put yourself in shoes of a customer.**
    - How does the customer spend the day.
  - » Why will they buy your product / service?
    - What do they buy now?
    - Why do they buy what they do now?
    - Why will they switch from their current product?
  - » How will you get to the customers?
    - Direct Salesforce? Resellers? Distributors?
      - How much of each? How quickly?
    - Advertising?
    - How much will it cost?
    - Common to underestimate time / cost
  - » How will you keep customers? How much will it cost?
- (C) Why won't the value be competed away?
  - » What will existing competitors do?
  - » What will other new entrants do? How will you respond?
- (T) Why is this a good time to enter?
  - » Why hasn't the opportunity been taken already?
- (S) Speed? How quickly can this be implemented?

- Good opportunities have positive IMPACTS.
- If the opportunity does not have IMPACTS, then it should not be pursued.

Exhibit 8 - Opportunity analysis based on the OUTSIDE-IMPACTS framework (Kaplan, 2007)

- (U) Uncertainties: What are major uncertainties?
  - Possible uncertainties:
    - » Market size.
    - » Customer acceptance.
    - » Customer approach.
    - » Competition.
    - » Management team.
    - » Potential real options.
  - Which uncertainties can be managed so that outcome is more likely to be favorable?
    - » Choice of initial customers? Choice of investors?
  - How do the answers affect the opportunity?
- (T) Team.
  - Can management team implement opportunity?
    - » How does previous experience relate to opportunity?
    - » How "hungry" is the management team?
  - If management pieces are missing:
    - » What pieces are missing?
    - » What type of person will you look for to fill them?
    - » How will you find that person?
  - For VCs, a good team and a good opportunity are necessities.

- (S) Strategy.
  - Is strategy consistent with opportunity, uncertainty, team, and exit?
- (I) Investment Requirements.
  - Cash flow requirements.
- (D) Deal.
  - Does deal structure provide appropriate incentives?
    - » Is the deal priced attractively?
    - » Do key individuals have incentives to do deal?
    - » Do key individuals have incentives to make deal work?
  - Does deal structure provide / ensure appropriate governance?
  - Does deal structure help manage the uncertainties?
- (E) Exit. Can investors exit the deal? How?

- **If an investment does not pass the OUTSIDE tests, leave it outside.**

Exhibit 9 - Analysis of all the variables of OUTSIDE-IMPACTS framework, except Opportunity (Kaplan, 2007)

The "OUTSIDE - IMPACTS" framework was created by Kaplan (2007) in order to help investors answering important questions in order to evaluate a start-up as an investment prospect. OUTSIDE

stands for**:** Opportunity, Uncertainty, Team, Strategy, Investment, Deal, Exit (Exhibits 8 & 9). IMPACTS stand for all the key sub-dividable questions that answered will impact the perception of the opportunity quality of each analysed start-up (Exhibit 8).

When talking about all the variables Kaplan (2007) highlights two of the most important ones, Team and Opportunity. And his study supports that if decisions had to be weighted only between these two key variables he would give more weight to the important opportunity as team members are more easily "changeable" than the team.

3. Methodology

This chapter will explain which will be the scope of this study, considering its' problem statement and RQs, then it presents a theoretical framework that will be used concerning in alignment with this research's purpose and, the last topic of this chapter, is the explanation of the research design.

3.1. Research purpose and RQs

The purpose of this research is to investigate how to support entrepreneurs assessing BM quality, as they need feedback from investors or entrepreneurs to understand whether their BM is good or not. This issue is targeted because it is considered as a main aspect that any entrepreneur has while developing a new venture (Zott & Amit, 2010). The research purpose of this study is: *How can we do online evaluation of* BM*s without relying on other interactions?*

We can sub-divide this study into three specific RQs:

1. What is a suitable algorithm to evaluate the success potential of start-up BMs?
2. How does such an algorithm compare to the assessment of business savvy people such as VCs or management students?
3. How could such an algorithm be integrated in an online tool?

3.2. Theoretical Framework - ISC Framework

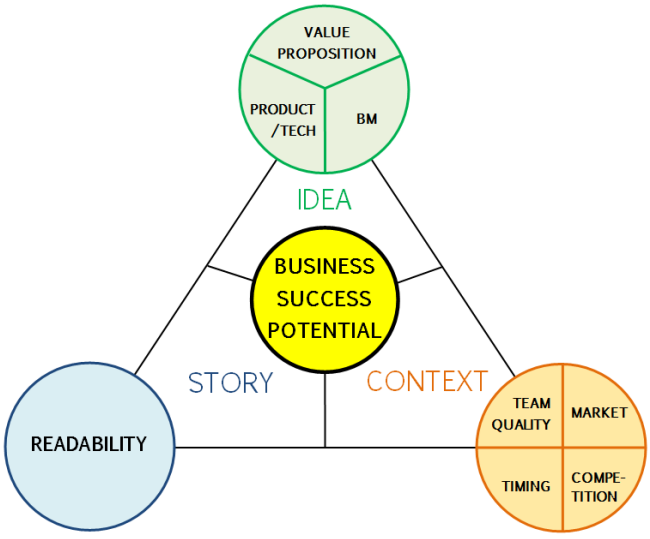


Exhibit 10 - ISC Framework

As an effort to answer to research question 1, I propose the ISC Framework which is an algorithm (explained in APPENDIX II) for predicting start-up's BM success potential, supported by standardized considerations that VCs do in order to assess an investment opportunity. It was built in

order to explore how to help entrepreneurs with companies on the start-up stage (Damodaran, 2002) understanding better whether their BM is worth pursuing without needing to access feedback from experienced entrepreneurs/ investors to know that. It's named ISC framework as its' general input variables are *Idea* (I), BM *Story* (S) (Magretta, 2002) and *Context* (C). These general input variables lead to an output score [scaled between 1 (minimum) and 5 (maximum) points] regarding start-up's *Business Success Potential* (*SP*).

The *Story* variable was built to analyze the readability of a written pitch of a start-up's BM through the SMOG Index (McLaughlin, 1969). Due to restrictions of the SMOG index in order to control the quality of the evaluation, the text: 1) should be at least 10 sentences-long; and 2) needs to integrate within its structure an answer to the four dimensions of Baden-Fuller & Haeflinger's BM framework (2013): customer identification; customer engagement; value chain linkages; and monetization. The *Idea* variable includes the analysis of three sub-variables: value proposition (which is evaluated in two levels, innovativeness of BM and customer likelihood of adoption); BM; and product/technology. Finally, the *Context* variable includes start-up's inner and outer factors that are related to the ability of the *Idea* to succeed. The factors included are team quality, timing, market size and competition.

	Start-up investment decision variables																
	Mgt. Team quality	Market Size	Financial Analyses	Timing	BM Analysis	Product/ Tech	Prospect of Exit	Customer adoption likelihood	Competition	Barriers to entry	Business stage	Sales channels	Funding required	Business Strategy	Portfolio Fit & Monitoring Cost	Other Investors Influence	Performance to date
Roberts & Barley (2004)	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X
Villalobos (2007)	X	X	X			X		X	X	X	X	X	X	X			
Goldman (2008)	X	X	X	X	X	X	X		X	X	X			X			X
Kaplan & Strömberg (2004)	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X
Kaplan (2007)	X	X	X	X		X	X	X	X	X			X	X			
ISC FRAMEWORK	**X**	**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**					

Table 8 - Start-up investment decision variables considered in the ISC Framework vs. total investment decision variables

In relation to the Venture Capital literature, this framework includes a great majority of the VC/BA investment decision variables (table 8) that are dependent on the start-up (as explained in the Chapter 2.2.3.). Out of the other 15 start-up's dependent decision variables, only 4 variables haven't been considered on the framework: *financial analysis*, *required funding*, *business strategy* and

performance-to-date. So, almost 75% of start-up's dependent decision variables are part of the ISC framework, and the variable *team quality*, that is part of the framework, is positively related to the four above mentioned decision variables (Villalobos, 2007; Kaplan & Strömberg, 2004; Goldman, 2008). The algorithm aims to be insightful for the average investor perspective on start-up's BM success potential.

As said in the BM literature part (table 1) a good BM should: (a) have good text readability, (b) fulfil a purpose while also (c) being close to an ideal-type of BM, (d) with the (cognitive) ability of optimizing itself against the market dynamism and (e) being innovative.

	Overview on studies regarding the analysis of BM quality				
	BM as text, and readability as quality measurement	BM as a tool that fulfils a purpose as quality measurement	BM as taxonomy and competencies. The proximity to ideal-type as quality measurement	BM as a (cognitive) process with optimization as quality measurement	BM with innovation as quality measurement
Achtenhagen et al. (2013)				X	
Baden-fuller & Haeflinger (2013)			X		
Baden-Fuller & Morgan (2010)			X		
Clauss (2016)					X
Johnson (2008)			X		
Kaplan (2012)					X
Konde (2009)		X			
Loock (2016)	X	X	X	X	
Martins et al. (2015)					X
McGrath (2010)				X	
Mclaughing (1969)	X				
Osterwalder (2010)			X		
Teece (2010)				X	
Zott & Amit (2007)		X			
ISC FRAMEWORK	**X**	**X**	**X**		**X**

Table 9 - ISC Framework VS. **BM** literature

The ISC framework considers four of the five BM quality analysis-criteria as seen in table 9, above.

3.3. Research Design

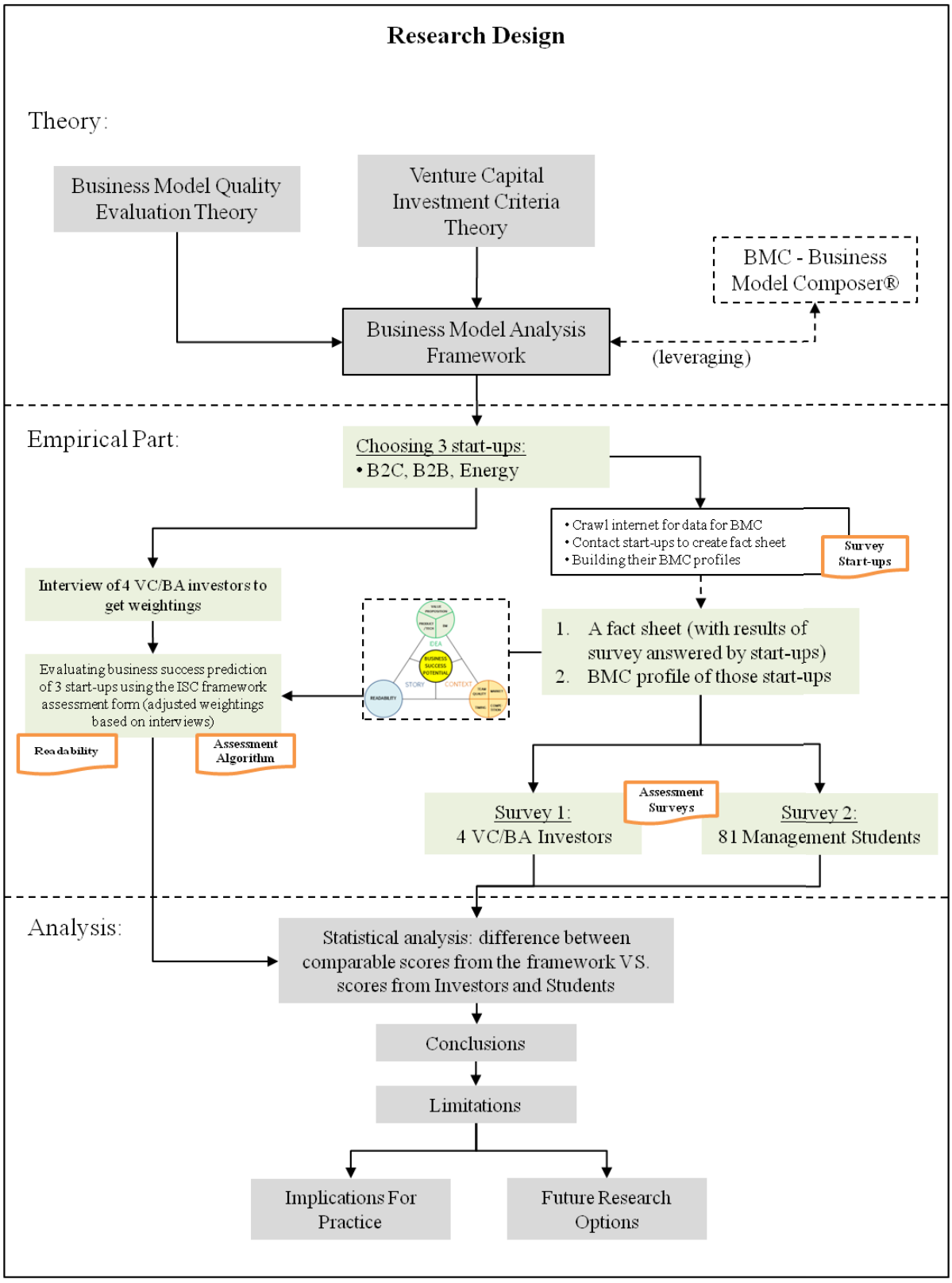


Exhibit 11 - Research Design

As seen in the research design (Exhibit 11), has three main parts: Theory; Empirical part; and Analysis.

Starting with the Theory part, the LR that have been conducted, due to the research purpose, includes review of both venture capital and BM's literature. This research has led to the creation of a theoretical framework, named ISC Framework (visualized in Exhibit 10) and it will leverage the BMC - Business Model Composer®, *a platform for sharing BMs with the world* (Business Model Composer, 2016), in a standardized way, *based on state-of-the-art research on business modeling* (Business Model Composer, 2016).

Why leveraging the BMC? The BMC provides to entrepreneurs a space for accomplishing the analysis-criterion of BM quality that the ISC framework doesn't respond to (see table 9), which is the ability to reach continuous feedback on the BM from customers, partners or investors, benefitting from its "Point of Action" feature to reach useful insights to know whether it's needed to pivot to another BM or not. Concerning the third research question, this is a platform where the framework could be integrated in practice. However, concerning this research's purpose the BMC will be used to apply the SMOG index for doing the readability test, directly associated with the *Story* part of the ISC framework, and it will also be useful for building and communicating BM profiles of three use case start-ups.

Now, concerning the Empirical part of the study, to test the framework I have chosen three early-stage start-ups. On the process of choosing the start-ups, three conditions were required: at least one start-up should be B2B (business-to-business); one or more start-ups should be B2C (business-to-consumer); and at least one of the start-ups should be in the energy sector. The chosen start-ups were *The Code Venture*, *Yoochai* and *Egg Electronics*. This empirical part is divided into three sub-part: 1) gathering information for building BMC profiles for each start-ups as well as to have the case start-ups answering a survey that has questions directly related to the ISC framework's questions; 2) I have interviewed 4 BA/VC professional investors (interview guidelines in APPENDIX III) in order to get weightings that should be given to ISC algorithm questions' answers, based on their empirical experience, so as to be able to score the start-ups' *success potential*; 3) the third effort was about reaching business savvy people like management students and investors' opinion about the case start-ups through the answer to two very similar assessment surveys (APPENDIX IV), one survey for each target. The third part, considered two important assumptions: a) when predicting start-up's *success potential* investors would be intrinsically considering whether they would invest on each start-up; b) Management students predict start-up *success potential* when considering to what point each start-up's BM seem like a good/bad business opportunity. With those two assumptions, the results from

the surveys from both students and investors could be comparable with the ISC frameworks *Business Success Potential* results in order to respond to research question 2, in the analysis part.

The investor's survey has only a sample of 4 well-reputed and experienced as well as diverse VC investors from the Portuguese ecosystem, that have also been interviewed to give the weightings to the ISC framework. This was a methodological decision as it is assumptioned that the most important opinion for entrepreneurs are investors' as they are the ones who are used to evaluate start-ups on a daily-basis, so I wanted to bring some of the best Portuguese VCs. With this methodological decision the results' analysis would be enriched with each individual investor's weightings and their opinions about the start-ups. This way, it's possible to do the comparison between their expected evaluation (based on the ISC score using their suggested weightings), the real evaluation and the ISC Score regarding each start-up, which would be very informative on how the framework is related to each investor's *success potential* evaluation (concerning research question 2). The sample of 81 Student, from all levels of business administration studies, from undergraduate until doctoral degree, had as goal to have a ratio of at least 20 students per VC.

Moving into the last part, Analysis, after having the ISC Scores and both survey results from both students and investors, I have done a results' analysis focusing on the difference between comparable scores from the ISC framework and investors and students' evaluations. Then, I'll takes conclusions concerning the results and the RQs. Furthermore, I highlight the limitations of this study and finish by sharing thoughts on this research's implications for future research opportunity and practice.

As an extra effort, as the BMC seems to be a complementary online tool to the ISC framework, on the regards of RQ 3, I also suggest in this thesis an integration plan for including the ISC framework in that platform.

4. Research design's results

This section contains the results' analysis of the entire empirical part of the research design (exhibit 11). It will have two types of results: the first attention will go to the quantitative results of this dissertation; and then I'll bring up the qualitative side of it, i.e. the insights that 4 diverse BA/VC investors from the Portuguese ecosystem have given regarding the ISC framework.

4.1. Qualitative Results' Analysis

This section focuses on the insights given by the four interviewed BA/VC investors according with their professional experience. It includes the most insightful and important content that resulted from this study. The interviews that have been conducted, using the "soft-guidelines" explicit in APPENDIX IV and the insights that were shared on each of the four one-on-one interviews can be seen in APPENDIX VIII **(**which includes 4 standardized tables, one per investor, with their independently shared insights**).**

In order to organize investors' feedback, I've created a table that differentiates which insights that investors have shared are optimistic or pessimistic, as seen in APPENDIX IX**.**

4.1.1. Pessimistic Insights

This section includes what factors investors say that can affect negatively the usage of the framework:

- Self-evaluation from entrepreneurs is positively biased, i.e. entrepreneurs are more optimistic about their BM than people that aren't part of the start-up;
- The *Story* can be an issue for people that aren't fluent in English, as the SMOG index can only be applied to text written in English;
- The *Story* works better for commercial people than for people with technical background;
- This framework needs previous work before providing effective information;
- Market tends to be overestimated by entrepreneurs;
- Team should be considered as part of the *Idea*, since it is "the guarantee that the product will go from 0 to 1" and *Context* seems more like the "surrounding factors";
- It doesn't substitute execution, which "is everything" in a start-up;
- Even though it's insightful, it is a very theoretical exercise;
- It doesn't include a go-to-market strategy analysis;
- It doesn't analyse financial viability of BMs as it does not assess the relation between Customer Lifetime Value and Cost of Customer Acquisition;
- The Likert-scale answer model for multiple choice questions will drive to provide subjective and positively biased answers, to make those questions more objectively answered it is important to provide answer suggestions per question for them to choose which best fits the situation.

- The ISC framework has many questions that could lead entrepreneurs to positively biased subjective answers (an example of a question is "how well-tested is your product?", it's an important question, but entrepreneurs need to answer to more specific questions concerning the previously mentioned question, to reach more objective insights by relying on questions such as "how many people tested your product?" which lead to objective answers).

4.1.2. Why the ISC framework is valuable for entrepreneurs

According to investors' feedback, this framework has several positives as follows:

1. ISC framework includes most of the decision variables that investors consider when deciding whether they should invest, or not, in a start-up.
2. For VC/BA investors:
    a. ISC framework could be a use tool for new inexperienced business angel investors;
    b. It could also be a more visual way for investors to analyse and screen start-ups they would consider investing in.
3. For entrepreneurs:
    a. By leveraging the framework will think and do work regarding all the variables that are part of it, and that is good as whenever they start looking for an investor they will probably put thinking on what matters to investors, so, given that, entrepreneurs will be expected to be well prepared whenever they decide to meet with investors (especially useful for inexperienced entrepreneurs);
    b. It can help entrepreneurs understanding what is good, and what is not so good, about their start-up in the eyes of investors, so they'll know what improvements they could do;
    c. It is a good tool to help entrepreneurs identifying bad BM ideas, which aren't worth pursuing.
    d. The "Story" concept is important, even if it has small weights, since the readability is an important way to assess the quality of perception from start-ups BM's (written) pitch. Usually communication quality of a start-up is given, but in this framework it can be evaluated.

4.2. Quantitative Results' Analysis

Although it was possible to reach a statistically significant sample of students, it wasn't possible to reach the same representation of investors. This fact makes the analysis of the results on the relation between the ISC framework scores and investors' and students' opinions (explained in-detail in **APPENDIX XII**) not statistically significant but rather suggestive. This means that RQ 2 will not reach a proper, i.e. scientific, answer.

4.2.1. ISC framework scores

		START-UPS		
	Weights	THE CODE VENTURE	YOOCHAI	EGG ELECTRONICS
IDEA	33,75%	4,04	4,44	4,07
STORY	15,00%	4,00	4,00	4,00
CONTEXT	51,25%	3,68	4,10	4,39
	SUCCESS PREDICTABILITY SCORE	**3,85**	**4,20**	**4,23**
	EVALUATION	MEDIUM	GOOD	GOOD

Table 10 – ISC Algorithm Scores (Score Scale: 1 – 5) - EVALUATION: 1 < X < 3 is BAD; 4 > X >= 3 is MEDIUM; 5 >= X >= 4 is GOOD

First of all, the ISC algorithm has weightings for each of its' variables and the resulting weightings are the average of the four interviewed investors' individual opinion. At ISC level we can tell the average investor has weighted the *Idea* variable as 33.75% of the explanation of *Success Prediction (SP), Story* has been weighted in 15% of *SP* and *Context* explains the remaining 51.25% of *SP*. The investors that have contributed to the weightings of the algorithm have shared very diverse opinions which suggests that there's an opportunity to make it even more standardized with more investors' contributions in order to make it even more useful and reliable.

The ISC framework has self-evaluating questions that have been answered by each of the case start-ups, on a survey. In line with table 10, when using those start-ups' self-evaluations and the calculated weightings for the ISC framework, the *SP* evaluations for the start-ups were: Good for both Egg Electronics and Yoochai; and Medium for The Code Venture. The framework suggest that these start-ups seem to have good enough BM opportunities for continuing to pursue them. But to have a better understanding of this, let's see how aligned is the algorithm with investors and students' thoughts about the same start-ups.

4.2.2. ISC algorithm *vs.* management students and Investors

As explained in section 4.2 of this chapter, this quantitative study has only reached quantitatively insightful information from student, but not from investors. So this analysis can only be regarded as indicative. According to APPENDIX XII, the first consideration that can be taken is that investors seem to be much pessimistic than management students in their opinions about students. Beyond that, the ISC algorithm suggest more optimistic scores than both investors' and students' rates. It seems to makes sense since investors, in chapter 4.1., suggest that the algorithm might be exposed to the positively biased opinions about their own start-ups as the scores come directly from entrepreneurs' opinions.

4.3. Conclusions

4.3.1. Quantitative research conclusions

Concerning the quantitative research that has been conducted (APPENDIX XII), the first and most important note is that it's not possible to take statistically significant conclusions out of the results coming from investors, but the results can be indicative for further investigation.

Overall, the ISC scores feel more optimistic than investors and students' opinions.

Another highlight that can be reached regarding both students and investors' opinions against the ISC Scores is that qualitatively the framework's score seems to always be aligned with one or another when considering the continuation of each case start-up's BM (medium or high scores).

As the deviation analysis between investors and students shows, investors seem to be more pessimistic than students (as it could be expected once they are professionals at evaluating start-ups) and as the comparisons between each other wouldn't help reaching a statistically relevant conclusion, the study has then focused more in-depth comparison between the framework's scores and investors ratings, as they are professionals in start-up investment.

Once observed each investor's ratings compared with the ISC, it is possible to note that their opinions are different (as in the case of João, he scores Yoochai at 4, while Stephan scores Yoochai at 2, regarding *SP*). At times, investors also seem to take investment decisions that give the impression of missing decision-making variables as, for instance, Stephan in Yoochai's case has scored *success potential* at 2 pts, but considering his own weightings to the ISC framework input variables and his own ratings to the same variables he would be expected to score it at 4 pts. Another interesting insight out of the quantitative analysis is that it seems to exist a positive correlation between average investors' *SP* rating and the ISC framework's score, since the higher the framework scores *SP*, the higher average investor are rating *SP*.

4.3.2. Qualitative Research conclusion

There seem to be two levels of conclusions as to the qualitative research, the ISC framework's limitation and its opportunities.

ISC framework Limitations

The ISC framework seems to have two main limitations, exposition to entrepreneurs' positive bias according to the way it was tested and it doesn't include all investors' investment decision variables.

Starting by the potential exposition to entrepreneurs' positive bias, if we look to the ISC scores per start-up and compare with investors and students' ratings it seems that it exists a positive bias from entrepreneurs which all the interviewed investors have recognized to exist. One of the investors, João, has suggested that the asked questions in the framework are important, but they would lead entrepreneurs to give subjective and consequently biased answers due to their broadness. He's suggested doing more specific sub-questions to achieve a more objective feedback, as a way to push entrepreneurs to think about the more specific-objective questions, obliging them to give as objective as possible answers. Regarding the same cause, another investor, Diogo, has also suggested a way to fight entrepreneurs' bias by suggesting that when entrepreneurs do self-evaluations based on questions with multiple choice answers it is important to minimize questions with "Likert-scale" answers as they «are never going to say that they "strongly disagree" about something related to their own start-up», in his perspective, instead, he advises the framework to have the more possible multiple choice questions that include answer suggestions meant for them to choose which they fit the best to. This change in answer format of the questions would increase significantly the objectivity of entrepreneurs' answers. The point here is that entrepreneurs positive bias matters for investors and the ISC framework seems, according to investors to be exposed to that bias. And as long as it is too exposed to the bias, the information that would come from it would be considered as reliable but rather too optimistic.

The second level of limitation raised by investors, was somewhat expected and confirmed by this research as Investors have made explicitly that that there are important investment decision-making variables which aren't addressed on the ISC framework. Those decision variables were the ones that couldn't be standardized as they are case-dependent variables (such as "execution" evaluation, "go-to-market strategy" or "financial viability"). The good news is that this limitation concerning start-up specific investment decision variables is in line with the literature-based limitations of the ISC framework's scope.

Opportunities of the ISC framework

Investors seem to capture several optimistic insights considering the framework's value added as for instance it seems that this framework standardizes answers to "most of the VCs/BAs' decision-making variables". In terms of utility it seems that for investors it could be especially useful for analysing and screening start-up applications. They seemed especially optimistic about it as a way to decrease the information gap between investors and entrepreneurs concerning BMs success potential, and it is also seen as an accelerator to the learning curve for inexperienced business angels.

5. Conclusion

This research's design was developed in line with three RQs that were raised in order to respond to the problem statement. So, the conclusions that are explained below will regard the relation between the results and its' associated RQs.

Following the order of the RQs, as explained in the methodology chapter the ISC algorithm comes as a suggestion of answer RQ 1 and 2. But in this conclusion RQ 1 would be better answered by analysing the qualitative investigation's results while RQ2 was is going to be answered in light of the quantitative results of the empirical part. Concerning RQ 3, the BMC platform according to the BM literature is complementary with the ISC framework, and so it is a fitting online tool on which the ISC framework could be integrated.

Starting with RQ 3, it is answered in the "implications for practice" chapter through a suggestion of an integration plan of the ISC algorithm on the BMC.

Regarding RQ 2, the quantitative empirical part of this study tends to demonstrate more optimism of the ISC frameworks scores against average investors' and average management students' opinions. It's possible to conclude that the insight regarding the average surveyed students, but disregarding the investors' as the sample isn't statistically significant and that information is merely a possibility and not a conclusion. Knowing this, only half of Research Question 2 is answered, but the other can't be concluded.

The ISC framework according to investor includes the majority of investors' decision factors, and so it can be a predictive function of success potential of BMs. It will help entrepreneurs decreasing the knowledge gap between themselves and VCs/ BAs investors, which will be fruitful once they decide to look for investment, and it will help them understand better what are the majority of start-up specific issues that impact positively the perception of success potential of their BMs. So answering RQ 1, this algorithm would be suitable to predict success potential of BM.

Having RQ 1 answered it's important to highlight that this is a new approach on BM, which bridges knowledge coming from start-up and venture capital literature with the research done on the topic of BMs. VCs have been successfully analysing and trying to predict success of several start-ups, but for them BMs were never the only thing to consider as there are other highly correlated variables such as team quality or market size, which impact decisively the capability of a start-up to succeed the implementation of a determined BM. The ISC algorithm is precisely a trial to standardize as much as possible what is the structure VCs/BAs mind-set as when they analyse start-ups as potential investments. The fact that investors say this framework include most of their decision variables is already a step forward in the right direction.

6. Discussion

6.1. Limitations

The ISC framework has been used in three real life examples. Investors have said that this framework includes many of their decision variables, it will help entrepreneurs finding bad and how to better their BMs success potential, but this study has its' limitations and needs follow up studies. As seen in the results' analysis this framework wasn't properly tested quantitatively as it wasn't possible to know statistically what was the framework's relation to investors opinions. According to investors' feedback the survey, entrepreneurs are exposed to give subjective answers to the ISC framework's question as they are and the conclusion of qualitative results highlight two suggestions to fight entrepreneurs' biased opinions, that seem to be visible as the ISC algorithm score per start-up was on average always higher than both students and investors. It's also important not to forget that the ISC framework doesn't include all investors decision-variables, so it won't substitute investors in the decision making process.

There are 7 out of a total of 17 investors' decision-variables, found in the LR, that aren't considered by the ISC framework.

6.2. Implications for future research

The ISC framework unlocks several research follow-ups to help predicting better BM's success potential.

Firstly, doing a similar quantitative effort, for comparing the framework's scores against students and investors opinions, but including a statistically relevant sample of investors, while updating the ISC framework's questions and/or information associated to the questions, to decrease significantly the risk of entrepreneurs' positive bias.

It would be interesting to do a similar exercise as Villalobos (2007) did, i.e. looking for a big and diverse sample of VCs / BAs for getting statistically significant weightings associated to the ISC algorithm.

It would increase significantly the framework's interest if variables that measure quality of business strategy and financial analyses would be included in the algorithm.

6.3. Implications for practice

6.3.1. General implications

The ISC framework should be implemented in practice, on online tools that are helping entrepreneurs getting better informed on what it takes to impress investors. The more data is generated around this framework the more useful data will exist for academic purposes, and especially the sooner there will be a better version of this first proposal.

6.3.2. Integration of the ISC Framework on BMC

In order to answer to RQ 3 and contribute pro-actively towards practice, this is a proposal about an integration plan of the ISC framework on the Business Model Composer® platform which according to the literature review is an online tool that is synergic to ISC framework's usage.

For better understanding the integration proposal, I'll firstly highlight BMC's main features so that then I can help the reader visualizing the ISC algorithm integration plan.

BMC main features:

The business composer platform has essentially three core features:

1) **"Test"**- a feature created for testing the BM (text readability) using the SMOG index. It includes four boxes where entrepreneurs write about each of the four dimensions from Baden-Fuller & Haeflinger BM framework (2013). The SMOG index's average score of the four text boxes defines the quality of the BMs;

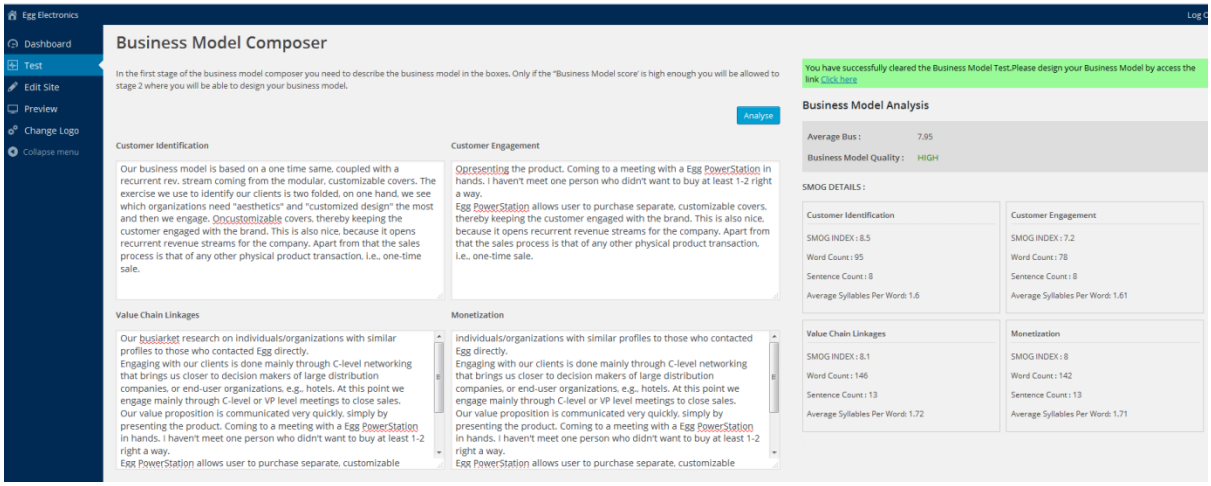


Exhibit 12 – Demo of "Test" feature

2) **"Edit Site"** – feature in which the BMC profile is built;
3) **"Preview"** – a feature that shows how the BMC profile looks like.

Proposal of integration of the ISC Framework

The integration could be done by subdividing "Test" feature into two feature-levels:

1) **Feature I - Readability Testing**:

a) I'd add an extra text box so that entrepreneurs write and evaluate the text quality of their BM*'s Story* leveraging the dimensions of the Baden-fuller & Haeflinger's Framework (2013), and restricting the text size with a minimum limit of 15 sentences and a maximum limit of 30 sentences. This text should also be visible on the start-up's BMC profile. This feature is important since the SMOG Index, in order to be more effective

b) I'd keep the text quality assessment per dimension of Baden-Fuller & Haeflinger's framework (2013), as it is a more visual way to understand the BM, than the one of point a), as well as I'd keep this text boxes in the BMC profile.

- With these suggestions, the BMC profile visitors should be able to choose whether they prefer to read the BM *story,* in text format, or a more visual way to understand the BM with four independent boxes that together explain the BM, in a more visual way, per BM dimension.

2) **Feature II – Getting/Editing ISC Score (through the ISC algorithm):**

a) Entrepreneurs would need to answer to ISC algorithm's questions at the form of a multiple choice survey, like the one done on this thesis. One of the important issues raised by the investors was that the likert-scale questions of the framework are somewhat broad and not so practice specific and by not specifying what is supposed that entrepreneurs take into consideration for their answers, it would lead to subjectively biased answers. Considering this issue, for each likert-scale question I'd include a clarification note for helping entrepreneurs understanding what should be considered once answering likert-scale questions for helping entrepreneurs giving more objective answers, and as consequence more interesting inputs on the ISC framework.

b) After having the survey answered it should have an ISC framework results' output visual (Exhibit 13, below) which shows what is the start-up's score not only on the *business success potential*, but also on other more specific variables of the framework. It should work accordingly to the following:

- The scores of each component of the framework will represented be as follows:
  - When the mouse passes over one ISC Framework component, its' color will change in accordance to the score level (visual example in APPENDIX X), as explained below:

(1) Bad scores:
   (a) Score range: 3 > X >=1
   (b) Color: Red
(2) Medium scores:
   (a) Score range: 4 > X >= 3
   (b) Color: Yellow
(3) Good scores:
   (a) Score range: 5 >= X >= 4
   (b) Color: Green

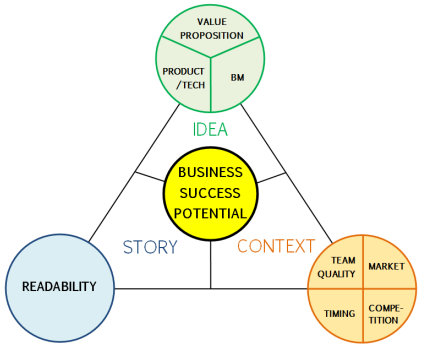


Exhibit 13 - ISC framework's result's visual

a) The result's output visual should also be interactive for reaching "micro-level scores". For example, imagine that entrepreneurs are curious to know more in-depth how they've performed within the *Business Model* variable, they should be able to click on *Business Model*. When clicking on it, it should pop-up the questions related to that issue as well as entrepreneurs' answers per question. It should also include the qualitative score associated with each answer (APPENDIX XI) This interaction is very important for entrepreneurs as it gives entrepreneurs feedback on a detailed level on how their BM's success potential is positively, or negatively, influenced.

6.4. General conclusion

Despite its' limitations, the ISC algorithm seems to be a first good answer for supporting entrepreneurs understanding what it takes for a BM to be closer to success than to failure. But also, the framework is useful to make entrepreneurs more aware of what is important in a start-up on the eyes of investors, which give them the capability to better know when to stop or continue pursuing a determined BM.

7. Appendices

Appendix I – Investors' decision variables explanation

Timing

One of the variables that investors analyse is whether the timing to put a product/service in the market is good. There's the risk relation that market is already full of *players* against "to what point is the technology of a specific BM too sophisticated for the market to succeed?", in terms likelihood of customer adoption or technological infrastructures (Gross, 2015). According to Gross (2015), timing is the greatest driver to success or to failure of a start-up and gives the example of *YouTube*, which had players moving towards that business before, but the internet bandwidth wasn't still strong enough for that kind of technology and when *YouTube* moved in the market was still nearly empty, as previous players died due to the misfit of technological infrastructures and their solutions, and had already good internet bandwidth in order to play videos online. "If we're too early, there's no market demand, and we have to survive until the demand reaches us. In that period of time, we have two problems: we have to keep doors open and feed everybody, and we may be susceptible to being leapfrogged by technology. So we don't want to be too early, but we don't want to be too late" (Roberts & Barley, 2004). Although timing is one of the decision variables towards a successful VC investment, it's not well understood yet as it's difficult to tell what's the right timing to invest for investors since their investments are highly influenced by their "gut feeling" (Roberts & Barley, 2004).

Business model analysis

According to Roberts & Barley (2004), when a market is "somewhat understood", then the market opportunity can be assessed as an opportunity if the business model design is considered to be good. But if markets are completely new, they aren't actually understood. Given this, it is too risky to decide whether there's a good business opportunity based on the perception of the quality of the business model. In this second scenario "before considering business models sometimes it's important to know how are the margins and distribution channels" and to know "what is the price and customer acquisition strategy"(Roberts & Barley, 2004). On the case of Goldman (2008), he says that business models need to have a credible story (Magretta, 2002). And finally according to Kaplan & Strömberg (2004) it's important to consider to what point the business model itself creates value in terms of being able to provide for instance "the same value with higher margins within a market?", if it complies with a differentiated business strategy or to what point the business model is scalable (among several other factors affecting BM analysis that the these last scholars highlight, shown on their framework of start-up analysis in the next sub-chapter).

Market

It's very important for investors to understand how large is the market opportunity and/or how fast is the market growing (Kaplan & Strömberg, 2004). A big market to an investor is typically valued in at least 1 billion US Dollars (Roberts & Barley, 2004), but it's also said to be big when valued above $500 million, according to Villalobos (2007). A fast growing market is also important since the probability that a firm might find a valuable place for providing good future returns to investors in the market is higher in this situation as the market value would be expected to grow as well as the market space for the company to compete in. Some investors inside Roberts & Barley's study (2004) support the idea that this is the most important factor.

Competition

In alignment with the market, investors also interested in knowing how competitive is the market, i.e. if there are many or few competitors within a specific market that a start-up is competing with, and the more competitors exist, the worse the conditions are (Goldman, 2008). Beyond how many competitors it's also important to know if the competition is strong or not (Villalobos, 2007).

Barriers to entry

According to Villalobos (2007) and Goldman (2008), if a market has low barriers to entry there's a low interest in entering the market and if the barriers are high it's a more appealing market. If new players want to move into a market with high barriers to entry in which a start-up is already in, then the prospect start-up is protected at a macro-level as these market conditions imply higher costs to enter the market and probably it's a market where probably exist few competitors (Porter, 1979).

Product/Technology

Investors like new technologies, especially the ones that are patented, but if entrepreneurs don’t know how their products/solutions will be marketed, then there will be much lower probability of interest from investors (Roberts & Barley, 2004). Investors don't look for products, but rather for solutions towards problems, or "pains", that customers are willing to pay for. If start-up products can be patented, then this is very important to be accomplished by entrepreneurs as that is a great opportunity to protect their product uniqueness against competitors threat of copying, which might be critical to maintain competitive advantage against the other incumbents (Kaplan, 2007; Roberts & Barley, 2004). Finally, investors look for big market opportunities, that might minimize the risk of not being paid back accordingly to their expectations, so products that are highly scalable are much more interesting for them (Kaplan & Strömberg, 2004).

Financial analyses

According to Roberts & Barley (2004) study, financial analyses are important to understand the quality of founding team, as the numbers aren't as critical since there are expected several mistakes on the realistic numbers due to high uncertainty levels surrounding start-ups. So what's interesting for investors in the financial analyses is the thinking behind those numbers. The better sustained and reasonable the numbers are, the better can be impression of investors. Beyond that, Goldman (2008) supports that these financial projects need to be tested, especially in terms of growth projections on which the assumptions are considered *critical* for the quality of the financials.

Prospect of Exit

In Roberts & Barley's (2004) study they have different kinds of investment answers, as some investors would want to find an exit strategy planned by entrepreneurs, while others say that focusing on exit might make entrepreneurs to *think smaller* and the ones supporting this idea focus on investments that want to go for an IPO (Initial Public Offer), the *ones who think big*. But the ones that focus on exiting on the other hand expect to exit more times, supporting that focusing their efforts on *IPO-able firms* will make them focus on a very slim window, and this reducing some level of risk. Although firms that might be acquired might have higher possibilities of exiting than IPO-oriented firms, investors need to perceive that there's enough space in the market for the company to become big enough for a player to want to buy them, then they don't believe in the quality of that company's exit ability. To increase the perception of opportunity to exit it's important that inside the market in which a start-up is a player, to identify potential strategic buyers (Kaplan & Strömberg, 2004).

Customer Likelihood of adoption

Lastly, customer likelihood of adoption is important as if there's no likelihood of customer adoption, there'll be less probability that customers will be willing to try a new untested products/services/technologies. So, if a start-up has a good customer traction it will impact positively investors perception that customers will actually adopt product that the start-up is pushing to the market (Kaplan & Strömberg, 2004). Timing is also a variable that might affect the adoptability by customers, as for instance, Airbnb had a very good market timing, in the context of the global crisis, when everyone had the need to get extra cash, they had the opportunity give them that extra cash, according to Gross (2015). Finally, the more compelling the value proposition, i.e. the pain that is being solved to the customers, the higher the likelihood of customer adoption might be predicted (Teece, 2010; Roberts & Barley, 2004).

Business stage

The business stage refers to the stage of the start-up accordingly with Damoradan (2002) firms' life cycle (Exhibit 5, on page 16)

Sales channels

Sales channels are the channels that the start-up will use for the reaching their revenue streams. And for companies in the start-up stage, according to Villalobos (2007), the better is the position of a start-up according to how well established are those selling channels.

Funding required

The required funding by the start-ups affects the investment possibilities, as the on the side of start-ups it must be financially credible, but the required funding also affects the valuations of the start-ups and both depend on the investment environments. A higher funding can be required in a more competitive environment of investors, or entrepreneurs can access more favourable valuations on the same environments, especially if there are many interested investors.

Business Strategy

The business strategy to address the market must be correct in line with investors' opinions, since if investors don't believe in it, the entrepreneurs lose their ability to impress investors.

Portfolio Fit & Monitoring Cost

This is an investor-dependent variable, since it only depends on the strategy from the investors. This means that even if a start-up has arguably very good potential, if it isn't part of the target portfolio of the investor, they would have no chance, to get investment. On the other side, the monitoring cost is about the effort that investors have to follow-up with the start-ups on their portfolio. For instance, if a start-up that is strategically based in Portugal visits the US to look for an investment and if American investors decided to invest only on start-ups close by since it's cheaper to meet with them every day on their office's neighbourhood, then the Portugal-based start-up wouldn't have a chance to get invested by these investors, despite having proven to be a good investment opportunity.

Other Investors Influence

Imagine that you are an investor and you invest on companies on a later stage of the company life cycle (Damodaran, 2002). These companies have probably already some investors onboard. In this case, the reputation of those investors and possibly your relation with those investors could impact directly your interest on a good start-up. For example, if they were investors that you've worked with previously and you hated it, you'll probably avoid that situation again or in the case you see an

interesting company with an investor onboard that is known for having successful investment with average exits, you'd probably find it interesting to join.

Performance-to-date

This concerns about the performance of the start-up until reaching an investor. If a start-up is perceived to have an outstanding performance until meeting with an investor, it might positively influence investors' decision to invest on that start-up.

Appendix II - ISC Algorithm

Concept explanation: This algorithm was built to help entrepreneurs understanding better what VC/BA investors look for in a start-up, and it will let them know how their start-up's business model is performing concerning great part of each investment decision-variable considered by those investors. The second benefit that this algorithm proposes to give to entrepreneurs is, depending on entrepreneurs answers on each variables, which is expected to be the current start-up's business model success potential.

How this algorithm works: It will provide a qualitative score (bad, medium or good) on the business model's success potential, based on weightings distributed to all the components (investor decision-variables) of the algorithm

Assessment weights			
	I - IDEA		
	Value Proposition Test (15%) *Good business model yields value propositions that are compelling to their customers - in terms of innovation within the market*	**Answers and Points**	**References**
	1- Value proposition innovation:		Clauss (2016); Kaplan & Strömberg (2004)
	Our products/services are very innovative in relation to our competitors	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	
	Our solution generates a new customer segment in our market	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	
	We are using entirely new distribution channels	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	
	Our relationship with customers is very novel in relation to our competitors	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	
	2- Likelihood of customer adoption		
	We have great acceptance of our product/service by professional community	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	
	Customers are very positive regarding the product/service	▪ Totally disagree (1) ▪ ...	

		▪ Totally agree (5)	
	Evaluation of Product/Technology (10%) Assumption: Products/Solutions are technically well done and fulfil well the value proposition of the firm. As this start-up is new, the partnership analysis for the business model analysis will not be considered, as the partners shall be only the ones the unlock the entrance to the market, as the start-ups looks to optimize quality of market entrance.		
	We have a superior technology with large market potential	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	Kaplan & Stromberg (2004)
	We have a well-tested product/technology	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	
	Our product/solution is very scalable	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	
	Evaluation of business model	**Answers and Points**	**References**
	Our revenue-cost model is very innovative when compared with competitors	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	Clauss (2016)
	We utilize innovative processes and procedures to provide our products/services	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	
	We leverage partners to support our processes when opportunities arise	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	
	Our team has very up-to-date knowledge and capabilities in comparison to our competitors	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	
	S - STORY Assumptions: Regarding BMC potential on the regards of business model quality • Business model as a Taxonomy has completeness as a quality claim (Loock 2016) o Baden-fuller & Haeflinger business model Framework (2013)		
	Evaluation of understand ability of the Business Model	**Answers and Points**	**References**
	BMC values according to the quality of text readability given by the SMOG index.	Text quality as quality: • X <= 8 grade: Excellent readability(5) • 13 > X > 8 grade: Good readability (4) • X >= 13 grade: Bad readability(1)	McLaughlin (1969); Loock (2016)
	C - CONTEXT OF BUSINESS MODEL Is the business model (generally) contextualized well in the eyes of investors? General Assumptions: ▪ Exit Prospect - Assumptioned IPO or EXIT possibility (Kaplan & Stromberg, 2004; Roberts & Barley, 2004)		
	Evaluation of Team Quality	**Answers and Points**	**References**
	Team Quality Assumptions: • The management team members have willingness to be coached (Villalobos, 2007); • Ability of the management team members to step-aside if there's a signal that they should be substituted by a new team-member (Villalobos, 2007).		
	What is the general experience of the founding team? (pointing system - choose and average)	▪ Many years business experience (3) ▪ Experience in this business sector(4) ▪ Experience as a CEO (5)	Villalobos (2007)

		▪ Experience as COO, CTO and CFO (4) ▪ Experience as a product manager (3) ▪ Experience only as a salesperson or technologist (2) ▪ Straight out of school (1)	
	Completeness of the team in terms of complementary knowledge backgrounds and number of team-members **necessary** to push the business to the market:	▪ Very incomplete (1) ▪ Somewhat incomplete ▪ Good start ▪ Rather complete team ▪ Complete team and experienced management team (5)	Villalobos (2007)
	Evaluation of the Market	**Answers and Points**	**References**
	Size: (50%)	▪ < $100m (1) ▪ >$100m (3) ▪ >$500m (4) ▪ >=$1bn (5)	Villalobos (2007); Roberts & Barley (2004)
	Evaluation of Timing	**Answers and Points**	**References**
	The required infrastructures are in place for customers to adopt/to buy our product/solution	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	Roberts & Barley (2004); Gross (2015)
	The customers will accept your product/service	▪ Totally disagree (1) ▪ ... ▪ Totally agree (5)	Kaplan (2007)
	Please categorize your start-up. Are you a pioneer, does something similar exist already or are there several firms providing the product/service already but you provide it in a more innovative way?	▪ First mover (3) ▪ Second mover (4) ▪ Late-mover (3)	(Shankar & Carpenter, 2013)
	Evaluation of Competition	**Answers and Points**	**References**
	1- What is the strength of competitors in your specific market:	▪ Very strong (1) ▪ Strong (2) ▪ Fragmented (3) ▪ Weak (4) ▪ Very weak (5)	Villalobos (2007)
	2- Barriers to entry: (i.e. regulation, high investment to entry, etc.)	▪ Very low (1) ▪ Low (2) ▪ Modest (3) ▪ High (4) ▪ Very High (5)	
	3- What is the status of the intellectual property (IP)?	▪ NA ▪ Trade secrets only (2) ▪ Core patents pending (3) ▪ Core parents issued (4) ▪ Complete patent estate (5)	

EVALUATION - Business Success Potential:

- BAD: X < 3.0
- MEDIUM: 4.0 > X >= 3.0
- GOOD: 5.0 >= X >=4.0

Appendix III - Investors' Interview Guidelines

1. (Explaining the ISC Framework)
2. I'll need your help for giving the weightings that in your perspective should be given to the ISC algorithm's components (**ISC algorithm - APPENDIX II**). The weighted average of these weightings will generate a score that will assess business model's success potential of a Start-up qualitatively as explained below the following table.
   Feel free to share ideas and comments while giving the weightings to the variables.

3. What do you think about the pointing system? Do you agree, or do you suggest something else?

EVALUATION – Business model quality:

- BAD: X < 3.0
- MEDIUM: 4.0 > X >= 3.0
- GOOD: 5.0 >= X >=4.0

4. For now, what comments do you have concerning the framework?
5. Which opportunities do you imagine this framework creating?
6. Which are the framework's limitations, for you?
7. Is there anything else you'd like to add?"

Appendix IV – Core parts of surveys to both investors and students

As the survey for both were similar, this appendix shows both surveys parallel since its' structure is almost equal.

Code of colors:

- **Part with common question for both investors' and students' surveys**
- **Part with a question per Students and (/) Investors**

-----Beginning of the survey----------

Differentiated beginning:

"Dear (ex)student,
Please consider that this survey was built ONLY for actual or past Business Administration students.
Your answer to the survey will be crucial for my master thesis' quality, done at Católica Lisbon School of Business & Economics.
To thank you for your contribution, you'll be part of a lottery among all respondents, that will be explained in the end of this survey.
It should take between 7 and 10 minutes.
To start, please, click on "NEXT" to start the survey."
/
"Dear investor,
Thank you very much for using some of your time for answering this survey.
Your answer to the survey will be crucial for my master thesis' quality, done at Católica Lisbon School of Business & Economics.
It should take between 10 and 15 minutes.
To start, please, click on "NEXT" to start the survey."

---- SEPARATOR----------

Start-up presentation:

The Code Venture

- You can find information about this start-up below, business on a Business Model Composer (BMC) Profile and on a fact sheet.
  Both information sources are complementary and should be taken into consideration for answering the following questions.

BMC Profile

- Here you'll find a website, that works as a business model profile page, with some information about The Code Venture.
- LINK - http://businessmodelcomposer.com/sbbarros92/

Fact sheet:

- Here you'll find The Code Venture's self-evaluation on issues that investors tend to be concerned about, according to this thesis literature.
- LINK - https://drive.google.com/open?id=0B56FMy5QNNsTU1QzN0dsTTVLak0

Common questions for this start-up:

- Q1) To what point do you agree that you understand well this start-up's business model? *
  - **Answer:** Disagree totally 1 2 3 4 5 Agree totally
- Q2) To what point do you agree that this is a good idea? (Please consider their value proposition, product/solution and business model) *
  - **Answer:** Disagree totally 1 2 3 4 5 Agree totally
- Q3) To what point do you agree that this start-up is, generally, well contextualized in its market? (Concerning about: team quality, timing, market size and competition) *
  - **Answer:** Disagree totally 1 2 3 4 5 Agree totally

Differentiated question for this start-up:

- Q4) How good is The Code Venture as a business opportunity, for you? *
  - **Answer:** Terrible business opportunity 1 2 3 4 5 Amazing business opportunity

/

- Q4) How good is The Code Venture as an investment opportunity, for you? *
  - **Answer:** Terrible investment opportunity 1 2 3 4 5 Amazing investment opportunity

---- SEPARATOR----------

Start-up presentation:

Yoochai

- You can find information about this start-up below, business on a Business Model Composer (BMC) Profile and on a fact sheet.
  Both information sources are complementary and should be taken into consideration for answering the following questions.

BMC Profile

- Here you'll find a website, that works as a business model profile page, with some information about Yoochai.
- LINK - http://businessmodelcomposer.com/yoochai/

Fact sheet

- Here you'll find Yoochai's self-evaluation on issues that investors tend to be concerned about, according to this thesis literature.
- LINK - https://drive.google.com/open?id=0B56FMy5QNNsTeXUzWE9FV2FueFE

Common questions for this start-up:

- QQ1) To what point do you agree that you understand well this start-up's business model? *
  - **Answer:** Disagree totally 1 2 3 4 5 Agree totally
- Q2) To what point do you agree that this is a good idea? (Please consider their value proposition, product/solution and business model) *
  - **Answer:** Disagree totally 1 2 3 4 5 Agree totally
- Q3) To what point do you agree that this start-up is, generally, well contextualized in its market? (Concerning about: team quality, timing, market size and competition) *
  - **Answer:** Disagree totally 1 2 3 4 5 Agree totally

Differentiated question for this start-up:

- Q4) How good is Yoochai as a business opportunity, for you? *
  - **Answer**: Terrible business opportunity 1 2 3 4 5 Amazing business opportunity

/

- Q4) How good is Yoochai as an investment opportunity, for you? *
  - **Answer**: Terrible investment opportunity 1 2 3 4 5 Amazing investment opportunity

---- SEPARATOR----------

Start-up presentation:

Egg Electronics

- You can find information about this start-up below, business on a Business Model Composer (BMC) Profile and on a fact sheet.
  Both information sources are complementary and should be taken into consideration for answering the following questions.

BMC Profile:

- Here you'll find a website, that works as a business model profile page, with some information about Egg Electronics.
- LINK - http://businessmodelcomposer.com/eggelectronics/

Fact sheet

- Here you'll find Egg Electronics' self-evaluation on issues that investors tend to be concerned about, according to this thesis literature.
- LINK - https://drive.google.com/open?id=0B56FMy5QNNsTSmhVVXJOUUNETlU

Common questions for this start-up:

- Q1) To what point do you agree that you understand well this start-up's business model? *
  - **Answe**r: Disagree totally 1 2 3 4 5 Agree totally
- Q2) To what point do you agree that this is a good idea? (Please consider their value proposition, product/solution and business model) *
  - **Answer:** Disagree totally 1 2 3 4 5 Agree totally
- Q3) To what point do you agree that this start-up is, generally, well contextualized in its market? (Concerning about: team quality, timing, market size and competition) *
  - **Answer:** Disagree totally 1 2 3 4 5 Agree totally

Differentiated questions for this start-up:

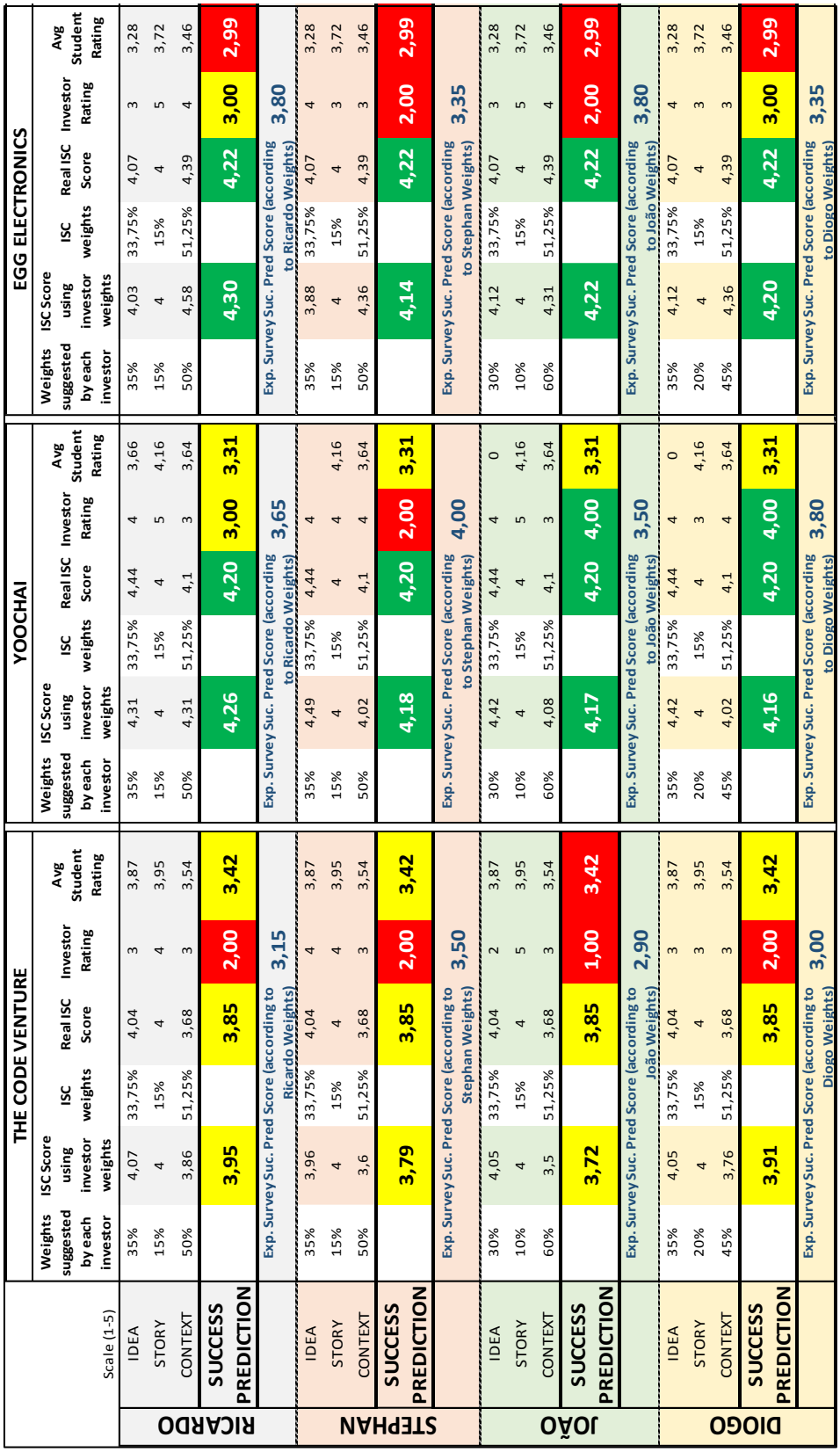
- Q4) How good is Egg Electronics as a business opportunity for you, in general? *
  - **Answer:** Terrible business opportunity 1 2 3 4 5 Amazing business opportunity

/

- Q4) How good is Egg Electronics as an investment opportunity, for you? *
  - **Answer:** Terrible investment opportunity 1 2 3 4 5 Amazing investment opportunity

----END OF RELEVANT PART ON BOTH SURVEYS---

Appendix V - ISC scores by investor



	Scale (1-5)	THE CODE VENTURE					YOOCHAI					EGG ELECTRONICS				
		Weights suggested by each investor	ISC Score using investor weights	ISC weights	Real ISC Score	Investor Rating	Avg Student Rating	Weights suggested by each investor	ISC Score using investor weights	ISC weights	Real ISC Score	Investor Rating	Avg Student Rating	Weights suggested by each investor	ISC Score using investor weights	ISC weights	Real ISC Score	Investor Rating	Avg Student Rating
RICARDO	IDEA	35%	4,07	33,75%	4,04	3	3,87	35%	4,31	33,75%	4,44	4	3,66	35%	4,03	33,75%	4,07	3	3,28
	STORY	15%	4	15%	4	4	3,95	15%	4	15%	4	5	4,16	15%	4	15%	4	5	3,72
	CONTEXT	50%	3,86	51,25%	3,68	3	3,54	50%	4,31	51,25%	4,1	3	3,64	50%	4,58	51,25%	4,39	4	3,46
	SUCCESS		3,95		3,85	2,00	3,42		4,26		4,20	3,00	3,31		4,30		4,22	3,00	2,99
	PREDICTION																		
		Exp. Survey Suc. Pred Score (according to Ricardo Weights)				3,15		Exp. Survey Suc. Pred Score (according to Ricardo Weights)				3,65		Exp. Survey Suc. Pred Score (according to Ricardo Weights)				3,80	
STEPHAN	IDEA	35%	3,96	33,75%	4,04	4	3,87	35%	4,49	33,75%	4,44	4		35%	3,88	33,75%	4,07	4	3,28
	STORY	15%	4	15%	4	4	3,95	15%	4	15%	4	4	4,16	15%	4	15%	4	3	3,72
	CONTEXT	50%	3,6	51,25%	3,68	3	3,54	50%	4,02	51,25%	4,1	4	3,64	50%	4,36	51,25%	4,39	3	3,46
	SUCCESS		3,79		3,85	2,00	3,42		4,18		4,20	2,00	3,31		4,14		4,22	2,00	2,99
	PREDICTION																		
		Exp. Survey Suc. Pred Score (according to Stephan Weights)				3,50		Exp. Survey Suc. Pred Score (according to Stephan Weights)				4,00		Exp. Survey Suc. Pred Score (according to Stephan Weights)				3,35	
JOÃO	IDEA	30%	4,05	33,75%	4,04	2	3,87	30%	4,42	33,75%	4,44	4	0	30%	4,12	33,75%	4,07	3	3,28
	STORY	10%	4	15%	4	5	3,95	10%	4	15%	4	5	4,16	10%	4	15%	4	5	3,72
	CONTEXT	60%	3,5	51,25%	3,68	3	3,54	60%	4,08	51,25%	4,1	3	3,64	60%	4,31	51,25%	4,39	4	3,46
	SUCCESS		3,72		3,85	1,00	3,42		4,17		4,20	4,00	3,31		4,22		4,22	2,00	2,99
	PREDICTION																		
		Exp. Survey Suc. Pred Score (according to João Weights)				2,90		Exp. Survey Suc. Pred Score (according to João Weights)				3,50		Exp. Survey Suc. Pred Score (according to João Weights)				3,80	
DIOGO	IDEA	35%	4,05	33,75%	4,04	3	3,87	35%	4,42	33,75%	4,44	4	0	35%	4,12	33,75%	4,07	4	3,28
	STORY	20%	4	15%	4	3	3,95	20%	4	15%	4	3	4,16	20%	4	15%	4	3	3,72
	CONTEXT	45%	3,76	51,25%	3,68	3	3,54	45%	4,02	51,25%	4,1	4	3,64	45%	4,36	51,25%	4,39	3	3,46
	SUCCESS		3,91		3,85	2,00	3,42		4,16		4,20	4,00	3,31		4,20		4,22	3,00	2,99
	PREDICTION																		
		Exp. Survey Suc. Pred Score (according to Diogo Weights)				3,00		Exp. Survey Suc. Pred Score (according to Diogo Weights)				3,80		Exp. Survey Suc. Pred Score (according to Diogo Weights)				3,35	

Appendix VI - ISC Scores vs. average students and investors ratings

Score scale (1-5)	THE CODE VENTURE				YOOCHAI				EGG ELECTRONICS			
	avg investors weights	ISC Score	Avg investor Rating	Avg Student Rating	avg investors weights	ISC Score	Avg investor Rating	Avg Student Rating	avg investors weights	ISC Score	Avg investor Rating	Avg Student Rating
IDEA	33,75%	4,04	2,5	3,87	33,75%	4,44	3	3,66	33,75%	4,07	3,66	3,28
STORY	15%	4	4	3,95	15,00%	4	3,75	4,16	15,00%	4	4	3,72
CONTEXT	51,25%	3,68	3	3,54	51,25%	4,1	3,75	3,64	51,25%	4,39	3	3,46
SUCCESS PREDICTION		3,85	1,50	3,42		4,20	2,25	3,31		4,22	3,25	2,99
	Exp. Survey Suc. Pred Score	2,98			Exp. Survey Suc. Pred Score	3,50			Exp. Survey Suc. Pred Score	3,37		

EVALUATION	
BAD	1 < X < 3
MID	4 > X >=3
GOOD	X >= 4

Appendix VII - Deviation analysis - ISC Scores VS. Investors' Ratings

Code of Colors: ISC SCORE more optimistic than INVESTORS' RATING
ISC SCORE more pessimistic than INVESTORS' RATING

RICARDO	Avg rating per dimension	Avg ISC score per dimension	dev
IDEA	3,33	4,27	0,940
STORY	4,67	4,00	-0,667
CONTEXT	3,33	3,97	0,637
SUCCESS PREDICTION	2,67	4,08	1,410
Expected Avg Suc Pred (with Ricardo Weightings)	3,53	Dev [ISC Score (Suc Pred) vs. Expected Suc Pred Rating]	0,544

avg dev Ricardo 0,580

STEPHAN	Avg rating per dimension	Avg ISC score per dimension	dev
IDEA	4,00	4,27	0,273
STORY	3,67	4,00	0,333
CONTEXT	3,33	3,97	0,637
SUCCESS PREDICTION	2,00	4,08	2,077
Expected Avg Suc Pred (with Stephan Weightings)	3,62	Dev [ISC Score (Suc Pred) vs. Expected Suc Pred Rating]	0,460

avg dev Stephan 0,830

JOÃO	Avg rating per dimension	Avg ISC score per dimension	dev
IDEA	3,00	4,27	1,273
STORY	5,00	4,00	-1,000
CONTEXT	3,33	3,97	0,637
SUCCESS PREDICTION	2,33	4,08	1,744
Expected Avg Suc Pred (with João Weightings)	3,40	Dev [ISC Score (Suc Pred) vs. Expected Suc Pred Rating]	0,677

avg dev João 0,663

DIOGO	Avg rating per dimension	Avg ISC score per dimension	dev
IDEA	3,67	4,27	0,607
STORY	3,00	4,00	1,000
CONTEXT	3,33	3,97	0,637
SUCCESS PREDICTION	3,00	4,08	1,077
Expected Avg Suc Pred (with Diogo Weightings)	3,38	Dev [ISC Score (Suc Pred) vs. Expected Suc Pred Rating]	0,694

avg dev Diogo 0,830

Avg deviation of ISC scores vs. Avg investor ratings 0,726

Avg dev Success Prediction Score 1,577

Avg deviation ISC variables - Ricardo	Avg deviation ISC variables - Stephan	Avg deviation ISC variables - João	Avg deviation ISC variables - Diogo
0,303	0,414	0,303	0,748

Avg dev ISC variables all startups 0,442

Appendix VIII - Feedback coming from the interviews

Ricardo Jacinto's Feedback

COMMENTS on the general part of the framework - Prior going onto in-detail analysis to the framework	COMMENTS ON THE FRAMEWORK's DETAILS	POINTING SYSTEM	OPPPORTUNITIES	LIMITATIONS
1- «"This is more than BM quality. It seems more like a general project analysis. This is "Project Quality" or "Business Opportunity"»; 2- "An "honest" or "conservative" entrepreneur is always positively biased when doing self-evaluation"; 3- "Telling the story structure by including Baden-fuller's framework is interesting since it involves very important issues (like customer ID, customer engagement, etc.) but it might be a bit too focused, since for instance it's interesting to understand the experience that entrepreneurs have with the problem they are solving, but this issue is sustained in the "context part". 4- Language: "Writing in english for non-english speakers could be an issue"; 5- Story: "Works better for comercial guys than geeks" 6- "This doesn't consider Execution" and "Execution is everything". 7- «"Story" is a name that doesn't work for me. I totally agree with the concept, but not the name - maybe "Communication"»	1- Inside "Likelihood of customer adoption - We have great accaptance of our product/service by professional community": «is it expected that they have prior work on this matter?» **I SAID YES.** 2- In Evaluation of Business Model he'd like to have the answer to "two important questions: How do you reach a customer? How long do you take to convert the customer?" He's suggested two possible (and flexible to any kind of industry) questions: "How much does it cost to acquire a customer? (in "money" or "time" variables) What is the Lifetime value of that same customer (in "time" and "money")." 3- Inside business model evaluation of ISC - We utilize innovative processes and procedures to provide our Products/services - "I'd include this issue on the "product or Value proposition part of ISC rather than on the BM evaluation part" 4- "Regarding market size, entrepreneurs tend to overestimate it"	"I'd adapt the value that distinguishes a "medium" and a "bad" project. Instead of 3.0 I'd say that values above 2.25 should start being considered medium". When I do an answer of 3 points I want more information, and I think it would be unfair to say that it's bad	"The story part is very positive, something that I don't so much weight on, but it's quite a relevant input."	He recalls for the execution matter. Said in the first comments

Stephan Morais' Feedback

COMMENTS on the general layout of the framework - Prior going onto in-detail analysis to the framework	COMMENTS ON THE FRAMEWORK's DETAILS	POINTING SYSTEM	OPPPORTUNITIES	LIMITATIONS
1- "For fundraising it has its drawbacks on first sight, but just for analyzing idea quality is good in the early days of the company" 2- "It's interesting for entrepreneurs to use it. It's quite complete in terms of investors' criteria to evaluate start-ups." 3- "I'd give 50/50 to idea and context, it's everything inside these two, but telling the story is important." 4- "The story part for me has to do with team quality, i.e. does the team know how to tell the story?" 5- «I'd include TEAM QUALITY in the "IDEA package" as it seems that this IDEA part considers the inner factors affecting the start-up. And so, by this reasoning, the Context would be the "surrounding factors". It's the way we do it. Great part of the idea is "team"» 6- He has considered critical decision factors (deconstructing the framework) were: product/tech (30%) + Team quality (40%) + Competition (30%). 7- "Value proposition is a sub-product derived from the BM & product, so it doesn't make sense to me that it should be separated, inside IDEA and that's also why I'd put "team" here.	1- "Questioning entrepreneurs their willingness to be coached should be a question on TEAM QUALITY (TQ) TEST, especially if these would eventually need support from investors." He has also proactively, then distributed weights: Coachability (30% TQ) + Experience (40%TQ) + Team completeness (30% TQ). 2- «entrepreneurs need to consider whether they expect competitors to build equivalent products to theirs, as reaction. Suggested question: "how likely is it that competition will create an equivalent product?", it's so important!». 3- Comment about a question: "Customers will accept your product/service"- I don't understand this question. It's important, but how can a person know this? (I said that they need to do some "home work"). 4- "Being the first isn't necessarily good"	1- "Entrepreneurs are very optimistic about their idea, there's a bias in entrepreneurs answers" 2- Point system is ok	For entrepreneurs: 1- "it is a good tool for them to identify bad ideas, more than good ones (since good ones will be shapped in time, with several pivots probably)" 2- It's also good for entrepreneurs to have their full home work done prior meeting investors. For investors: 3- "maybe it could also be useful for inexperienced BA investors" (less likely to be the case)	"This ends up being a very theoretical exercise, except if the company has a lot of work done. It doesn't guarantee that things will go well, once it gives good rate. This should be a disclaimer of this framework's usage."

Appendix VIII (cont.) - Feedback coming from the interviews

João Freire Andrade's Feedback

COMMENTS on the general layout of the framework - Prior going onto in-detail analysis to the framework	COMMENTS ON THE FRAMEWORK's DETAILS	POINTING SYSTEM	OPPPORTUNITIES	LIMITATIONS	FURTHER COMMENTS
1- "This for pre-seed/seed start-ups, right?" (Right) 2- He would for instance substitute "IDEA" by "EXECUTION", while including TEAM QUALITY (in IDEA), since when considered a product there's the automatic thinking of the team's ability to make it happen, especially since probably the product isn't working yet. "Team is the function of IDEA execution. For me, it's the team who's the guarantee for me that the product will go from 0 to 1."	1- "The Likelihood of customer adoption sub-variables should consider whether the firm is B2B or B2C" - He weighted differently accordingly.	"Totally biased answers. Since the likert-scale questions aren't objective in-detail, and broad instead. "Example of questions that he would like to see being answered, regarding technology: "How much of your tech is outsourced?" and "how much control of the code of the company?". More concrete questions, that lead to better perception of quality." "I doubt that any of the answers was rated below 3." (and in fact very few answers were pointed below 3)	"For Entrepreneurs: They have to think about this, at least. They cannot even think of speaking to an investor if they don't think in detail about these issues."	"The great limitation of this framework is that most of the questions are not going enough into detail, i.e. the questions aren't concrete enough to have more objective and comparable answers. For example: Commenting on "is your product/technology well-tested?" - Being well-tested is subjective (there isn't a clearly defined criteria) - "what is being well-tested?" - it needs to be clarified so that answers are informing better - like, how many people have used the products? how likely is it that customers are satisfied with their product experience? This applies to all topics that dependend on likert-scale answers, in my opinion."	"For investors: the standardization is interesting, but only if more objective answers come out of this framework and if a good mass of investors can input their suggested weights. It might become a very interesting tool."

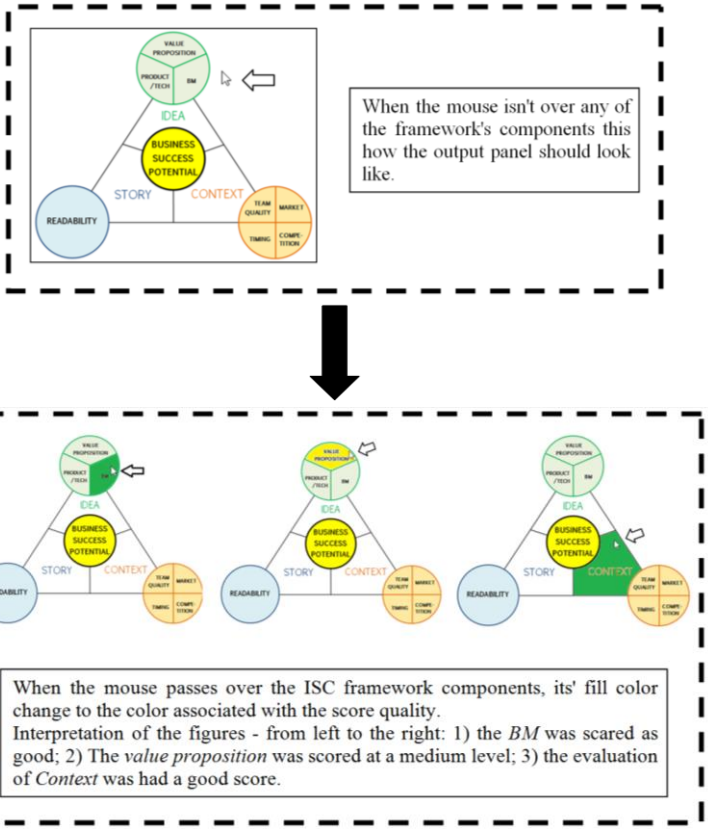
Diogo Alves' Feedback

COMMENTS on the general layout of the framework (Prior going onto in-detail analysis to the framework)	COMMENTS ON THE FRAMEWORK's DETAILS	POINTING SYSTEM	OPPPORTUNITIES	LIMITATIONS	FURTHER COMMENTS
1- "It's interesting"; 2- "the story" is only useful if tech, vp and bm are aligned";	1- «A question to add on Likelihood of customer adoption: "Do you have customer recommendations?"»; 2- "You don't talk about tech differentiation"	1- "On the likert-scale questions: Answering "totally disagree" regarding their owns start-up seems too unlikely. 2- "there should be a "Very Good" opportunity if the ISC framework general evaluation is higher or equal to 4.5."	To entrepreneurs: 1-"It can help entrepreneurs to understand what is being well-done and what should be improved." For investors: 2- "A more visual way to analyse start-ups and do screening. We are actually using an application form, that is very long, like 20 pages long. If we could have something more visual: it would be faster and easier to analyse. Maybe with a more in-depth version of this model".	1- "No GO-TO-MARKET strategy. It's important to know if it's expected good execution." 2- «Everything that is "agree and disagree" is somewhat bias, positively. It's much better to have objective answers and give points to them. Changing this way to answer would help decreasing the bias.» 3- "These questions are very subjective, and they might lead you to error. Giving answer hypothesis that could better fit to their reality would help a lot keeping answers objectivity." (like mkt size answer style, or team experience)	"In general, you consider most of the important variables taken into account by investors decision-making process."

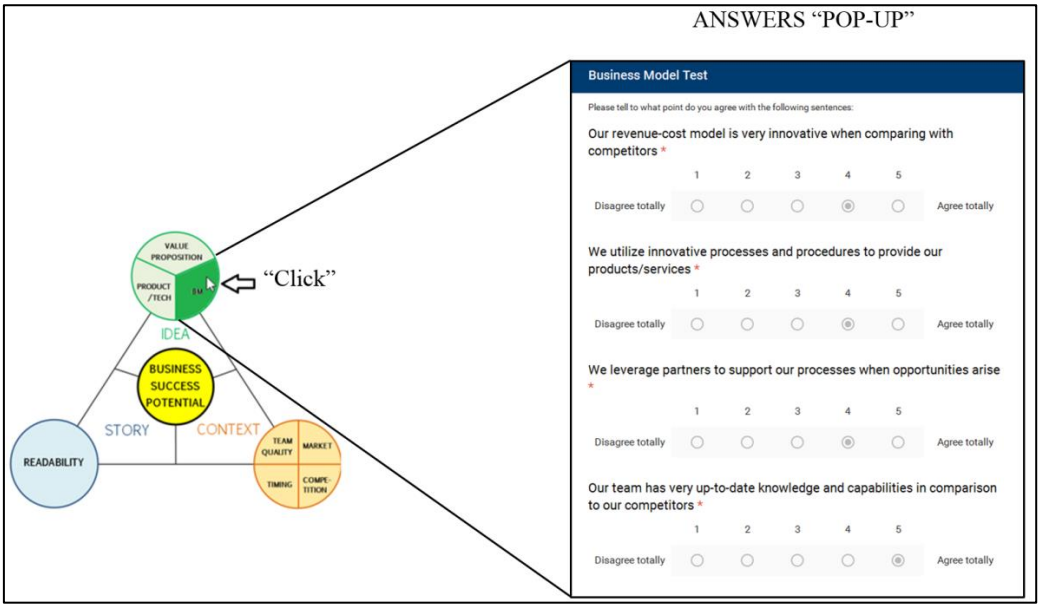
Appendix IX - Investors' insights: Optimistic VS. Pessimistic

OPTIMISTIC INSIGHTS	PESSIMISTIC INSIGHTS
- **In general**: • it considers most of the important variables taken into account on a decision making process for deciding whether to invest or not on a start-up; - **For BA/VC investors**: • It could be useful for inexperienced business angel investors; • A more visual way for investors to analyse and screen start-ups; - **For entrepreneurs**: • By using this framework, entrepreneurs will need to think and do work regarding all the variables that this framework includes, which is good since then when they start needing to reach investors, they'll probably be better prepared (especially useful for inexperienced entrepreneurs); • It can help entrepreneurs knowing what is, or seems to be, well-done, but also what still needs improvement; • It's a good tool for helping entrepreneurs to find bad business model ideas, that aren't worth pursuing; • *Story* concept (readability evaluation) is good for helping entrepreneurs knowing when they are communicating well their idea in-text, something that isn't usually evaluated and is important;	• It doesn't substitute execution, which "is everything" on a start-up • It doesn't include a Go-to-Market Strategy analysis • It doesn't consider an analysis of Customer Lifetime Value VS. Cost of Customer Acquisition, which is important to consider financial viability • This is a theorectical exercise • It has many questions that will lead to subjective answers due to entrepreneurs positive bias (eg. "How well tested is your product?" is one question from the ISC framework: it's an important question, but entrepreneurs need to answer to more specific questions in order to reach more objective answers such as "how many people tested your product?"); • A likert-scale answer model for multiple choice questions will drive entrepreneurs to provide subjective and positively biased answers, in order to make those questions more objectively answered it's important to provide answer suggestions per question for them to choose which best fits their situation • Self-evaluation from entrepreneurs is postively biased; • Story: writing in english could be an issue; and it works better for commercial people than for people with a more technical background; • This is a framework that needs prior work in order to provide more effective information; • Market size tends to be overstimated; • Team should be considered a part of the idea, since it's the "function that will affect the quality of the product/service", "context" sounds like "surrounding factors".

Appendix X - Interface of the ISC Results' Output



Appendix XI – Pop-up interaction on the Framework's results



Notes: 1- The isn't representing the colors that are associated to the answers quality, but it should happen on the real interface; 2- Another important feature that the pop-up should show: the "clarification note" per question.

Appendix XII - Detailed statistical analysis on the relation of ISC algorithm's scores against investors' and students' ratings

ISC algorithm vs. average students' and average investors' ratings

I'll by comparing the relation between the ISC Scores and both students' average and investors' average ratings. Then I'll do the deviation analysis of students' opinions against investors.

General consideration concerning information from APPENDIX VI:

- ISC more optimistic than investors and students;
- 2/3 of the expected answers from investors are qualitatively aligned with their real qualitative rating for *SP;*
- When the ISC framework outputs a *SP* score which suggests at least to continue pursuing an idea (with medium or good evaluations on *SP)*, there's always an investor or student with the same opinion;
- Increasing quantitative *SP* values are in line with increasing investors' rating, so there might be a relation, but it's not possible to conclude that as the sample of investors isn't statistically significant;
- There's never an alignment between investor's and students' qualitative rating.

Now, in order to better understand how divergent are students and investors opinion about the use case start-ups, I'll do a deviation analysis, especially for understanding who would be more optimistic and pessimistic about each start-up.

The Code Venture

	Avg Investor rating	Avg Student Rating	Deviation	Avg Deviation
IDEA	3	3,87	-0,868	-0,757
STORY	4	3,95	0,050	
CONTEXT	3	3,54	-0,540	
SUCCESS PREDICTION	1,75	3,42	-1,669	

Yoochai

	Avg Investor rating	Avg Student Rating	Deviation	Avg Deviation
IDEA	4	3,66	0,342	0,059
STORY	4,25	4,16	0,090	
CONTEXT	3,5	3,64	-0,140	
SUCCESS PREDICTION	3,25	3,31	-0,055	

Egg Electronics

	Avg Investor rating	Avg Student Rating	Deviation	Avg Deviation
IDEA	3,25	3,28	-0,025	0,014
STORY	4,25	3,72	0,530	
CONTEXT	3,5	3,46	0,040	
SUCCESS PREDICTION	2,50	2,99	-0,488	

Avg deviations in IDEA	-0,184
Avg deviations in STORY	0,223
Avg deviations in CONTEXT	-0,213
Avg deviations in SUCCESS PREDICTION	-0,737

Avg deviation opinion Students vs Investors

-0,22775

Code of Colors: STUDENTS more optimistic than INVESTORS
STUDENTS more pessimistic than INVESTORS

Exhibit 13 - Deviation Analysis - Investors Vs. Students ratings on the use case start-ups (Rating Scale: 1 – 5)

This analysis will be done while regarding Exhibit 13, and its results are the following**:**

- The students are on average more positive than investors about the code ventures' performance on the ISC variables, and even more positive than investors considering the investors considering their opinions on *SP* of the start-up;
- Average deviation on *SP* between investors and students is more than 3x higher than the average deviation between students and investors, beyond the students' side the most optimistic;
- Students are always more positive than investors on rating success potential;
- Students were always more pessimistic about the *story* quality than investors;
- On average students are more positive than investors;
- The investors' sample isn't statistically significant so these results aren't conclusive, but rather indicative of their differences.

As it's not possible to compare in a statistically significant way the relation between students and investors, I'll focus attention to the framework's relation against investors

ISC Score vs. individual investor's opinion

Further on, the ISC score will be compared with the investors' average opinion. However, since four investors isn't statistically relevant sample, I'll do a more specific analysis within each investor's view to reach more specific insights directly from the framework and their independent opinions. Thus, I'll do four independent analyses (one per investor) about the relation between the ISC Score algorithm and each investor's ratings concerning the three use case start-ups, using APPENDIX V as the main source of the analysis' information (please have it always easily accessible during this analysis).

For each independent analysis I have used the following structure: I start by highlighting the weights for the ISC input variables (*Idea*, *Story* and *Context*) assigned by the investor; Then, focusing on *Success Prediction* (the output variable of the ISC Score algorithm), I'll share the differences between the ISC Real Score and ISC Score using the investor's suggested weights, and I also comment those scores while contextualizing with the investor's rating of the same output variable (*success prediction*); finally, I do a deviation analysis concerning the differences between average investor rating per (ISC Algorithm) dimension and the average ISC Score per dimension.

Ricardo Jacinto

As seen in APPENDIX V, Ricardo Jacinto has weighted the ISC framework input variables on the following way: 35% for *Idea*; 15% for *Story*; and 50% for *Context.*

At a first sight, considering the *Success Prediction*, the output variable of the ISC algorithm, the difference between the ISC score using investor's weights and the Real ISC Score is always small (as there is no significant change) for all the three start-ups.

Now, I'll look at each individual start-up's output variable, and compare the ISC score per start-up with the investor's rating per start-up. Starting off with The Code Venture (TCV), Ricardo evaluated as Bad (2 points) on *Success Prediction*, although according to the weightings the investor has suggested the score should be medium (3.15 pts) aligned with the Real ISC score which is also classifying TCV as medium (3.85 pts). In Yoochai's case, the difference-between the Real ISC and Investor's Success prediction is that the framework's score suggests a good opportunity (4.20 pts) while the investor indicates it is medium (3.00 pts) at success predictability, and it is qualitatively aligned with the Expected score for the same metric (medium = 3.65 pts). Finally, with regards to Egg electronics, we verify a similar situation to Yoochai's case, with exactly the same qualitative *Success predictability* scores/ratings.

RICARDO	Avg rating per dimension	Avg ISC score per dimension	dev	avg dev Ricardo 0,580
IDEA	3,33	4,27	0,940	
STORY	4,67	4,00	-0,667	
CONTEXT	3,33	3,97	0,637	
SUCCESS PREDICTION	2,67	4,08	1,410	
Expected Avg Suc Pred (with Ricardo Weightings)	3,53	Dev [ISC Score (Suc Pred) vs. Expected Suc Pred Rating]	0,544	

Table 11 - Deviation Analysis - average Ricardo rating per dimension vs. average ISC Score per dimension; aggregate average deviation: Ricardo's Rating against ISC Score.
(Scale evaluation: X < 3 is bad; 4 > X >= 3 is medium; 5 >= X >= 4 is good)

On a global perspective, I'll do a deviation analysis between the Average ISC Score, per dimension, and average Investor's ratings, per dimension.

As seen in Table 11, above, the main highlights from the deviations per dimension occur at the *Idea* and *Success Predictability* levels, with positive deviations of 0.940 and 1.410 respectively. Beyond that, it's interesting to look at the average of Ricardo's rating of *Success Prediction* of the start-ups against the other input variables, to note that the evaluation of the output variable (that is "bad") seems inconsistent with the three input variables (pointed as "medium" and "good"). And If we look to table 4 **(chapter 2.2.3.)**, the expected average rating for *success prediction* (Medium= 3.53 points) it seems that on average the opportunities still had some margin to work out, and it wouldn't be dissuasive for the average start-up founders to continue working with that BM. The ISC Score, however, considers all the BM opportunities to be good (>= 4 points) on average, so it's clearly the most optimistic measure.

Stephan Morais

Regarding again APPENDIX V, Stephan Morais has weighted the ISC framework input variables on the following way: 35% for *Idea*; 15% for *Story*; and 50% for *Context.*

Comparing with Ricardo's analysis, the weightings of the input variables are exactly the same and looking at *Success Prediction* the difference between the ISC score using investor's weights and the Real ISC Score is again very short considering all three evaluated start-ups.

Focusing on each start-up and considering again the output variable of the ISC framework, I'll compare the ISC score per start-up with the investor's rating per start-up. Starting by TCV, on the survey Stephan evaluated as Bad (2 pts) on *Success Prediction*, although according to the weights that the investor suggested, the score would have been medium (3.50 pts) aligned with the Real ISC score which is also classifying TCV as medium (3.85 pts). On Yoochai's case, the difference between the Real ISC and Investor's Success prediction is that the framework's score suggests a good opportunity (4.20 pts) while the investor indicates it is bad (2pts) at success predictability,. However, Stephan's qualitative expected score (using stephan's weights) for the same metric would be aligned

with Real ISC Score (Good= 4pts). The Yoochai's case seems very inconsistent as all the parameters were evaluated at a "good" level (4) and he's still evaluated it as bad. Finally, on the Egg Electronics evaluation, we verify that both Real ISC score and Investor's rating have the same qualitative rating/score as in Yoochai's situation, in terms of *success prediction,* but in this case Stephan's expected score is at a "medium" score, so the ISC framework in this case is more positive than both real and expected investor's answers.

STEPHAN	Avg rating per dimension	Avg ISC score per dimension	dev	
IDEA	4,00	4,27	0,273	avg dev Stephan 0,830
STORY	3,67	4,00	0,333	
CONTEXT	3,33	3,97	0,637	
SUCCESS PREDICTION	2,00	4,08	2,077	
Expected Avg Suc Pred (with Stephan Weightings)	3,62	Dev [ISC Score (Suc Pred) vs. Expected Suc Pred Rating]	0,460	

Table 12 - Deviation Analysis - average Stephan rating per dimension vs. average ISC Score per dimension; aggregate average deviation: Stephan's Rating against ISC Score.
(Scale evaluation: X < 3 is bad; 4 > X >= 3 is medium; 5 >= X >= 4 is good)

Above is the general picture of Stephan's deviation analysis concerning the Average ISC Score, per dimension, and average Investor's ratings, per dimension.

As seen in Table 12, above, the main highlight from the deviations per dimension occurs at the *Success Prediction* level with a positive difference of 2.077 pts., between ISC score and and Stephan's average rating. Beyond that, it's interesting to look at the average Stephan's rating for *Success Prediction* of the start-ups against the input variables, given that in Ricardo's case the evaluation of the output variable ("bad") seems inconsistent with the three input variables, pointed out as "medium" and "good", especially since he suggested that the framework contains almost all the important issues concerning the evaluation of a business opportunity, like Ricardo did. Stephan's expected average rating for *success prediction* (Medium= 3.62 pts) justifies that even if opportunity isn't at a "good" level it should at least be considered to be at a "medium" level, being worth continue pursuing. The ISC framework considers all the BM opportunities to be good (>= 4 pts) on average, so it's clearly more optimistic than the investor, but with a much shorter deviation, of 0.46 pts, between the Real ISC Score and the Expected ISC score using Stephan's weightings.

João Freire de Andrade

Looking again at APPENDIX V, João Freire de Andrade has weighted the ISC framework input variables on the following way: 30% for *Idea*; 10% for *Story*; and 60% for *Context.*

Comparing with previous investors' situation, the weights of the input variables are different for the first time and looking at *Success Prediction,* the difference between the ISC score using investor's

weightings and the Real ISC Score is again very short, and even zero, considering all three evaluated start-ups.

Focusing on each start-up and considering again the output variable of the ISC framework, I'll compare, again, the ISC score per start-up with the investor's rating per start-up. Starting by TCV, on the survey João evaluated as a bad (1 pt.) opportunity on *Success Prediction*, in alignment with his expect rating using his suggested weightings (2.90 pts.), while the Real ISC score which is classifying TCV as medium (3.85 pts). It's the first investor that does a bad evaluation (< 3 pts.) and is aligned with his expected score. In Yoochai's case, there's for the first time a qualitative alignment between the investor *success prediction* rating and the Real ISC score as both suggest "good" quality , but in this case according to João's weights his expected evaluation of Yoochai should have been Medium (3.50 pts). Lastly, with regards to the Egg Electronics evaluation we verify a similar situation to Stephan's qualitative opinion, as the ISC Score says that this is a good opportunity while João has rated this as a bad opportunity, and he would be expected to consider it a medium opportunity.

JOÃO	Avg rating per dimension	Avg ISC score per dimension	dev	
IDEA	3,00	4,27	1,273	avg dev João 0,663
STORY	5,00	4,00	-1,000	
CONTEXT	3,33	3,97	0,637	
SUCCESS PREDICTION	2,33	4,08	1,744	
Expected Avg Suc Pred (with João Weightings)	3,40	Dev [ISC Score (Suc Pred) vs. Expected Suc Pred Rating]	0,677	

Table 13 - Deviation Analysis - average João rating per dimension vs. average ISC Score per dimension; aggregate average deviation: João's Rating against ISC Score.
(Scale evaluation: X < 3 is bad; 4 > X >= 3 is medium; 5 >= X >= 4 is good)

This is the general picture of João's deviation analysis concerning the Average ISC Score, per dimension, and average Investor's ratings, per dimension.

As seen in Table 13, above, the main highlight from the deviations per dimension occurs at the *Idea* and *Success Prediction* levels with a high positive differences 1.273 and 1.744 respectively, between the average ISC score and João's average rating. Regarding the João average rating for *Success Prediction* of the start-ups against the input variables values, as in previous investors' case, the evaluation of the output variable (that is "bad") seems inconsistent with the three input variables, assessed as "medium" and "good". Even so, João's expected average rating for *success prediction* (Medium= 3.62 pts) justifies that even if opportunity isn't at a "good" level it should at least be rated at a "medium" level, being worth continue pursuing, even if it's not a *Unicorn case* (start-up with a valuation equal or higher than a billion US Dollars), it looks that at least it seems like an average opportunity. The ISC framework considers all the BM opportunities to be good (>= 4 pts) on average, so it's again more optimistic than the investor's opinion.

Diogo Alves

Regarding again APPENDIX V, Diogo Alves has weighted the ISC framework input variables on the following way: 35% for *Idea*; 20% for *Story*; and 45% for *Context.* The weightings of the input variables are different and looking at *Success Prediction,* the difference between the ISC score using investor's weights and the Real ISC Score is once more quite small among all three evaluated start-ups.

Focusing on each start-up and with the eyes on *Success Prediction* variable of the ISC framework, I'll compare the ISC score per start-up with the investor's rating per start-up. Starting off by TCV, Diogo evaluated it as a bad venture (2 pts.) on *Success Prediction*, but the expected *Success Prediction* follows the same pattern as Stephan and Ricardo's, as it becomes a medium opportunity when using his suggested weights on his ratings on the input variables. In Yoochai's case, Diogo has equivalent qualitative results when compared with João's situation for the same case. Concluding with Egg Electronics' assessment, the Real ISC suggests a good opportunity (4.20pts) and Investor's rating on *Success prediction* indicates a medium level (3 pts) and is qualitatively aligned with the Expected score for the same metric (medium=3.65).

DIOGO	Avg rating per dimension	Avg ISC score per dimension	dev	
IDEA	3,67	4,27	0,607	avg dev Diogo 0,830
STORY	3,00	4,00	1,000	
CONTEXT	3,33	3,97	0,637	
SUCCESS PREDICTION	3,00	4,08	1,077	
Expected Avg Suc Pred (with Diogo Weightings)	3,38	Dev [ISC Score (Suc Pred) vs. Expected Suc Pred Rating]	0,694	

Table 14 - Deviation Analysis - average Diogo rating per dimension vs. average ISC Score per dimension; aggregate average deviation: Diogo's rating against ISC Score.
(Scale evaluation: X < 3 is bad; 4 > X >= 3 is medium; 5 >= X >= 4 is good)

This is the general picture of Diogo's deviation analysis concerning the Average ISC Score, per dimension, and average Investor's ratings, per dimension.

As seen in Table 14, above, the main highlight from the deviations per dimension occurs at the *Success Prediction* level as a positive difference of 1.077 pts. is the lowest amongst all investors, between the average ISC score and Diogo's average rating. Another highlight is the Diogo's average rating for *Success Prediction* of the start-ups against the input variables, as like in all other investors' cases the output variable ("bad") seems inconsistent with the three input variables, assessed as "medium" and "good". Diogo's expected average rating for *success prediction* (Medium= 3.38 pts)

would justify that even if the opportunity isn't at a "good" level it should at least be considered to be at a "medium" level, being worth continue pursuing.

ISC score vs. all investors' opinion

On this part I'll compare the ISC Score with the average Investor rating per start-up, concerning *SP* and ISC input variables and I'll end with an analysis about the deviation between investors' ratings and the ISC Score for the three aggregated start-ups.

ISC Score vs. average investors rating per start-up

Looking again at APPENDIX VI, regarding the ISC Score it seems that all three start-up have a fairly positive scenario as the opportunity has good *success prediction* for Yoochai and Egg Electronics, while the scenario is more ambiguous to The Code Venture as it is perceived as a "medium" BM opportunity. On the other side Investors' *success prediction* ratings seem to be much more pessimistic than what the framework's suggesting. The investors' thoughts, indicate that they disincentive Yoochai and The Code Ventures' BMs to be implemented since they rate them as non-success predictive opportunities, while on the other hand they would be fairly optimistic about Egg Electronics BM's success predictability. Analysing more in-depth the investors' opinion per start-up, and starting by The Code Venture it seems that the input variables also lead towards a "bad" (2.98 pts) *success prediction* if we look at their expected success predictability according to the ISC weights (equivalent to average investors' weightings), so the weightings seem to lead them towards their decision correctly. Furthermore, it is interesting to do a parallelism about Investors' opinions of Yoochai against Egg Electronics, as Egg Electronics was rated as medium opportunity while Yoochai was considered a bad opportunity, but if we look at the expected score of *Success Prediction*, Yoochai scores better than Egg Electronics (3.50 against 3.37). So, it seems that the gut-feeling of investors isn't necessarily aligned with their expected behavior when evaluating investment opportunities.
The *Success Prediction (SP)* is directly influenced by the ISC variables and the *SP* score is definitely more positive than investors' real rating on the start-ups and much more positive than their expected Success Prediction scores, which already more positive than their real ratings. To sum up, the self-evaluation that entrepreneurs have done to their own start-ups seems to be over positive, as students are more positive than investors and the ISC Score is still always more positive than their opinions.

General comparison between ISC Score and Investors' average rating

The goal of this framework is to help guide entrepreneurs through the thoughts of BA/VC investors, and the first thing that I can tell is that statistically it is not possible to establish a clear correlation. Looking at APPENDIX VII it *seems* that ISC algorithm has very optimistic results since when

observing how investors rate a start-up on average, the average *success predictability* for investors is on average pointed in less 1.577 points that what the ISC algorithm suggests, which is a considerable difference. However, the positive deviation between the ISC score and investors' average opinion is much lower on average if we only consider the average of the input variables (*Idea*, *Story* and *Context*) as the difference is positive in 0.442 points, lower in more than a point when comparing with the deviation on the output variable. Overall, when one gathers the deviation of the scores from both input and output variables from the ISC framework, the average deviation between the ISC score and Investors' average is positive on 0.726 points.

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