



**The analysis of the impact of Causation and Effectuation
approaches on decision-making of IT start-ups**

by

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Dissertation of Master in Management

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2016

Abstract

This dissertation investigates the impact of two alternative ways of thinking: effectuation and causation logics on decision-making and strategic management in startup companies that operate in IT sector. Based upon the theory of effectuation introduced by Sarasvathy (2001), this study provides a critical examination of five effectual principles: bird-in-hand, affordable loss, patchwork quilt, lemonade and pilot-in-the-plane at the edge of their effect on new venture performance. Using a multiple case-study methodology, this study aims to provide an in-depth analysis of the following research issue of effectual reasoning deliberated through the primary data and, answers following research question *How do entrepreneurs perceive the contribution of an effectuation logic in defining a viable and successful strategy when compared to a traditional-planned or causal logic?* The findings suggest that effectuation and causation logics are often combined to overcome startup's top challenges throughout a lifecycle; while there are still some stages where adoption of effectuation reasoning might enhance startup success. We also provided a startup typology with regards to the level of favorability to effectual reasoning and opened a discussion towards the results and hypotheses of prior studies on effectuation and entrepreneurial expertise, market newness level. Overall, the theoretical insights derived from the process-and-context analysis of this study have important practical implications for entrepreneurs looking for adequate and efficient decision-making strategy.

Key words: effectuation, causation, decision-making, startup lifecycle, strategy

JEL-Code: M13

Acknowledgement

I am using this opportunity to express my gratitude to everyone who supported me throughout the time of research and writing of this thesis.

I would like to express my special appreciation and thanks to my advisor Catarina Roseira. I am thankful for her inspiring guidance, invaluable constructive criticism and friendly advices during the whole period of my work on this thesis.

I express my warm thanks to all entrepreneurs and startups' CEOs who found the time in their tough schedule and agreed to participate in the interview process for this empirical study. I would also like to thank all of my friends who provided me with valuable contacts of IT startups' network in Porto. Without their support it would not be possible to collect data for this research.

Finally, I would like to thank all lectures and my classmates for making my mobility program in University of Porto a wonderful experience.

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1. Introduction

The number of researches in entrepreneurship field has increased significantly over the past thirty years. Such genuine interest to entrepreneurship is primarily dictated by the phenomena of ‘entrepreneurial society’ that implies the fact that every year more and more people all over the world are getting involved into entrepreneurial activity which, however, not necessarily mean starting more startups, but likewise starting better ones that stand the test of time better and create more value (Audretsch, 2009; Roger & Osberg, 2007; Sarasvathy & Santos, 2015).

These both processes, new venture creation and performance improvement in the young startups, imply the need to take on actions and make decisions under the conditions of high uncertainty and rapidly changing external circumstances (Bower & Christensen, 1995; McMullen & Shepherd, 2006; Read, Dew, Sarasvathy, Song, & Wiltbank, 2009; Sarasvathy, 2001; Wiltbank, Read, Dew, & Sarasvathy, 2009). In particular, informational technology industry (computers and computer software) is ranked third in the top 10 most uncertain industries according to the recently published analysis in the Harvard Business Review (Dyer, Furr, & Lefrandt, 2014). In case of IT new ventures, entrepreneurs, to a large degree, face two primary types of uncertainty: demand uncertainty - will customers pay for startup’s product/solution?; and technological uncertainty - is startup able to make a desirable solution?

Thereby, the nature of IT startups caused by product/solution development, market and customer segment selection, monetization model design and other accompanying processes are perceived as not just risky ones but, at the same time, as essentially unpredictable and interfaced with ambiguity and uncertainty (Blank, 2007; Dyer et al., 2014; Festela, Wuermseherb, & Cattaneoc, 2013)

Wiltbank, Read, Dew, and Sarasvathy (2011), S. A. Alvarez and Barney (2007), and Blank (2007) emphasized in their studies that uncertainty, in its general form, confounds and puzzles entrepreneurs’ decisions regarding the processes of new venture creation and its validation. While a set of new tools and techniques – like, for example, design thinking (Brown, 2009) and agile development (Alliance, 2015) help tackling the issue of high uncertainty at the level of established companies, founders of new ventures stand in need for a better understanding of existent or/and emerging new decision-making tools to help organizing startups in such ambiguous contexts.

Herewith, the entrepreneurship literature portrays several approaches to decision-making how to cope with uncertainty, including concepts that accent the significance and positive effect of planning and control (Delmar & Shane, 2003; Hough & White, 2003; Szulanski & Amin, 2001), or concepts that endorse adaptive and flexible way of startup managing, for example, ‘blue ocean’ thinking involving new market creation (Kim & Mauborgne, 2004), bricolage – DIY approach by applying combinations of the resources at hand to new challenges (T. Baker & Nelson, 2005), and effectuation thinking emphasising affordable loss and other principles (Sarasvathy, 2001)

However, with reference to the results of scientific investigations, planning-driven approach does not gain as much popularity among entrepreneurs-practitioners as adaptive and transformative approaches for decision-making under true uncertainty of startups’ environment context (McMullen & Shepherd, 2006). Since planning is mainly linked to the predictions judged by past events, its outcome quite often appears to be inaccurate and unfaithful for the context where past experience simply does not exist, like, for example, entirely new market or new innovation solution (Honig & Samuelsson, 2009; Leimsider & Dorsey, 2013; Wiltbank, Dew, Read, & Sarasvathy, 2006).

On the contrary, recent results obtained for adaptive and flexible approaches show better alignments to the uncertain environment (S. Alvarez, Barney, & Anderson, 2013). Overall, it has been assumed that planned-based methods are more effective and practical in situations with low uncertainty, while transformative approaches are irreplaceable for venture creation under high uncertainty (S. Alvarez & Barney, 2005; Sarasvathy, 2001, 2008).

Today, it is widely accepted in the scientific community that in business environments with the high uncertainty, decision-making logic should be based upon adaptive methods, transformative responses to the unfavorable events, and flexible intentions for sudden changes in startup’s surrounding (Wiltbank et al., 2006). Nonetheless, no studies were conducted to explore how decision-making logics are applied over time of startup’s lifecycle, how they may be differ according to various startup’s stages, and when may occur the shift from one logic prevailing on another (S. Alvarez et al., 2013).

As mentioned above, two main concepts of decision-making logic exist: planned-oriented and adaptation-oriented. This study particularly focuses on the novel theory that combines both planning and flexibility under the framework of one theory – the theory of Effectuation suggested by Sarasvathy (2001), and described by *causation* and *effectuation* ways of thinking.

An effectual logic is portrayed by entrepreneur's reasoning which is highly receptive to the uncertainty exploration through maintaining feedback and stakeholders' network examination and, leveraging its means for the best optimal solution. In contrast, causal logic is based on predictive calculations, heuristics rooted in prediction that will unlikely contribute to the successful decision-making under ambiguity for new ventures (Sarasvathy, 2008).

Despite the increasing interest to effectuation theory over the last 15 years, the complete understanding of how both logics progress and exercise over time is still underdeveloped, as well as when and why either logic is used over another (Arend, Sarooghi, & Burkemper, 2015).

To address this gap, a process-based approach seems to be essential for a broader explanation of decision-making in startups. And this is primary because the specific conditions aligned with each of the startup's lifecycle stage have the same equal importance to the entrepreneur's reasoning as the strategic decisions that aim at designing the base of new venture. Thus, decision-making process is affected by the changes in the context and its level of uncertainty. As throughout the whole startup's lifecycle, the context is highly volatile, entrepreneur might shift from one decision-making logic to another or to combine both at the same time (Read & Sarasvathy, 2005)

Therefore, examining effectuation theory helps to understand if there is a possibility to consider effectuation and causation logics as complementary to each other instead of competing with each other. It also can help to draw a clear picture why sometimes both logics might be combined or incoherent while applying to one or another lifecycle stage.

Consequently, this study is focused on the variety of combinations of entrepreneurial decision-making logics for particular startup's stages (or assigned to certain events) taking under consideration the context aspect of the each stage in the venture creation process under uncertainty.

Moreover, taking into account that existent research on effectuation's effectiveness compare only the processes of decision-making between nascent firms and established mature companies, their results appeared to be quite one-sided. Roughly speaking, they highlighted that the effectual way of thinking is predominantly used when the level of uncertainty is high (as for startups), while causal thinking is preferentially used when processes are already established, the rules of the play are known and the level of uncertainty is relatively low (as for matured companies) (N. Dew & S. Sarasvathy, 2009; Fisher, 2012; Read, Dew, et al., 2009; Sarasvathy & Menon, 2013; Wiltbank et al., 2009).

Herewith, one of the main Sarasvathy's statement states that "successful firms are more likely to have begun through an effectual logic and grown through causal approaches as they expand and endure over time" (Sarasvathy, 2008, p. 133). In this vein, there seems to be a point in time when the focus of a company's decision-making shifts from effectual to causal. Sarasvathy's conclusions are grounded on two formally different business artifacts where the first one is a startup company and the second one is an enterprise on its mature phase. Undoubtedly, the way in which artifacts were selected may serve obtaining an easier and intuitive results regarding better implication of causal or effectual logic.

Whereupon, this study intended to fill the gap in the literature through examine decision-making process just for one artifact – the startup, throughout its whole lifecycle. Specifically, the main aim of this work is to inspect Sarasvathy's hypothesizes referring to effectuation effectiveness under the analysis of decision-making logic on each stage of startup's lifecycle. Thus, it addresses the following main research question:

How do entrepreneurs perceive the contribution of an effectuation logic in defining a viable and successful strategy when compared to a traditional-planned or causal logic?

Despite of the apparent ease of this question, the difficulty is might be found in the business context and real working startup environment, where every startup undergoing many profound changes during its development, and thus may or may not peremptorily emphasis on either planned or effectual approach during 1.5-3 years of startup's lifecycle. Therefore, each of the lifecycle stages must be carefully studied and analyzed to verify the fact that decisions taken in each stage are critical to the. company's viable

strategy and its success. Consequently, it might be found that the general conclusions found in previous studies (Chandler, DeTienne, McKelvie, & Mumford, 2011; Dew, Read, Sarasvathy, & Wiltbank, 2009; N. Dew & S. Sarasvathy, 2009; Fisher, 2012; Goel & Karri, 2006; Harting, 2004; Morrish, 2009; Read, Dew, et al., 2009; Read & Sarasvathy, 2005; Sarasvathy & Kotha, 2001; Wiltbank et al., 2009, 2011) about the positive effect of effectuation thinking in new ventures appeared to be not accurate for certain stage or event of startup lifecycle.

To answer this question, the study uses a qualitative approach to analyze 11 main events related with startups life cycle stages in 12 IT startups based in Portugal. The main findings of this study will hopefully contribute to the theoretical understanding of effectual decision-making logic under strategical events within startup's stages. In particular, an amalgam model of startup's decision-making was defined through understanding how and why startups might combine effectual and causal reasoning along the whole lifecycle. Additionally, practical implications of the findings may serve for entrepreneurs as the guideline to effective decision-making processes, i.e. when one logic may better be shifted to another or certain effectual principle is better given a high priority.

The rest of the paper proceeds as it follows. Chapter 2 presents the theoretical background around the main concepts of this study and is divided in two sections. Section 2.1 reviews published articles in the fields of effectuation, its main principles, and certain contrasts with causation as the theoretical basis to underline the gap in the existing literature; Sections 2.2 discusses three startup's lifecycle models to be taken as the frame foundation for this analysis. Chapter 3 describes the methodology: adoption of a multi-case study approach; the data collection and analysis techniques. Chapter 4 discusses the findings of the study and Chapter 5 closes the study with the presentation of the study's main conclusions, theoretical and practical contributions and limitations.

2. Theoretical Background

This chapter provides an overview of the theories that are relevant to this study. Section 2.1 discusses theories of entrepreneur's decision-making under uncertainty. It pays a particular attention to Sarasvathy's Effectuation Theory with a discussion of what are the main principles of effectuation, and how they are differ from the causation reasoning. Section 2.2 evolves around the startup's lifecycle, and provides the description of three different startup's lifecycle models and a detailed examination of the model chosen as the main framework for this study.

2.1. Effectuation Theory

2.1.1. Definitions of Effectuation and Causation

This section brings together several definitions that might shed the light on what are effectuation, effectuation processes and effectual reasoning. Causal processes and causation will be described as a dichotomy phenomenon and interpreted through the contrast to effectuation and its derivatives.

The definition of effectuation came into first sight in Sarasvathy's article '*Causation and effectuation: toward a theoretical shift from economic inevitability to entrepreneurial contingency*', published in 2001. In this article Sarasvathy proposes to change the view of entrepreneurship as a set of individual psychological traits or part of the social networks to entrepreneurship as a set of skills, models and processes that can be acquired with time and deliberate practice. She called this approach - entrepreneurial decision-making logic that includes two polar mindsets: causation and effectuation.

The first interpretation of causation and effectuation came out from the aspect of processes that emphasize either a known desirable effect in conjunction with selecting between means to make that effect happen (for causal logic), or a process of known means alongside with the focus on selecting possible valuable effects out of these means combination (effectual logic) (Sarasvathy, 2001).

In 2005, Sarasvathy complemented her vision of effectuation as a process with other broader perceptions like if it is an idea to improve the life of individuals, a logic of entrepreneurial expertise, and finally a theory of constrained creativity (Sarasvathy & Dew, 2005). Later, she also extended the effectuation idea from just the decision-making processes happening only in early-staged ventures to the decision-making logic

that might occur in established firms. The evolution of Effectuation process is briefly depicted in Table 1.

Table 1 - Examples of ‘effectuation’ definitions.

Definition of effectuation	Studies (Date)
Effectuation processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means.	Sarasvathy (2001)
Effectual processes are these where current means are transformed into co-created’ goals with others who commit to building a possible future.	Wiltbank et al. (2006)
Effectuation is an idea with a sense of purpose - a desire to improve the state of the world and the lives of individuals by enabling the creation of firms, products, markets, services, and ideas.	Sarasvathy (2008)
Effectual reasoning is a type of human problem solving that takes the future as fundamentally unpredictable, yet controllable through human action; the environment as constructible through choice; and goal as negotiated residuals of stakeholder commitments rather than as pre-existent preference orderings.	
Effectuation is a logic of entrepreneurial expertise. Effectuation is a logic of entrepreneurial expertise that both novice and experienced entrepreneurs can use in the highly unpredictable start-up phase of a venture to reduce failure costs for the entrepreneur.	
Effectuation as logic of entrepreneurial action that has both theoretical and methodological implications for entrepreneurship research, rather than as a theory to be pitted against extant theories.	
Effectuation is not a theory of “anything goes” – it is a theory of constrained creativity.	Wiltbank and Sarasvathy (2010)
Effectuation is not an independent theory – it builds on and integrates the work of several well-received theories in economics and management.	
Effectuation is not a resource-based view of individual decision making – it does not assume valuable resources, it inquiries into what makes things valuable and how one can acquire and/or create value in resources.	

Source: Author

In continuing with causation way of thinking, its inverse observation contributes to better understanding of effectuation dichotomy model that stresses effectual principles in contrast with causal ones such as means-driven vs. ends-driven, control vs. prediction, affordable loss vs. expected returns, new vs. existing products and markets, cooperation vs. competition, and cyclicity vs. linearity aspects and perspectives. Therefore, it seems relevant to use the comparison table (see Table 2) proposed by Read and

Sarasvathy (2005) to highlight the main differences between the causal and effectuation attitudes to business processes.

Table 2 - Contrasting Causation and Effectuation processes.

Issue	Causal or Predictive Position	Effectual Position
View of the Future	Prediction. The causal approach views the future as a continuation of the past that can be acceptably and usefully predicted.	Creation. The effectual approach views the future as contingent on actions by willful agents, largely nonexistent and a residual of actions taken. Prediction is unimportant as a result.
Basis for Commitment	Should. Commit as a course of maximizing, analysis, and what should be done.	Can. The effectual approach is to do what you can (what you are able to do) rather than what your prediction says you should.
Basis for Taking Action and Acquiring Stakeholders	Goals. The causal approach is to let goals determine sub-goals. Commitment to particular sub-goals determined by larger goal constrained by means. Goals determine actions, including individuals brought on board.	Means. Actions emerge from means and imagination. Stakeholder commitments and actions lead to specific sub-goals. Feedback from achievement/non-achievement of sub goals leads to design of major goals.
Planning	Commitment. Path selection is limited to those that support a commitment to an existing goal.	Contingency. Paths are chosen that allow more possible options later in the process, enabling strategy shift as necessary
Predisposition Toward Risk	Expected Return. The causal approach is to pursue the (risk adjusted) maximum opportunity, but not focus on downside risk.	Affordable Loss. The effectual approach is not to risk more than can afford to be lost. Here, the calculation is focused on the downside potential
Attitude Toward Outside Firms	Competition. The causal approach is to be concerned with competition and constrain task relationships with customers and suppliers to just what is necessary	Partnership (pre-set engagements). The effectual approach is to create a market jointly, building your market together with customers, suppliers and even prospective competitors.

Source: Adapted from Read and Sarasvathy (2005)

Herewith, effectuation sees the future as some effects that could be achieved by combinations of existent and controllable entrepreneur's means, assuming the highest risk-level that the entrepreneur accepted to face through understanding what might be his/her irreversible losses. It supposes that planning might be used as a path that allows possible high-valued effects to happen, however, if over time another more important or/and more valuable effect originates, effectual reasoning will persuade strategy shifting in order to get this effect developed. The effectual approach suggests doing what entrepreneurs can (what startup is able to do) rather than what his/her predictions say should be done. And, likewise, all actions in a startup emerge from its existent means and the en-

trepreneur's imagination and creativity, along with the support of pre-selected stakeholders who are committed to startup development.

While causation sees the future as a prediction based on formed situations and decisions, it requires a complete analysis of what should be done to reach the initial goal and maximize startup's value. Such strategy requires constant planning with hierarchical structure from main goal to sub-goals always taking in account expected return of every goal's accomplishment. Additionally, causal logic puts competition in the center and based its predictions on competitor's reaction under rival label.

Such opposite-based view to effectual and causal logic helps to explain the main differences between two ways of thinking. Although, Sarasvathy and her followers heavily emphasize on the polar opposite of these two logics, in real business context, it should not be excluded that entrepreneurs might use the hybrid reasoning of these two logics or, at least, might practice both reasoning at different time periods of their startups' development. Since the single choice of decision-making is not a simple binary option, it seems adequate to study the complex set of options and, additionally, the context influencing these options, since it might point out to what degree causation or effectuation affected on the entrepreneur's choice.

2.1.2. Effectuation's Principles

Sarasvathy identified the main principles of the effectuation logic through a series of experiments with entrepreneurs. She proposed a set of principles from real-life experiments with serial entrepreneurs by establishing 'clusters of semantic chunks in the transcripts that demonstrate different dimensions of this expert way of thinking' (p.122). These dimensions became an essence of effectuation logic for over the past decade and used to contrast effectuation and causation.

Nonetheless, the fixed set of principles is not agreed among different scholars and even the interpretation of each single principle remains controversial. Therefore, the degree to which effectuation principles describe decision-making logic and consequent behavior leads to an open discussion. For instance, the number of effectuation principles ranges between three and five (see Tables 3 and 4) and thus each element has to be fairly clarified in comparison to others. Particularly, this clarification might be procured through empirical evidence that later lead to further discussion and close literature gap.

Table 3 - Explanations of the principles of Effectuation.

Principle name	Short explanation	Principle concept	Contrasts with causal logic
Bird-in-hand	Start with your means	When expert entrepreneurs set out to build a new venture, they start with their means: who I am, what I know, and whom I know. Then, the entrepreneurs imagine possibilities that originate from their means.	<i>Pre-set goals or opportunities.</i> Causal reasoning works inversely by assembling means after a goal is set.
Affordable Loss	Focus on the downside risk	Expert entrepreneurs limit risk by understanding what they can afford to lose at each step, instead of seeking large all-or nothing opportunities. They choose goals and actions where there is upside even if the downside ends up happening.	<i>Expected return.</i> Causal reasoning first targets a return, then works to minimize associated risk.
Lemonade	Leverage contingencies	Expert entrepreneurs invite the surprise factor. Instead of making “what-if” scenarios to deal with worst-case scenarios, experts interpret “bad” news and surprises as potential clues to create new markets.	<i>Avoiding surprises.</i> Causal reasoning works to minimize the probability of unexpected outcomes.
Patchwork Quilt	Form partnerships	Expert entrepreneurs build partnerships with self-selecting stakeholders. By obtaining pre-commitments from these key partners early on in the venture, experts reduce uncertainty and co-create the new market with its interested participants.	<i>Competitive analysis.</i> Causal reasoning presumes that competitors are rivals to contend with.
Pilot-in-the-plane	Control versus predict	By focusing on activities within their control, expert entrepreneurs know their actions will result in the desired outcomes. An effectual worldview is rooted in the belief that the future is neither found nor predicted, but rather made.	<i>Inevitable trends.</i> Causal reasoning accepts that established market forces will cause the future unfold.

Source: Adapted from Sarasvathy and Dew (2013)

Accordingly to the Table 3, current effectuation theory implies five core principles. The ‘bird-in-hand’ principle signifies that entrepreneur should start his/her new venture by understanding of what are the means he/she possesses at present time that might become a compelling reason to open a startup.

The affordable loss principle presumes that entrepreneur should better concentrate his/her attention on the downside risk instead of simple risk minimizing while following his/her estimations and calculations of the startup’s requested return.

The ‘lemonade’ principle implicates that entrepreneur should never perceive undesirable situations as ones with necessarily negative outcomes, and thus continuously try to

avoid them. Instead it suggests to squeeze and sweeten “lemon-situations” to create new opportunities.

The ‘patchwork quilt’ principle suggests entrepreneurs to act from the positions of patchwork quilter who can chose whatever patch he wants and by experimenting and changing its direction create any new ‘masterwork’. Here, the business environment or market is seen as still in-the-making; the entrepreneur and his creativity play a key role in organizing the work of pre-selected stakeholders and co-create the new market.

The ‘pilot-in-the-plane’ principle encourages entrepreneurs to not entirely focus on inevitable trends, which are considered as ones causing future unfold. Entrepreneurs following effectual reasoning would focus on activities within their control because they are assured about the desired outcomes of such their activities.

However, these five principles had not been developed instantly with the first publication of effectuation theory. The evolution of the principles development reflected in following studies, as summarized in Table 4.

Table 4 - Comparison of publications with inclusion of effectuation principles.

Authors	Principles under study					Research focus	Research question
	‘Means’	Affordable loss	Stakeholder commitment	Exploiting contingencies	Non -predictive control		
Sarasvathy (2001)	(x) ¹	x	x	x	x	Expert ENT	How are firms created?
Wiltbank et al. (2006)	x	x		x		New ventures and established firms	How do firms decide what to do when faced with an uncertain situation?
Wiltbank et al. (2009)					x	Angel investors	Do investors' use of predictive and non-predictive control relate to their investment success?
Read, Dew, et al. (2009)	x	x	x	x	x	Expert entrepreneurs and MBA students	Do expert ENT frame marketing decisions using EFF more often than novices do?
Read, Song, and Smit (2009)	x	x	x	x	(x)	Re-conceptualized the variables from (Read, Dew, et al., 2009) as effectuation variables	
Dew et al. (2009)	x	x	x	x	(x)	Expert entrepreneurs	How do individuals decide what they can afford to lose and what they are willing to lose to plunge into entrepreneurship?
Chandler et al.	(x)	x	x	(x)		Expert	Are the sub-constructs underlying

¹ (X) means that the principle was mentioned but not considered as a core principle of EFF logic in the study.

(2011)						entrepreneurs	causation and effectuation distinct?
Brettel, Mauer, Engelen, and Küpper (2012)	x	x	x	x		Established firms with R&D research	Does effectuation theory work for R&D research projects?

Source: Adapted from Ted Baker and Welter (2015) and Perry, Chandler, and Markova (2012)

In her groundwork article (2001) Sarasvathy mentioned a set of four elements included: affordable loss, stakeholder pre-commitments, exploitation of contingencies and controlling an unpredictable future. Those four principles served as a supporting coverage to the dominant idea of the paper – prevailing means over goals. The same view on the effectuation principles was adopted by Read, Dew, et al. (2009) in their meta-analysis and Dew et al. (2009) in comparison study of experts and novice entrepreneurs. However, in both studies, the principle of control was named differently and was not given the same significance as in the other four studies- *overall approach of design* by Read et al. and *non-predictive logic as opposed to predictive control* by Dew et al.

Brettel et al. (2012) considered the same four principles excluding the control factor moving from the entrepreneurial to the corporate R&D context. It was one of the first studies with intermediate research state because it stepped ahead from entrepreneurial-oriented theory and captured particularities of effectual and causal dimensions in the scale-development process.

Chandler et al. (2011) only partly relied on the Sarasvathy’s set of effectuation’s components. They included in their analysis the affordable loss and pre-commitment principles from the initial set and enlarged it with the other two other sub-dimensions - flexibility and experimentation- arguing that effectuation is a formative and multidimensional construct, while causation is a uni-dimensional construct.

This short overview of effectuation studies shows that effectuation is just in the middle of its development as a coherent theory. Despite the fact it has well-defined principles, the effectuation theory does not provide any scale of how these principles should be investigated. Could one principle be prioritized while examining to what extent entrepreneur used effectual thinking? If principles are interrelated, how can the influence of each of them be studied to measure the effect on performance of the company? Would it

be enough to conclude that startup follows effectual reasoning if it only emphasizes one or two mentioned principles?

In the second place, some confusion may even arise in case of equal understanding of certain effectuation terms treated differently by various authors. For instance, the term *means*, which is a spine of the effectuation theory, is interpreted sometimes in a wider context as a ‘general resources’, while ‘means’ as a principle involves understanding of the Who I am? What I know? Whom I know? questions with regards to the three levels of analysis: individual level, firm level and level of economy. Even if such precise definition can (and will) sometimes align with ‘individual resources’ or ‘corporate resources’, it is important to draw a line under a translation of ‘means’ that helps distinguish effectuation from other established theories and models or a definition of ‘resources’. A classification regarding entrepreneur’s given set of means is presented below in the Figure 1.

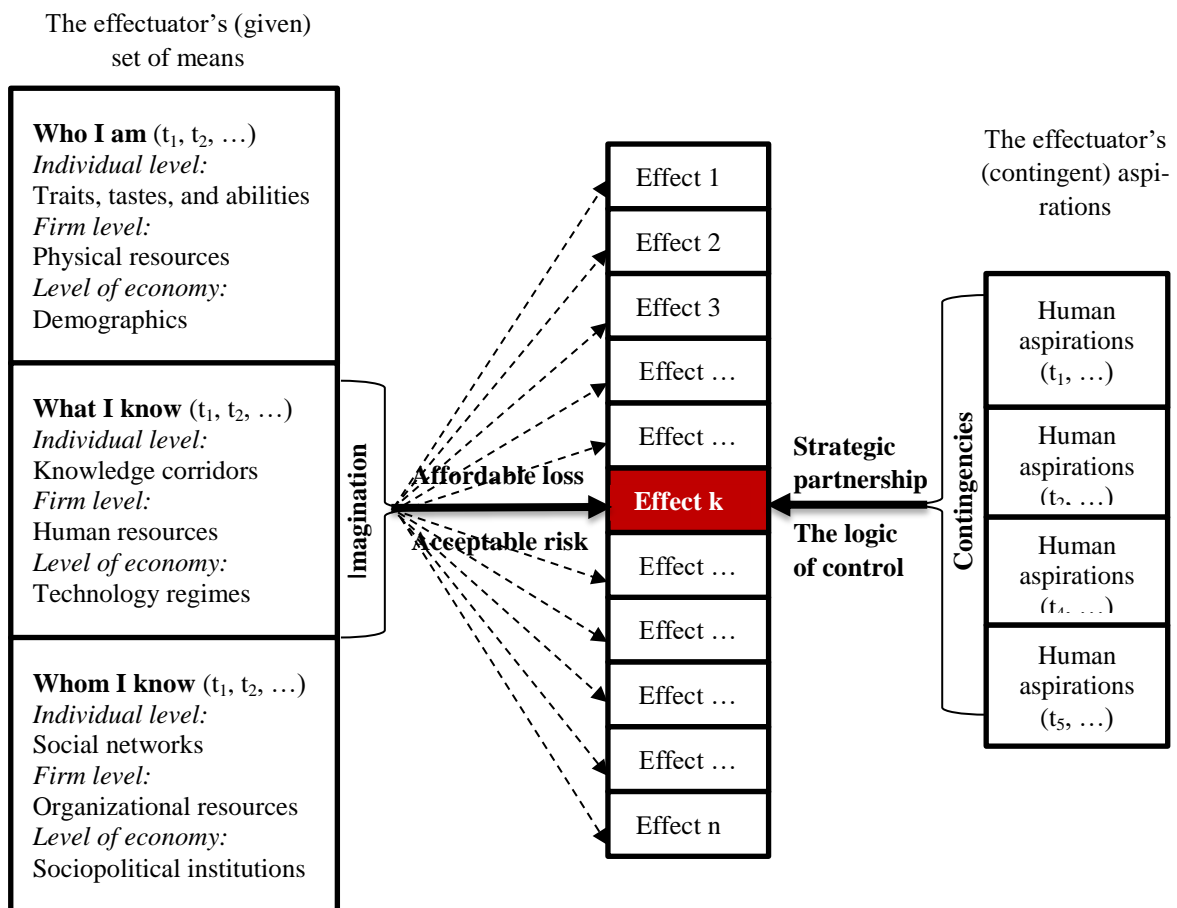


Figure 1 – The effectuator’s (given) set of means.

Source: Sarasvathy (2001, p. 253)

Effectuation begins with a given set of means and contingent human aspirations to select from a set of possible effects imagined by the effectuator(s). Both means and aspirations change over time. The particular effect selected is a function of the level of loss or risk acceptable to the effectuator(s), as well as of the degree of control over the future that the effectuator(s) achieves through strategic partnership along the way.

Thus, the concept of effectuation ‘means’ is basically explained by the bird-in-the-hand principle. Effectuators rely only on existing means identifying through three main questions: ‘who I am?’, ‘what do I know?’, ‘whom do I know?’ After answering these questions, entrepreneurs have to frame the possibilities of their potential business based upon existing cluster of competencies, resources and network. Thereafter, the next question ‘what can I do?’ arises and each individual has to decide about what are new firms and markets could be created with the available resources and competencies. It explains why effectuators do not wait for the perfect opportunity. It is believed that they manage existing resources and knowledge in the way to create new opportunities from mere possibilities. Action is limited by only the amount of resources (this limitation correlated with affordable loss principle) that can be used to design an opportunity.

Moreover, in particular case of new market creation followed by the opportunity recognition a *serendipity effect* plays a central role very often. This means that the entrepreneur did not have any intention to create a new market initially, i.e., it was not his primary goal in the beginning. This startup’s goal emerges during the evaluation and transformation processes. What is interesting is that such evaluation of ‘individual means’ ceases to be ‘individual’ when another actor gets involved into this process, such as for instance, investor, mentor, adviser, partner, etc. who open doors to new/re-formed/re-modeled potential business opportunities (see Figure 2).

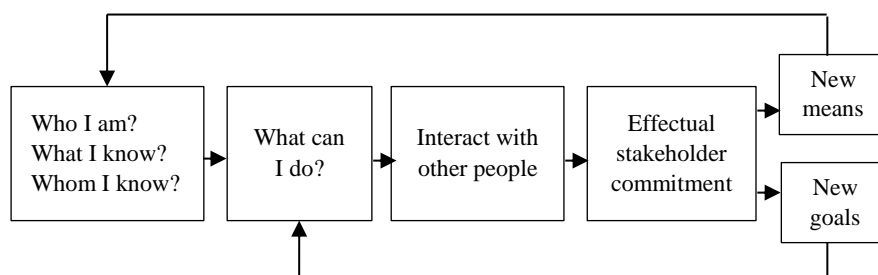


Figure 2 - Clarification of the improving perspective of 'means'.

Source: Sarasvathy (2008, p. 101)

Another term with a blurred interpretation is the term ‘affordable loss’ because it does not only address the risk awareness but includes as well the recognition of relevant decision-making criteria for investments into the process. Here, affordable loss is not limited by money boundaries alone and might include such parameters as time, information accessibility or even venture reputation. Moreover, affordable loss should be considered from the side of company’s current or future partners. Otherwise the possibility of not reaching potential partners could be relatively high if the loss attributed to them does not match their expectations. Therefore, ignoring the principle of affordable loss might cost a lot, especially in situations when the second chance to proceed with the partner is lost.

Furthermore, a clear distinction is required for affordable loss principle versus real-option practice (Adner & Levinthal, 2004). Both are useful decision tools under uncertainty, consequently, the affordable loss concept is often mistaken with a real-option logic (N. Dew & S. Sarasvathy, 2009). The real-options approach explained as “the implicit imagery is of a firm ‘buying a ticket’ to engage in some pre-specified opportunity set, thereby ignoring the potential for the firm to mold and enhance initiatives, learn about new opportunities, and discover new possible initiatives not conceived of at the time of the initial investment” (N. Dew & S. D. Sarasvathy, 2009, p. 4). In contrast to the real-options theory, an effectual use of the affordable loss principle is characterized with the chance that entrepreneurs can shape, transform and reconstitute current realities, as well as their own limited resources, into new opportunities.

Pointing once again, principle of affordable loss has to be tested both for a venture and its potential partners. It incorporates monetary investments as well as time that will be spend, accessibility of the information required and venture’s goodwill. It assumes multi-stage investment with possible mold and transformation and does not consider just like an initial investment.

Other confusion comes from the principle of partnership in effectuation theory that often relates to alliances. Particularly for empirical studies, this element incorporates the partners’ self-selection and pre-commitments. ‘Taken to an extreme, the partnership principle could be combined with a zero level of personal affordable loss, which would imply that building partnership should be the dominant activity from the first day on’. (Ted Baker & Welter, 2015, p. 89).

Overall, it is very important not to be mistaken by simply reading how principles are called. It is essentially important to understand the core explanation of every principle the way how it was interpreted by S. Sarasvathy and other authors that focused on this issues. (Agogue, Lundqvist, & Middleton, 2015; Arend et al., 2015; Bonazzi & Perruchoud, 2014; Brettel et al., 2012; Chandler et al., 2011; Fisher, 2012; Harmeling, 2005; Harms & Holger, 2012; Harting, 2004; Kaufmann, 2013; Kraaijenbrink, Ratinho, & Groen, 2011; Morrish, 2009; Nielsen & Lassen, 2012; Read, Song, et al., 2009; Welter, Mauer, & Wuebker, 2015)

Such detail description of effectual reasoning serves as a good guide while trying to identify if decisions in startups involving in this study are determined by causal or effectual logic, and which principles are prevailed according to different stages of startup's lifecycle.

2.1.3. Effectuation Theory as an integrated theory

Additionally, to enhance the understanding of the effectual principles within the entrepreneurship theory, it seems necessary to consider how effectuation theory connected to other relative and more solid concepts. This is important also for the data analysis of present study because some of the startups might refer their decision-making to specific practical approaches derives from other popular and widely used theories. Therefore, interrelationships of these theories should be known and perceived as the marker for researchers to identify if a particular decision-making can be aligned with a certain principle.

For the past several decades, management science has been undergoing many changes in theoretical frameworks, concepts and theories of new venture strategies (Ferreira, Reis, & Miranda, 2015). New approaches emphasized either narrow specialization and, in contrast, a holistic, systemic enterprise mindset have been designed and gained huge interest in both academic circles and practitioners' networks. While some stress uncertainty aspects of the business processes (Gartner, 1985; Gudykunst & Hammer, 1987; Knight, 1921) or opportunities chasing and recognition (Bhave, 1994; Blank, 2007; Koning, 1999; Shane, 2000; Shaver & Scott, 1991; Sigrist, 1999; Teach & Schwartz, 1999a; Venkataraman, 1997), other focus the nature of individual entrepreneurs or social network structure (Busenitz & Barney, 1997; Collins & Moore., 1964; Nandram & Samson, 2000; Timmons, 1989).

Notwithstanding, the theoretical overlap of these approaches suggests that they are fairly interdependent and complementary (Ferreira et al., 2015). Thus, theories of decision-making in entrepreneurship frequently grounded on either one or more concepts mentioned above. One of the brightest examples of recent integrated theories is, of course, the theory of effectuation.

As agreed by many authors in business studies, it is still a very new theory of entrepreneurship, with insufficient empirical testing and critical analysis (Arend et al., 2015; Chiles, Allen, & Vishal, 2007; Perry et al., 2012). “Where industrial organization has the five forces, and the resource-based view has VRIO, to be powerful in a practical manner, effectuation theory needs to have a simpler, cleaner, and more understandable and coherent set of main factors than it now has. It then needs to explain how potential benefits from adopting this simpler effectual approach outweigh potential costs” (Arend et al., 2015, p. 645)

What is clearly defined about effectuation theory is that it is built on the dichotomy logic - division into two mutually exclusive, opposed, or contradictory groups. Many models similar to effectuation models follow this logic, as depicted in Table 5.

Table 5 - Relative dichotomy models in strategy and decision-making.

Author (s), date	Relative to Effectuation Theory dichotomy models in strategy and decision-making	
Mintzberg and Waters (1985)	Emergent strategy	Deliberate strategy
Imai (1986)	Process-oriented strategy	Result-oriented strategy
Levinthal and March (1993)	Exploration	Exploitation
Bower and Christensen (1995)	Disruptive innovation	Incremental innovation

Source: Author

For example, Mintzberg and Waters (1985) contrast strategies in a stream of decisions - emergent and deliberate. Emergent strategy classifies as a set of activities always consistent over time, which are not stated in a formal plan and evolve outside of that plan or between planning reviews. Deliberate strategy deals with the collective vision, goals and/or intention(s) of an organization that are articulated in as much detail as possible and communicated to the actors within organization in order to realize a given outcome.

One year later, Imai (1986) described the mindset behind the success of Japanese companies that was called Kaizen or continual improvement of organizational and managerial processes. He described two ways of decision-making: process-based or results-based logic. Where process-oriented strategy puts all the efforts for improvement, cares how the processes work and how the results are obtained, brings supportive and collaborative role among managers in process-oriented management and gives rewards based on recognition and honor geared to the effort made. In opposite, result or goal-oriented strategy focuses on performance and results; reaching goals must be designated, planned and follow the time-frame; control-centric behavior is the main criteria for all processes, while rewards are generally related to financial performance (Imai, 1986).

Another dichotomy model that might explain some of the principles of effectuation theory is the model about exploration and exploitation processes developed by Levinthal and March (1993). It explains two ways of opportunity recognizing through understanding how knowledge is perceived. Thereby, exploration is the search for new knowledge, use of unfamiliar technologies, and creation of products with unknown demand. Exploitation is the search for available knowledge; it is the use and development of things already known: existing knowledge, technologies, and products.

Alongside with the exploration and exploitation, disruptive and incremental innovation by Bower and Christensen (1995) might be considered as another guiding star for many entrepreneurial companies and startups. This theory suggests that company might follow two different paths in their business development. Incremental innovations are those that fit within a planned business model and time horizon and help to make marginal improvements in what the organization is doing. Disruptive innovations are wild and unexpected technological breakthroughs that require corporations to radically rethink their very existence. At first they seem of limited interest, but eventually they completely overturn existing products and markets” (Bower & Christensen, 1995, p. 45). Later, in 2015, Christensen pointed out that disruptive innovations always develop in low-end (less-profitable segment of customers) or new-market footholds. (Christensen, Raynor, & McDonald, 2015).

As seen from the short description above, effectuation theory shares some concepts with solid and mature management theories (see Table 6).

Table 6 - Effectuation's principles with accordance to the concepts of relative dichotomy models.

Principles of EFF	Means	Affordable loss	Leverage contingencies	Partnership	Control
Similar Models explaining EEF principles	Process-oriented strategy	-	Disruptive innov.	Process-oriented strategy.	-
			Exploration		
	Disruptive innov.		Emergent str.		

Source: Author

Thereby, the most important effectual principle bird-in-hand or, in other words, start with your own means empathies that an entrepreneur first has to study its own means. Then, he/she imagines possibilities that may be developed from those means. A similar concept is partly suggested by the process-oriented vision when the focus shifts from the goal to the process; learning about its flow and changes. The constant check-up and detailed understanding about the process might lead to the recognition of new opportunities. Here, the process is considered as company's means that by re-shaping, re-organization and re-composition of its 'parts' can lead to new business ideas or even to global changes if company's business model.

Additionally, the concept of disruptive innovations puts in the center a new-market foothold that is obviously related with the analysis of startup's means which are essential while entering non-existent market. Christensen's explanation is that the real challenge in a disruption is when it requires a new business model. Business model is not just a value proposition; it is also the resources, processes and values so called RPV that are necessary to bring new value proposition to a profitable business. Being successful means optimizing the RPV for the firm's market (Christensen et al., 2015). Thus, the disruptive innovations do not start from chasing market opportunities; they begin with the understanding of venture's means by trying different combination in order to introduce simplicity, suitability, accessibility, and affordability to the existent market where complication and high cost are the status quo.

An almost identical interpretation refers to leverage contingencies principle and exploration model where both theories welcome the surprise factor. Instead of coping with worst-case situations, entrepreneurs read "bad" news and surprises as potential opportunities to create new markets. Analogically, main disruptive innovations happened when

entrepreneur could twist negative effect in business to its main competitive advantages probably in another market or even industry (Christensen et al., 2015). The emergent strategy also fits to leverage contingencies concept assuming that new decisions may arise as some changes in the business processes happened, particularly, when unexpected situations or ‘negative’ events came from the external factors.

Principle of partnership in effectual logic determines pre-commitment from key partners (stakeholders) through which startup can reduce uncertainty and co-create new markets together. Same logic is used for the process-focused strategy where company rejects the fact that its competitors are rivals to contend with and, oppositely, see them as potential partners who can contribute to successful decisions for both parties (Imai, 1986).

Overall, effectuation theory in entrepreneurship is a new theory that could successfully integrate solid and widely accepted models to one broad-focused model explaining entrepreneur’s logic. On the other hand, effectuation is still the underdeveloped theory with insufficient empirical testing and undefined theory-building characteristics (Arend et al., 2015). In this regard, it seems very interesting to test Sarasvathy’s hypothesizes and provide either an additional support or critical overview. Nevertheless, this study obviously is not the first one that aims to test the viability of the theory and, thus it makes sense to observe the findings and suggestions from other researchers and accurately verify the literature gap that can be studied in this research.

2.1.4. Similar studies and literature gap

As mentioned before, effectuation theory shows increasing interests among of researchers due to its perspective on how entrepreneurs think and behave when creating new ventures. Concerning that effectuation theory is still a relatively new theory, Perry et al. (2012) in their article *‘Entrepreneurial effectuation: A review and suggestions for future research’* argued that “the effectuation-related model of entrepreneurship is an important theoretical model that needs to be tested by researchers” (p.859). They also highlighted that effectuation is moving toward an intermediate research state and so, implies the emergence of cross-sectional studies exploring relationship between effectuation and established constructs.

In this regard, one of their suggestions for future research was calling for the examination of the developmental stage of a new venture. Such potential studies could contribute to the theory conceptualization in general and, moreover, show how certain stages of

a venture are related in different ways to different sub-dimensions of effectuation. “Multi-level and contingent models may also help us better understand how and when the different sub-dimensions of effectuation are most applicable” (Perry et al., 2012, p.840).

Herewith, the main research question of this study completely aligns with the suggestion proposed by Perry et al. Nevertheless, to understand what perspective should be put in the center of this research it is necessary to do an overview of other papers and verify what their main contributions are (see Table 7)

Table 7 - Studies on the Effectuation approach.

Article	Research question/ subject (s)	Research object	Theoretical contribution
Sarasvathy and Kotha (2001)	Do entrepreneurs use effectual processes when faced with Knightian uncertainty?	Expert ENTs/ New ventures	ENT when faces with uncertainties act on EFF logic.
Harting (2004)	Do established firms use an effectuation when exploring entrepreneurial opportunities?	Mature firms	EFF preferably for early stages and CAU in later phase of the corporate entrepreneurship
Harmeling (2005)	How do new ventures come into existence under the high level of uncertainty	New ventures	Owners use EEF logics when uncertainty is high.
Dew et al. (2009)	Do expert ENTs frame decisions using EFF reasoning more often than novices do?	Expert ENTs/ Novice ENTs	The expert ENTs were more likely to think holistically about business, more means-driven, less concerned with expected return, and more interested in developing partnerships than MBA students.
Wiltbank et al. (2009)	Do investors' use of predictive and non-predictive control strategies relate to their investment success?	Business Angels	Uncertainty → Emphasize control strategies as opposed to prediction
Read, Song, et al. (2009)	How EFF principles affect venture performance?	New ventures	M, P and LC positively related to performance. AL – negatively but result is not significant
Morrish (2009)	How effectuation and causation logic influences portfolio formation among entrepreneurs?	Mature firms/Portfolio	EFF gives way to CAU with maturation of the portfolio
Chandler et al. (2011)	Validation of causation and effectuation approaches to new venture creation and adding associated sub-dimensions.	New ventures	CAU negatively associated with uncertainty, while EXP positively. EFF and CAU can be measured differently.
Harms and Holger (2012)	What are the antecedents and consequences of causation and effectuation in the entry mode selection?	New ventures / Novice ENTs	EFF decision-making applies to foreign market
Nielsen and Lassen (2012)	How ENT educators can place more emphasis on identity related struggles involved in the entrepreneurial effectuation process?	Novice ENTs/ New ventures	Students develop a sense of ENTal identity through EFF logic
Kaufmann (2013)	How EFF and CAU influenced the targeting of the biotechnology sectors and what limits they targeted?	Mature firms	Neither CAU nor EFF alone produced desired results. Combination is needed (Singapore–CAU/Israel-EFF)

Solesvik and Gulbrandsen (2013)	How EEF and CAU influence open innovation process.	Mature firms	EFF is preferable to open innovation.
Bonazzi and Perruchoud (2014)	How to combine the notion of “causation”, “effectuation” and “lean startup” in a coherent model?	Concepts	The lean approach appears to follow a linear mindset (“causation”).
Welter et al. (2015)	What are the highlighting bricolage, effectuation and opportunity creation theories overlaps and divergences?	Concepts	EFF employs means-based heuristics to create possible business. BRI uses resources on hand to solve an existing problem in a new way
Agogue et al. (2015)	How nascent technology entrepreneurs in action combine causal and effectual decision-making logics?	New ventures	EFF and cognitive preference should not favor towards CAU.

Source: Adapted from and author’s own literature review ²

² See extended Table with methodological aspects in Appendix 1

Effectuation theory appeared as an attempt to answer how expert entrepreneurs manage their ventures under uncertainty (Sarasvathy & Kotha, 2001). Short while ago, Sarasvathy and her followers tested newborn concept within a two sample groups: expert and novice entrepreneurs (MBA students were considered), to check if the theory equally applies for the average type of entrepreneurs and not necessary experts. The obtained results, however, showed a huge difference between expert entrepreneurs (89% of them) who appeared to use effectuation more than causation, while 81% of novice entrepreneurs preferred causation instead (Sarasvathy, Dew, Read, & Wiltbank, 2007). When Dew's et al. (2009) study appeared on stage (reviewed 2001's article) it was almost completely accepted that effectuation is not a theory of non-experienced entrepreneurs. Since then, studies shifted to the course of verifying whether or not effectuation can be taught to and learned by novice entrepreneurs, such as, for example, Nielsen and Lassen (2012).

Another perspective on effectuation examination relates to the understanding if the effectuation might be used for a company on its mature stage, or in other words, for established companies. The first study on this theme was written by Harting (2004), where decision-making logic was studied for a single case of a car retailing unit from its origins as to the one-year anniversary. Using a semantic chunk methodology, it found that effectuation was used preferably for the early phases, and causation for later phases of the corporate entrepreneurship. Despite that the findings were obtained from a single case-study, effectuation theory got a new confirmed hypothesis that causation logic is valuable for the development processes of the established firms.

Later, Morrish (2009) endeavored to support findings about effectuation thinking for mature companies. Her research aims to investigate how effectuation and causation influence portfolio formation among entrepreneurs. She used a sample of 15 firms and got an evidence of effectuation reasoning during the preliminary and early stages of venture and portfolio development, while causation logic is adopted as ventures and portfolios mature.

Even though, her findings refer to the decision-making for different stages of firms, same as for Harting paper, in fact, the aspect of different development stages was not accurately examined. Morrish, basically, considered only two stages: first one called

early stage, assuming intention to start the business, company opening and early activities until startup has not set all its organizational processes; and second one called later stage, assuming that firm already chose its market, customers and established administrative processes. Morrish's study is probably the one that might be considered as the most similar to the present study, though, it did not pursue the goal to study the decision-making throughout company's development process specifically, and thus, it has not considered any sequences of decision events describing how things change over time. Instead, it carefully focused on the verbal protocol of possible emerging patterns for the portfolio entrepreneur's given means, like 'who I am?' for affordable loss principle; 'what I know?' for leveraging contingencies; and 'whom I know?' for strategic partners.

Another study that cannot be remained aloof while talking about effectuation theory is a validation study of Chandler et al. (2011). It also focused on young firms' examination and found that effectuation is a formative and multidimensional construct. However, the main contribution of this study is an evidence of two additional sub-dimensions for effectuation logic – experimentation and flexibility. And, the second breakthrough is finding that both effectuation and causation share one-dimension – pre-commitment. Here-with, for the data analysis of the present study it is essential to consider all five effectual principles corresponding to one event or development stage in case to provide an accurate differentiation and do not be mistaken by only pre-commitment sub-dimension.

A similar opinion with Chandler et al. about the possible merge of both effectual and causal logic for the successful development of a company is shared by Kaufmann (2013). He examined two case-studies: Singapore's biotechnology policies as an example of causation logic and Israel's biotechnology policies – as effectuation logic. However, both after a decade of implementing their policies failed to create fully fledged biotech clusters. Therefore, Kaufmann concluded that "a combination of the two logics is needed, especially when targeting complex sectors with a yet unknown development path" (Kaufmann, 2013, p. 868).

It is also worth to mention, that in recent years effectuation theory moved from the simple explanatory researches such as ones contrasting expert and novice entrepreneurs, new ventures and mature firms or their effect on the venture performance to the cross-

relationship investigations. Among these papers are Solesvik and Gulbrandsen (2013) who suggested that the effectuation approach is preferable to open innovations; Bonazzi and Perruchoud (2014) who argued that LEAN startup approach follows a linear mindset, or causation, “that seems to be in contrast with the attitude of expert entrepreneurs, who start by assessing the available resources and then seek for commitment to finally derive an understanding of the highly uncertain environment”; Welter et al. (2015) who looked for three theories overlapping and divergences: bricolage, effectuation and opportunity creation theories.

One of the latest studies conducted about effectuation and relevant to the present research is the study written by Agogue et al. (2015) where authors examined how nascent technology entrepreneurs in action combine causal and effectual decision-making logics. This study appealed to 13 cases, where the decision-making process of the technology entrepreneurship students was studied. Using C-K design theory, “a useful and unique tool for studying mindful deviation in early stage idea development, as it accounts for diverse paths of exploration and the necessary learning associated, through knowledge acquisition”(Agogue et al., 2015, p. 8), authors found that the combination of effectuation and causation are required to successfully address both existing technological paths and novel entrepreneurial developments.

They also suggested that effectual logic should subsequently not only be associated with experience and seniority. Rather, effectual logic can also occur, both naturally or adopted through method, among individuals with low entrepreneurial experience. This statement undoubtedly extends the effectuators’ group and, more significant, it confronts with the earlier claims that effectual decision-making is the prerogative of the expert entrepreneurs.

Overall, many studies conducted so far used a relatively open-ended data that needs to be interpreted for meaning. In fact, that effectuation constructs are still not unified and approved (for example, the weight and influence of each principle independently), the level of vulnerability to finding spurious results is moderately high.

Despite the ease of comparing expert entrepreneurs’ techniques with managers or MBA-students decision-making logic, it is much more complicated to test the effectuation itself. Thus, more specific testing is required. Here is why, the research question of

this study emerges as the attempt for the process approach stressing decision-making dynamics. It aims to find patterns of effectuation and causation over the whole period of startup's lifecycle and check whether there are barriers or favorable conditions for adopting either one or another way of thinking.

In this vein, it is essential to determine the choice of startup's lifecycle model to frame this research.

2.2. Models of startup's lifecycle

Following the conclusion of previous sub-section, this part of the study shortly describes three different models of startup's lifecycle, and focuses on explanation why certain model was chosen for this analysis.

“Lifecycle is among the most widely used concepts in the social sciences” (O'Rand & Krecker, 1990, p. p.241). Strictly defined, the lifecycle concept used to represent sequential processes of the object's evolution through predetermined stages. The main reason why lifecycle concept was chosen as a foundational framework for this study is that it shows correlation between each stage and organizational, administrative, production, and marketing issues, and so, provide a better understanding of a context in which startup is operating (Kazanjian, 1988).

Nevertheless, there is little known regarding the ways problems are administered through the rapid lifecycle processes of IT, and particularly Internet startups. The complexity related to the emergence of a new startup has been referred to a plenty of factors. Therefore, different models of startup' lifecycle were introduced recently, where each of them underlines certain set of influencing factors (Drori, Honig, & Sheaffel, 2009).

In this sub-section, three models of startup's lifecycle are considered: Kazanjian's dominant problems-oriented model (1990), Blank's customer-centric model (2007), and Marmer, Herrmann, Dogrultan, and Berman (2011a)'s model both product- and customer-focused (see Table 8).

Table 8 - The four-stage models of startup’s lifecycle.

Stage	Kazanjian (1990)	Blank (2007)	Marmer et al. (2011a)
1.	Conception and Development	Customer Discovery	Discovery
2.	Commercialization	Customer Validation	Validation
3.	Growth	Customer Creation	Efficiency
4.	Stability	Company Building	Scale

Source: Author

Kazanjian’s model

The four-stage lifecycle model suggested by Kazanjian (1990) is one of the first attempts to build a model specifically designed for the technology-based new ventures. Often in literature this model refers to a problem-oriented startup lifecycle model due to its stages derived from the analysis of startup’s dominant problems throughout startup’s development. It consists of four stages: conception and development, commercialization, growth and stability. These patterns of ‘problem’ were found using responses to 105 questionnaires addressing only to technology-based new ventures (Kazanjian, 1988, 1990)

Types of problems studied for Kazanjian’s model include a variety of issues such as “resource acquisition, technology development, vendor relations, production start-up, growth of sales and market share, profitability and internal controls” (Kazanjian, 1990, p. 137). His results showed that some problems and stages have overlaps, though, there is a solid support for a predictable pattern of problems faced by a startup as it develops.

Herewith, the stage one, called conception and development, implies the processes where new product/service has being invented and its development must be started. Building and testing a prototype is essential to continue a startup’s existence. A resource acquisition and technology development issues become the spotlight during this stage.

Stage two involves commercialization of an invention, or a service, or a process. Startup should focus on the production-related issues, while product’s financing has to be secured by this time, at least initial financing. Startup should start the introduction of the product to a chosen market. Some ventures might contract new employees or consult-

ants during this stage to facilitate the production processes. Nevertheless, startup has to keep costs down to be able at any time to allocate money into research or administrative expenses.

Stage three - growth - when the main startup's concern has to be a market share increase and market position's strengthening leading to the result of customer base growth. Key efforts must be focused on keeping up with the growth within the areas of production and customer service.

Finally, in stage four - stability – a startup should seek for profitability through the focus on internal control. It also has to search for the future growth program, which is quite often a second product offer. Hiring new professional managers is also desirable for the stability stage.

Steve Blank's model

Next model (Figure 3) suggested by Steve Blank - a Silicon Valley serial-entrepreneur and academician who is recognized for developing the Customer Development methodology, which launched the Lean Startup movement.

This model was derived from the validation of Blank's Customer Development concept (initially designed only for the early-stages startups) with the number of valley's startups that have passed "we're just starting out" stage a while ago. He found that every startup he addressed, despite of not being a just-started ventures anymore, were under pressure to solve "a common set of problems: Where is our market? Who are our customers? How do we build the right team? How do we scale sales?", issues that were at the heart of the Customer Development methodology.(Blank, 2007, p. vi). Therefore, Blank understood that his methodology might be applicable both for just-started and existing startups attempting to launch new products into new markets.

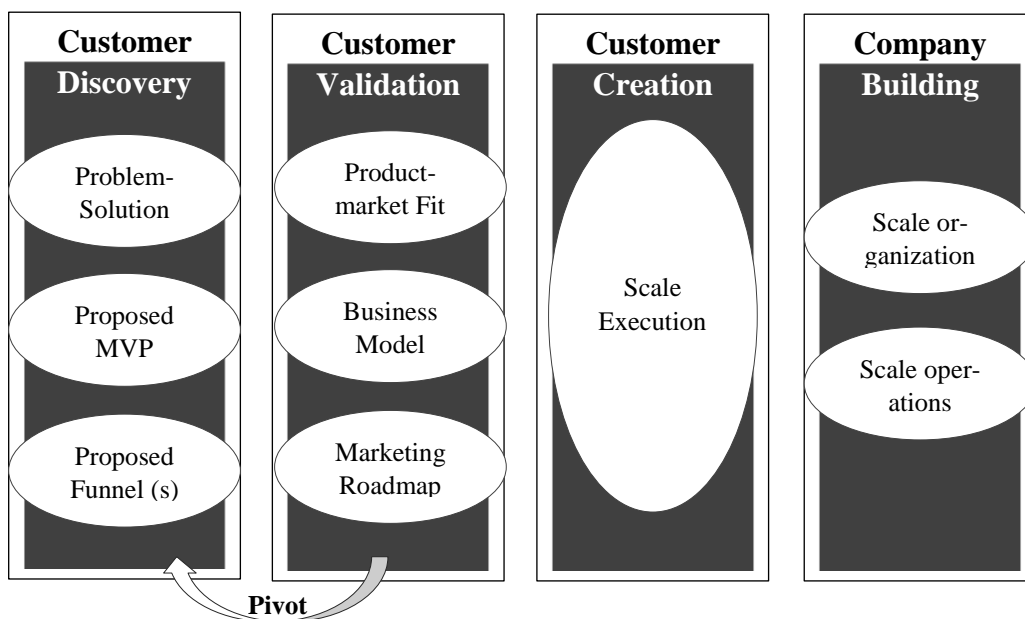


Figure 3 - Customer Development startup's lifecycle.

Source: Blank (2007)

In this way, Blank's startup lifecycle model is always perceived as a customer-centric model that emphasizes customer-based issues on each of the four stages: customer discovery, customer validation, customer creation, and company building. "In this first step, the goal of a startup is to search for a repeatable and scalable business model. It typically takes multiple iterations and pivots to find product/market fit - the match between what startup is building and who will buy it" (Blank, 2007, p. 41).

Startup's first stage - customer discovery – implies exactly the same goal as stated in its name, to see whether there are customers and a market for startup's product and vision. This stage encourages startup's team to "get out of the building" and test whether startup's hypotheses about customers' problem and their products are correct. The gate to the next stage will only open after startup shapes its unique differences to potential customers.

Stage two – customer validation - includes processes of building a repeatable sales roadmap both for the sales and marketing team. This stage should prove that startup has a base of customers and market that react positively to the product. It is also important that if startup did not get a positive reaction to its product it has to come back to the first stage again and incorporate a new idea of current or new product.

Stage three – customer creation – has its goal to create end-user demand and push it into the startup’s sales channel. It also stresses marketing efforts and heavy customers’ acquisition.

Last stage of Customer Development model is the company building, when startup moves from informal team functioning to formal mission-oriented departments to work on further startup’s early market success. A startup also needs to put in place culture, training and product management established processes.

Marmer et al.’s model

Marmer et al’s (2011) proposed another model of startup’s lifecycle based on milestones and thresholds studied specifically for IT and Internet startups. They conducted a survey with the first set of 650 IT startups that, two years later, was expanded by 3200 startups. This survey was performed within the Startup Genome project which intends to increase the success rate of startups by turning entrepreneurship into a science.

The results from their survey suggested that IT startups move through similar thresholds and milestones of development, which were segmented into six stages (since last two stages³, according to author’s, are attributed more to the established firms rather than startups they were not considered for this analysis). The stages considering for this study are discovery, validation, efficiency, and scale. Authors argued that startups which skipped these stages performed worse.

One of the main distinctions between this model and others is that its assessment of the stages does not include traditional ways of assessment like funding, team size, user growth, and etc. It is entirely based on practical experience of many startups regarding a certain set of milestones and thresholds, an example for a milestone is building a MVP, and an example for a threshold is certain rate of retention.

Marmer’s model is characterized by authors as more product-focused rather than customer-centric, though, some of the milestones of first and second stages are heavily attributed to customer-oriented processes. Still Marmer’s model does not only focus on customer development issues but covers many other product- and process-related concerns and milestones.

³ Profit maximization and Renewal

Thus, stage one - discovery (5-7 months) includes solicitation of the advice of mentors, evaluation of business potential and answering the main question ‘Are we solving a problem, and are people interested?’ This stage is also characterized by establishing a founding team, garnering investments from family/friends and generating minimally feasible products/services.

The stage two - validation (3-5 months) involves such processes as acquiring money or attention to verify interest in the product, refine core features, obtain seed funding, expand hiring beyond founding members, get first paying customers, implement metrics and analytics.

The stage three - efficiency (5-6 months) requires a refining a business model alongside with improving efficiency of customer acquisition and modifying the value proposition through which repeatable sales process must be adjusted.

And finally, stage four - scale focuses on aggressively pushing for growth and improving the back-end scalability while establishing new organizational structure and department’s creation.

Table 9 - Marmer et al.’s startup lifecycle overview.

Stage	Average month working	Top Challenges
Discovery	7	Customer Acquisition/Over capacity
Validation	11	Customer Acquisition /Product Market Fit /Problem Solution Fit
Efficiency	17	Customer Acquisition/Team building/Fundraising
Scale	25	Customer Acquisition/Team Building

Source: Adapted from Marmer et al. (2011a)

Overall, all three models have been designed specifically for the purpose of explaining rapid IT startup’s lifecycle, and all derived from the field examination with the sufficient number of participants. The Kazanjian’s model focuses on the dominant problems of startups, Blank’s model - on the customer-related issues, and Marmer’s model – on milestones and thresholds, still all three models have a large part which is overlapped.

Nonetheless, the Marmer’s model was chosen as a ground model for this analysis. First, its stages were formed in accordance with the successful startup’s cases and, moreover,

it accumulates the pattern from more than 1000 responses about actual events involved in startup's development. Second, this model does not solely emphasize any of the influencing factors whether there are customer-centric, product-centric, profit-centric or company-centric. Third, it is the most current model that combines both best Steve Blank's comments and conceptual aspects of Kazanjian's model (Marmer et al., 2011a, p. 27). Fourth, it provides not just stages' description, but precise milestones of what has to be part of certain stage. All these reasons contributed to the choice of Marmer's model that best suits the needs of present research aim to examine effectual reasoning throughout the process where entrepreneurs act under certain initial circumstances, respond to perceived changes, and define their ventures' growth process.

2.3. Summary

To sum up, the effectuation theory is still an underdeveloped theory of entrepreneurial decision-making and the disputes about its practical implication and value continue till nowadays. Several empirical studies that test the theory's hypothesis produced different or even opposed conclusions. One of the reasons for this is that theory is not precisely defined yet and effectual principles are treated differently from researcher to researcher.

Therefore, our first step before the analysis involved detailed explanations of the latest and foundational studies regarding the effectuation and its principles. What we found is that effectuation has never been studied from the process-oriented or dynamic position. And this might be a relevant omission that might explain those contrary findings. A longitudinal methodology helps to provide a more comprehensive clarification on the entrepreneurial decision-making. It needs to be stressed that not only strategical decision-events shape a startup over time (Morrish, 2009; Sarasvathy & Kotha, 2001), but also, and maybe even to the broader extent, the conditions and startup's environment that affects an entrepreneur decision-making in different periods can guide the startup development's direction. Undoubtedly, the decision-making thinking is a context-dependent process, and tracking the context with its changes over time can suggest that entrepreneurs do not rigorously causation or effectuation logic but can shift from one to another under particular conditions or even merge two logics in one hybrid model. In this vein, a process approach can facilitate to the understanding of whether or not causation and effectuation are necessary competing logics, and if this Sarasvathy's hypothesis

applies to the real business context. It can reveal insight into the relationship between both logics in the startup development process.

In consistent with the above criticism, we decided to test the effectuation theory not with just one generalized decision-event - venture creation - but with the preliminary and subsequent events involved in the startup creation process. For this reason we selected one of the latest startup's lifecycle model - Marmer et al. (2011a) that consist of the real (based on data from 650+ IT startups) thresholds and milestones of development that IT startups move through. The next chapter reviews the research goals and details the methodology adopted in the empirical part of this study.

3. Research Goals and Methodology

This chapter describes the methodology adopted in the present study. In sections 3.1-3.2 it provides a short summary of the research methods used for similar studies discussed above (cf. 2.1.4.) and in 3.3-3.5 justifies the research strategy, data collection method and analysis approach chosen for this study.

3.1. Research goals and conceptual framework

Taking into account that the literature review and identification of gaps, the main research goal of this is to uncover:

How do entrepreneurs perceive the contribution of effectuation logic in defining a viable and successful strategy when compared to a traditional-planned or causal logic?

With this question, we aim at contributing to a better understanding of how do entrepreneurs perceive the contribution of effectuation logic in defining a viable and successful strategy when compared to a traditional-planned or causal logic the following theoretical model has been designed. Throughout the literature review, some factors were identified that may influence the perception of startups regarding the usefulness of both logics. Therefore, to provide a complete and detailed answer to the main research question we formulated four additional supportive research questions:

- 1. Do the stages of startup's lifecycle influence the perception of usefulness of adopting effectual or causal reasoning when crafting/executing strategy? If so, why and how?*
- 2. Does the entrepreneurial expertise matter when adopting effectual or causal reasoning? If so, why and how?*
- 3. Does the level of market newness (new or existent market) influence the choice between effectual and causal decision-making? If so, why and how?*
- 4. Does the type of target market (B2B, B2C, and B2B2C) influence the choice between effectual and causal decision-making? If so, why and how?*

The research questions are put together in the conceptual model depicted in Figure 4.

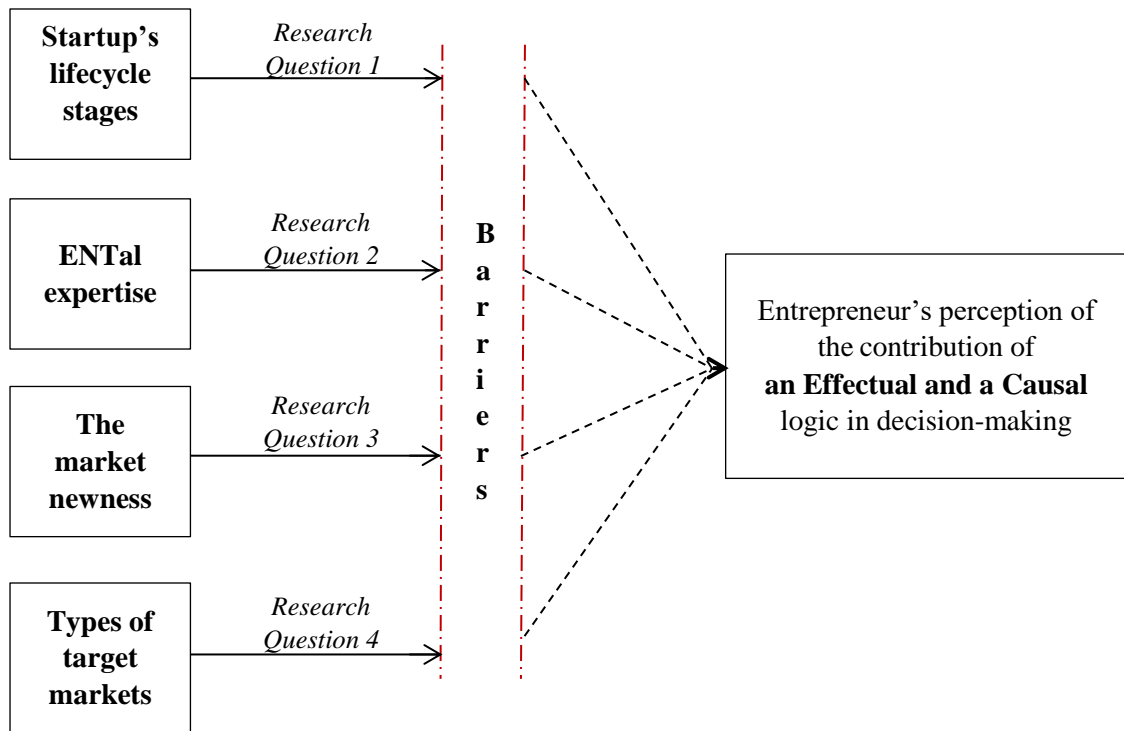


Figure 4 - Conceptual model.

This model is designed to imply a holistic examination of the decision-making processes in startups through the comprehension of four factors that are believed (as explained in the literature review section) to have influence on the entrepreneur's perception of the contribution of an effectual and causal reasoning to the success of a startup. The embedded factors (lifecycle stage, entrepreneurial expertise, market newness and target market) may constitute barriers to the adoption of one or the other logic.

3.2. Research methodology

To choose an adequate research methodology that could be used to study all supportive questions we, first, analyzed what methods were adopted in prior studies. We looked for the strengths and limitations of those methods to find out how we can improve an accuracy of our results.

To begin with, it is problematic to test the effectuation construct through the usual method for gathering a large sample: a survey (Chandler et al., 2011). Respondents normally might not feel a significant difference between some notions such as, for in-

stant, uncertain and unpredictable future. Or some respondents might simply not be familiar with the alliance partnership because they never were involved into new market creation processes.

Therefore, the majority of effectuation studies are based on qualitative research (see full Table 1 ‘Studies on the Effectuation approach’ in Appendix 1). Moreover, the nature of effectuation theory and its embodied decision-making concept has to ensure that all aspects of why, how, where, who or what might be equally studied and, thus researches opted for qualitative methods more often than quantitative ones. A fragment of the extensive Table on methodological consideration of similar studies provided in Appendix 1 supports this explanation and displayed below in Table 10.

Table 10 - Methodological Consideration of similar studies.

Article	Research subjects	Sample	Method	Data analysis	Level of analysis
Sarasvathy and Kotha (2001)	Do entrepreneurs use effectual processes when faced with Knightian uncertainty?	1	Case study	Verbal protocol interpretation through emerging patterns of data	Decision-events
Morrish (2009)	How effectuation and causation logic influences portfolio formation among entrepreneurs?	15	Multiple case-studies	Verbal protocol interpretation through emerging patterns of data	Portfolio development
Agogue et al. (2015)	How nascent technology entrepreneurs in action combine causal and effectual decision-making logics?	13	Multiple case-studies	C-K design theory	Tech ENTs’ decisions

Source: Fragment of Table Methodological Consideration of similar studies in Appendix 1

As seen from the table, all three studies that examined similar to this research aspects using case-studies methods. Concept work by Sarasvathy only focused on the analysis of the one established technology-based firm, while Morrish and Agogue et al. studied 15 and 13 cases, respectively. Such choice of method explained by the fact that holistic and in-depth investigation were needed to study effectuation in dynamic (set of decisions taken over time, changing in portfolio, C-K maps around different processes). Thus, it gives a hint that case-study methodology will be also appropriate for this research.

As emphasized by Yin (2003b), “The case study method allows investigators to retain the comprehensive and meaningful characteristics of real-life events” which is relevant with the above described research questions in context of holistic examination. Thus, this methodology seems adequate to explore startups’ complex interventions, relationships, or programs and supports the deconstruction and the subsequent reconstruction of effectuation phenomena.

Still according to Yin, case studies seem a particularly fit to strategy when *why?* and *how?* questions are set. Thus, this study research questions match with the case study methodology. The research question 1 also seems to fit with the case study logic where focus is put on a contemporary phenomenon within real-life context. Hereby, the multiple case-study method was chosen, first, to replicate the findings and, second, to enable the analysis for both within-case data and cross-case data.

To collect data, in-depth interview method was chosen to avoid misinterpretations of the effectuation’s sub-constructs and terms which might appear when close-end questions are used for. The interviews were conducted with startups’ CEOs and/or founders to get the answers about what thinking mindset startup follows in particular stage and why they believe it is the best mindset to adopt. Overall, the set of methodological aspects of this study is indicated in the in the Table 11.

Table 11 - Methodological aspects of this study.

Research strategy	Data collection method	Analysis Method	Approach	Perspective
Multiple-case study	In-depth interviews	Qualitativecontent analysis	Deductive approach	Theory-guided analysis

Data analysis was performed according to the following iterative process designed by researches:

1. Examine whether or not effectual philosophy took place in the decision-making process on each of the considered startup’s lifecycle stages;
2. Scan for the effectual principles being used;
3. Analyze the perceived opinion of startup’s founders regarding the impact of effectual or causal-based decision-making;

4. Identify patterns whether or not effectual mindset is perceived better than causal in particular stages. And study what are the main drivers /processes/ procedures/events that lead to such conclusion?

3.3. Cases selection

Concerning the goal of this study, it was essential to select a number of startups dedicated to each stages of startup's lifecycle. Additional condition for this investigation was to analyze only IT startups as they operate under high uncertainty and in very dynamic and unstable business environment where, according to the literature (Harmeling, 2005; Read, Dew, et al., 2009; Sarasvathy & Kotha, 2001) they would likely address the effectual approach in decision-making.

Hereafter, the range of startups that belong to IT industry needs to be clarified. In this study, the understanding of tech startups is based on the combination of Steve Blank and Lance Weatherby definitions, 'An organization formed to search for a repeatable and scalable business model, that is potentially producing and selling technological products - whether those are software, hardware or both' (Blank, 2007; Weatherby, 2009). Which means in order to be an IT startup the creation of technology (not just using) is required.

The sample was limited by the age of the startups: 5 years or less to minimize the instability of recalled data. Considering startups averaged 2.7 years of age and have 10 employees team by the current time. Additionally, it was required that startups and/or entrepreneurs included in the sample also exhibited some diversity in this dimension.

To identify startups that fit these criteria, this study utilized three following sources:

1. UPTEC's⁴ list of tech startups (incubate startups and host national and international Business Innovation);
2. The list of IT startups in incubator of the Catholic University of Portugal;
3. Data bases of the Portugal Startups community and startups' network.

From here, seventeen IT startups located and based in Portugal were selected. However, only twelve were short-listed to be analyzed for this study since remaining six were ei-

⁴ UPTEC - is the structure of the University of Porto dedicated to incubate startups and host national and international Business Innovation.

ther not completely matched with the conditions to be called IT startups as described above or simply not fully answered for all mandatory interviews questions. The final sample is described in Table 12.

Table 12 - Startups involved in this study.

Nº	Name	Business description	Year	Lifecycle stage	Market type	Industry/ Special-n	Size	Market newness	Founder gender	Financing type	ENT's Expertise
1	Boleia	An online carpooling platform in Portugal.	2013	Scale	B2B2C	Internet/ car-pooling	1-10	No	M	SF	1
2	Newton.ai	A searching for a job platform with functional for recruiting companies and HRs.	2015	Validation	B2B2C	Internet/ HR	1-10	No	M	SF	2
3	Globinnova	European security company with specialized in cyber intelligence.	2015	Validation	B2B	Computer& Network Security	1-10	No	M	SF	1
4	SCRAIM	An online service for project and process management.	2014	Scale	B2B	Internet/ Software	1-10	No	M	SF	2
5	Infraspeak	An efficient software to excel at the overall process of facility and asset management.	2015	Efficiency	B2B	Computer software	1-10	No	M	SF	1
6	Musicverb	A marketing and management platform for the live music industry.	2014	Scale	B2B2C	Internet/ Music	1-10	No	M	SF	2
7	ZARCO	A mobile app that will allow people to book a travel guide with just a few taps.	2015	Discovery	B2C	Internet/ Travel	1-10	Yes	M	VC	2
8	Nomadmove- ment	An online platform where you can tell your personal online travel story.	2014	Validation	B2C	Internet/ Travel	1-10	Yes	M	VC	1
9	Invoice Capture	A software solution that allows companies to automatically initiate collection of their over- due invoices.	2016	Discovery	B2B	Computer Software	1-10	No	M	SF	2
10	Last2ticket	An online platform that provides service to manage and sell tickets online.	2011	Post-Scale	B2B2C	Information Technology and Services	1-10	No	F	A	1
11	EZ4U	SMS Platform which enables sending of Mas- sive SMS texts for clients.	2011	Post-Scale	B2B	Computer Software	1-10	No	M	SF	1
12	Running- photos	A project that allows easy and universal ac- cess to photo-contents with professional quali- ty for participants of many sport events.	2016	Validation	B2C	Information Technology and Services	1-10	Yes	M	SF	2

Legend for
Table 10

ENT - entrepre-
neur
VC - Venture
capital investment
SF - Self-founded
(bootstrapping)
A - Alternative
external invest-
ment (bank loan)
ENT expertise:
1 – novice
(1st startup)
2 – expert (2nd or
more startup)

As seen from the Table 12 each of the selected startups creates and develops its own technological product: either this is a global security intelligence product or a carpooling platform. The sample is pretty diverse and allows analyzing the data according to the factors identified in the research questions. Furthermore, these characteristics are aligned with the variables studied in prior researches and, thus allowing the comparison of findings of previous studies that are summarized in Appendix 1.

All the startups are hereinafter referred to their serial number as indicated in the Table 12.

3.4. Data collection

Data collected for this study was gathered through semi-structured in-depth interviews. An in-depth interview is a qualitative research technique that implies individual interviews with a small number of respondents in order to gather their attitudes toward a particular idea, project, or situation. Respondents might be asked about their experiences related to any particular object, their thoughts concerning project processes and certain results, or about any changes they believe attributed to the progress and/or regress of the project. (Boyce & Neale, 2006).

According to Boyce and Neale (2006), such interviews are useful when the detailed information about a respondent's thoughts and behavior is required to obtain a more complete picture of what happened in the project and why. In addition, in-depth interviews are less structured than surveys while, at the same time, more flexible and adaptive to responder's answer. Thus, I believe that using interviews to collect data for analysis regarding effectuation logic is one of the most accurate and less subjective ways of data gathering because focus always lays on the opinion of the responders and their perceived assessment of the situation, external influence or decision-making event.

Thereby, twelve semi-structured in-depth interviews were conducted for this analysis, one-round interview for each startup. All respondents are members of their startup's founding team and, in the majority of cases, held either CEO or CTO position. It is also important that all of them were involved in the startup's processes from the beginning of idea initiating to the actual stage at the moment of interview. The interviewing process continued for roundly 1.5 months starting from March, 2016. All interviews took place in Porto, Portugal, with the only exception of startup [1] that happened through Skype, and all lasted between 30 minutes and 1.20 hours. Additional information about each interview is presented in Table 13.

Table 13 - Interviews' and respondents' characteristics.

Nº	Startup Name	Respondent's Name	Respondent's status	Interview Date	Interview Place	Interview duration
1	Boleia	Toni Jorge	CEO, founder	19 March, 2016	Lisbon, PT	> 1 hour
2	Newton.ai	Hélder Silva	CEO, founder	13 April, 2016	Porto, PT	> 40 mins
3	Globinnova	João Paulo Magalhães	CTO, co-founder	17 April, 2016	Porto, PT	> 1 hour
		Pedro Norton Barbosa	CEO, co-founder			
4	SCRAIM	César Duarte	CTO, Product Manager	15 April, 2016	Porto, PT	> 1 hour
5	Infraspeak	Felipe Ávila da Costa	Co-founder, Head of Customer Development	4 May, 2016	Porto, PT	> 40 mins
6	Musicverb	Rui Santos Couto	CEO, founder	21 April, 2016	Porto, PT	> 1.2 hours
7	ZARCO	João Miguel Dias Monteiro	CEO, co-founder	29 April, 2016	Porto, PT	> 30 mins
8	Nomadmove-ment	João Miguel Dias Monteiro	CEO, founder	29 April, 2016	Porto, PT	< 30 mins
9	Invoice Capture	Mário Miguel Rangel	CEO, co-founder	25 April, 2016	Porto, PT	> 1.2 hours
10	Last2ticket	Emília Catarina Oliveira Simões	CEO, founder	22 April, 2016	Porto, PT	> 40 mins
11	EZ4U	Vasco Vinhas	CEO, founder	19 April, 2016	Porto, PT	> 1 hour
		Pedro Mendes	CTO, co-founder			
12	Running-photos	Vasco Vinhas	CEO, founder	19 April, 2016	Porto, PT	< 30 mins

The interview script involves 11 questions such as ‘How did you come up with your business idea? What did you do to analyze the opportunity and how you started?’ These questions were designed to obtain the respondents’ perspective on aspects such as: attitude to goal or means-oriented developments, the influence of context or their behavior under uncertain context and events. However, if the respondent did not provide wide and broad answer or omitted some key characteristics required for this study additional questions were asked.

To address the main aim of the study related with startup’s lifecycle these 11 questions were divided by four groups according to four stages of startups. Moreover, questions were designed with the correspondence to the main events inherent to each of the four stages suggested by Marmer et al. (2011a). For example, regarding the alignment between the event of MVP (minimal viable product) and the discovery stage the question ‘To analyze customer interest did you build a MVP? Please describe your first MVP? What key factors/criteria you built your MVP on?’ was attributed. It is worth to mention, that if the respondent did not answer the main question with the details that were expected, additional narrative questions might be asked in order to get a clear picture about the responder’s attitude to effectual reasoning. The complete list of questions including stages and events is presented in the Table 14.

Table 14 - Interview script (this table also provides correspondence between questions and lifecycle stages).

Stage	Time	Purpose	Events	Questions	Principle (s)
DISCOVERY STAGE	5-7 months	Focus on validating whether a startup is solving a meaningful problem, and Whether anybody would hypothetically be interested in offered solution.	1. Idea initiating	1. How did you come up with your business idea? -What were the first steps to recognize business opportunities? -Did you do any analysis of your means? (your knowledge; network; resources, capabilities) -Have you been a part of business incubator activities? How this effected your business ideas and your relationship with mentors?	M, AL, PA, LC,C
			2.Customer pain identifying	2. How did you answer core Q ‘Are we solving a customer pain/problem?’ -Have you done any questionnaires/surveys/go-out-of-the-building activities? -Have you analyzed competitors’ offers? -Have you analyzed long-run opportunities and their expected/possible return for your startup?	LC/ M, LC, C/ C, AL/C
			3.Business Plan	3. Did you have a Business Plan (BP) since the beginning of your business? -Was it focused on future events prediction or on control factors under your control? (capability, means, networks etc.) -Which categories play a major role in your BP? (demand prediction/ cost and revenue estimation/ competitors’ analysis/ risks analysis etc.) -What was the main purpose of your BP? (roadmap/ competitor’s analysis/ investors’ and venture capital requirements)	M, LC, PA, AL, C/ M, LC/ LC
			4.First investment	4. How did you finance your initial stage?	AL, P, C
			5.Minimally feasible product/ service (MVP)	5. Have you built a MVP to analyze customer interest? -Was it full-featured or simple solution? -What were the key criteria you based your MVP on? (alternative to competitors’ offer market analysis, opportunity analysis, customers’ preferences, your current means)	M/ M, LC/ C, M, PA/ M, LC/
VALIDATION STAGE	3-5 months	Focus on validating whether customers are interested in MVP and following products through the exchange of money or attention.	6.Product-market fit	6. What did you do to understand if your product/service fit the market needs? -What processes did you use to acquire attention and/or money from your prospects? (strategic partnerships & “selling”, enlarging customer segments/strategic partners, enter to un) -Did you operate on existent market (compete with competitors) or you create new market? -Did you know your exact Market? your customer segment? your potential customer? your positioning?	PA, C, M/ M/ M,C

EFFICIENCY STAGE	5-6 months	Startups refine their business model and improve the efficiency of their customer acquisition process.	7.Pivots ⁵ (if necessary)	7. Did you have a phase when after discovering your opportunities and building MVP you refined your core features? Why did you do so? -What critical factors you relied on while pivot your project (product or service)? Name them and give a priority level.	M, AL, PA, LC, C
			8.First paying customers	8. How did you acquire your first paying customers?	AL, M,C,PA
			9.Refine business model	9. After your business validation have you changed the elements of your Business Model? -Have you considered to change your target customer segments, value proposition, distribution channels, core capabilities, cost structure and/or revenue model? If so, what drives you to do so? -Have you changed the strategy of customer acquisition or you mostly rely on and empower the initial program (during validation stage)? -Have you preferably acted as were planned or as if, it was emerged to be more effective?	M, AL, PA, LC, C LC, C, M
SCALE STAGE	7-9 months	Startups step on the gas pedal and try to drive growth very aggressively.	10.Process Improvements Back-end scalability improvement/ process implementation and Massive customer acquisition	10. What kind of improvements you considered as an urgently necessaire ones in the scale stage? -Was your improvement mostly depend on your actions or on actions of other stakeholders (competitors included) -What had to be improved in you process? (financial processes, marketing, administrative, sales, IT, legal). Why you couldn't do it earlier? -Is scale stage well-understandable or still uncertain for you? -What did you put at the forefront of your CA campaign? (learn from customers feedback, learn from SEO metrics, meet planned goals/numbers and so on)	LC, C, PA, M
			11. Growth Plan	11. What is your Growth Plan? Goal-oriented growth or means-oriented growth? Clear indicator/measure for future growth vs. extending use of the actual startup's means? -Have you planned your growth strategy based on what you can control or what and how far you can predict? -Have you cared about the mitigation activity for some threats that may happen? Or you prefer not to avoid any uncontrolled events? -If you has a new idea (Growth Hacking) would you tried to test it on a small scale with MVP or build a good fully-featured product?	M, LC, C, PA, AL

Legend for Table 14

M – means, AL – affordable loss, LC – leverage contingencies, PA – partnership and pre-commitment, C – control.

⁵ “A pivot is a substantive change to one or more of the 9 business model canvas components.”

3.5. Data analysis and coding

Thus, this study began with data analysis through the deductive method when “research question explores a known theory or phenomenon and tests if that theory is valid in a given circumstances” Snieder (2009, p. 16) and closely follows an investigation process suggested by (Mayring, 2000) as indicated in the Figure 6 below.

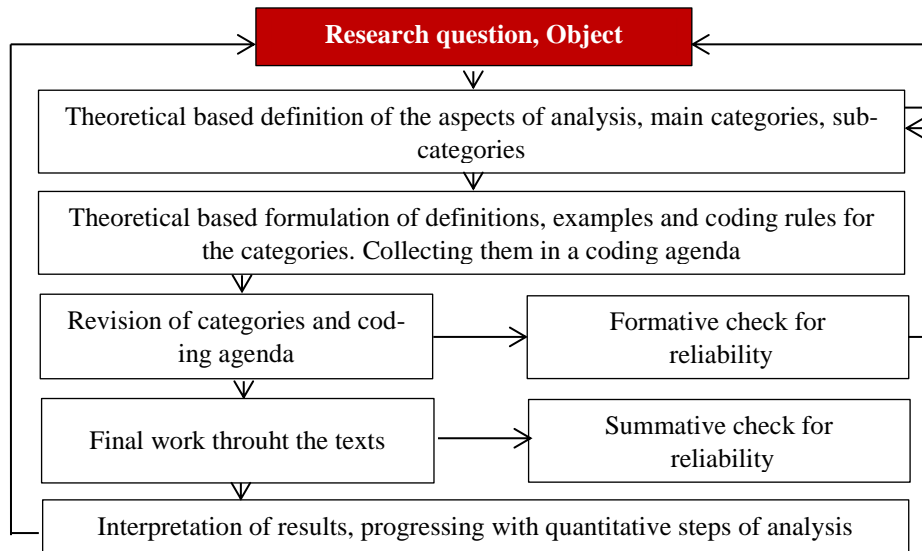


Figure 5 - Step model of deductive category application.

Source: Adapted from Mayring (2000)

Herewith, in the first step of the process all records with interviews were typed, and transcripts were organized using a table where interview’s questions were grouped according to their relative lifecycle stage. After, each question was examined for interrelations with each of the five effectuation principles: means, partnership, affordable loss, leverage contingencies and control. This means that each question might include maximum of 60 (12 startups * 5 principles) sub-cases to be scanned for the correspondence to effectual logic. This enabled identification of acceptance and adoption of each of the five effectuation principles, their influence to the business development and the founders’ perception of whether such influence had a positive or negative effect on the startup’s performance. Then, each sub-case was shortened to smaller fragments containing only respondent’s opinion to his/her own examples for particular principle, whether it had a positive or negative influence to the studied event.

In the second step, a coding agenda was developed including the formulation of definitions, examples and coding rules for the categories. In the end, five categories were constructed that correspond to the five effectuation principles. Within each category (or principle), five sub-categories were created corresponding to the degree of adoption of effectuation or causation approaches. Specifically, points 4 and 5 correspond to a heavy adoption of effectuation-based decision-making, with the factor of 5 corresponding to a total adoption of the principle and 4 to a high adoption of the principle. Points 1 and 2 correspond to a total and high adoption of the causation-based decision-making principles, respectively. Thus, the highest factor is assigned when the highest commitment to effectual logic is shown, and the lowest factor when the highest commitment to causal logic is shown. The example of coding for the ‘bird-in hand’/means principle presented in the Table 15 below. The other four principles were analogically structured using as definitions the main characteristics of corresponding principles. The example of the first-step results for the discovery stage and its first event – idea initiating is depicted in Appendix 3.

In the third step, the interpretation of results was progressing with quantitative elements of analysis. Based on that quantitative part (see Appendix 2) following results and findings were obtained. In order to answer the research goal, a cross-case analysis was performed to check for patterns of association between the factors embedded in the research questions and the startups preferences for one or the other logic or even for a combination of both.

The findings of the research are presented and discussed in the next chapter.

Table 15 - Coding agenda (example for 'Means' principle).

Categories	Definitions	Examples	Coding rules
C1 Totally effectuation based decision-making	All decisions taken during this stage/event highly correspond to the effectual reasoning as determined by the Effectuation Theory with regard to Means principle: 1. actions emerge from means and imagination; 2. stakeholder commitments and actions lead to specific sub-goals; 3. feedback from achievement /non-achievement of sub goals lead to design of major goals.	'We started company doing other things than sms, the traditional consultancy services. One of our client was a dental clinic and everything had been already done there, nothing to improve to be more efficient in telecommunication costs at except for the sms. And we decided to do sms service from scratch trying to see if we will be able to compete with the current offers' (16)	All three aspects of definitions have to point to 'high' influence and complete acceptance. Corresponds to respondent's 'Strongly applied' answer for relative question. (+++++) or factor of 5
C2 High effectuation based decision-making	The majority of decisions taken during this stage/event correspond to the effectual reasoning as determined by the Effectuation Theory (as written for C1)	'We don't have a magic vision that can help us to predict what are exactly customer needs but we understand market rules, what market potentially can offer, and how it will be developing during next few years. Our knowledge came from the US market where Cyber Security is booming. And we had some interactions with them to understand what are they going and why. And we took some ideas from there' (3)	All three aspects of definitions have to point to 'high' influence and complete acceptance. Equally corresponded to respondent's 'Applied to this case' (++++-) or factor of 4
C3 Preferably EEF d-m but CAU has its medium influence	More than half of decisions taken during this stage/event correspond to the effectual reasoning as determined by the Effectuation Theory (as written for C1)	The Musicverb is a merge of my competences and interests. As I worked a lot in music industry I understood how 'old-school' this industry is. I worked with softwares developed in earlies 90th that are not really match the current needs of music industry today (9)	All aspects have to point to 'medium or low' influence or some of them aren't applied to the case. Equally corresponded to respondent's 'Likely applied to this case and had a positive effect' (+++--) or factor of 3
C4 High Causation-based decision-making	All decisions taken during this stage/event highly correspond to the causal reasoning: 1. decision-making derived from goals; 2. the causal approach is to let goals determine sub-goals; 3. commitment to particular sub-goals determined by larger goal constrained by means; 4. goals determine actions, including individuals brought on board.	'The project with exact the same name as you know it was developed by me an another six senior managers - my MBA colleagues for just the entrepreneurship course. Later, I decided I what to start my business and I took that idea to create startup' (15)	All three aspects of definitions have to point to 'high' influence and complete acceptance. Corresponds to respondent's 'Strongly applied' for relative question. (++++-) or factor of 2
C5 Totally Causation-based decision-making	The majority of decisions taken during this stage/event correspond to the effectual reasoning as determined by the Effectuation Theory (as written for C4)	'Originally it was R&D project. We came up with idea in 2010, project - 2011. The idea started from process of our project management consultancy. We have a goal to build and sell new solution/ product while still continue provide service'. (6)	All three aspects of definitions have to point to 'high' influence and complete acceptance. Corresponds to respondent's 'Strongly applied' for relative question. (+----/-----) or factor of 1 or 0

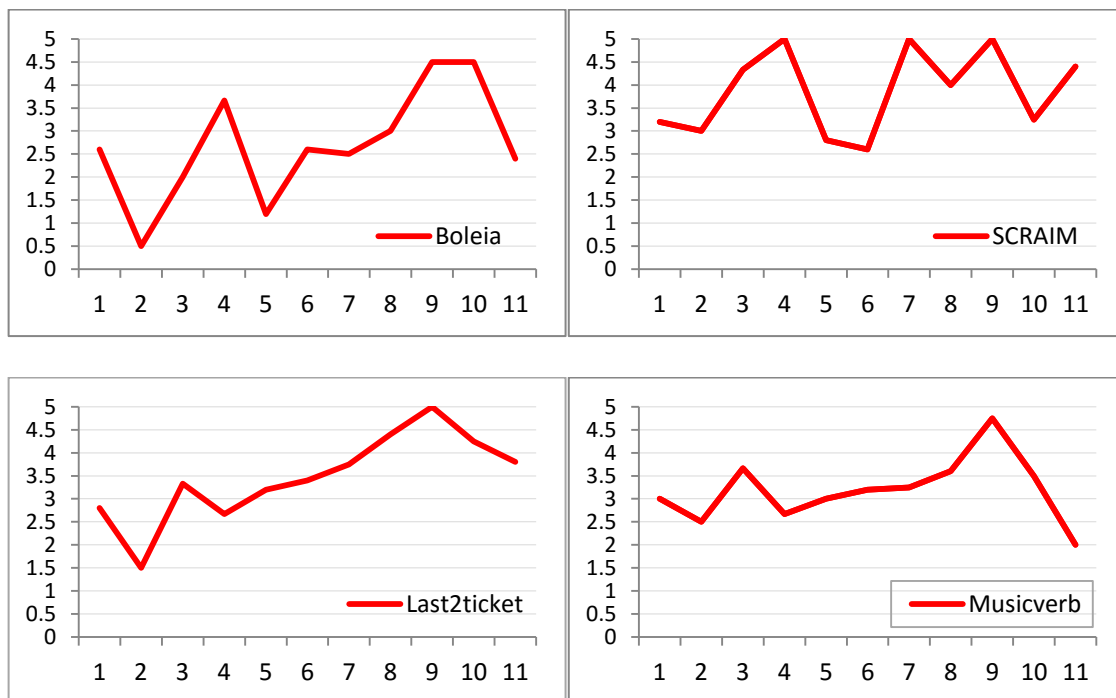
4. Findings and Discussion

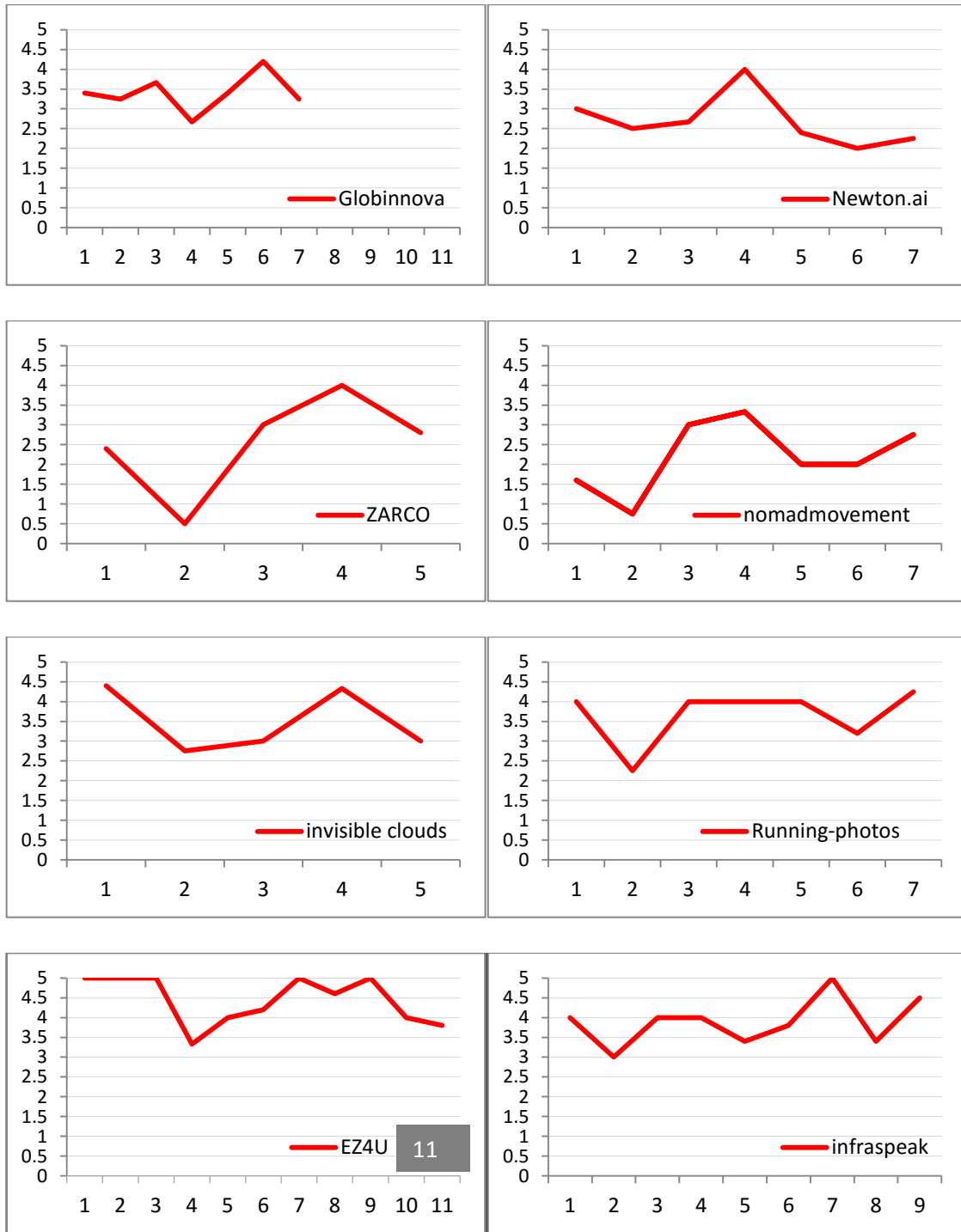
This chapter reflects on the main findings of the research in terms of its contributions to the theoretical model introduced before. Thus, it includes four sections 4.1- 4.4 organized around tables and figures that are sequenced to present key findings to four supportive research questions. The findings are placed in the context of earlier researches about the effectuation reasoning and are used to make some discussion on the key themes of entrepreneurial expertise, the market newness level, and the types of target markets in relation to the effectuation and causation way of thinking.

4.1. Stages of startup's lifecycle

When looking for each case individually where only one startup (11) showed a preference to effectuation slightly higher than to causation for all four stages and the majority of events (see Figure 6). But even this case does not completely deny causal logic as a logic for decision-making processes in new venture. Herewith, it can be proposed that startups are not exclusively dependent on effectuation as Sarasvathy assumed.

Figure 6 - The relative frequency of the use of both logics per case.





Moreover, our findings do not find any evidence among cases showing that effectual logic's power can be decreased with the time when startup is getting matured. Oppositely, it was found that the effectual logic is highly favorable during the efficiency stage (86%) and continues to be relatively high (72%) in the scale stage. What is truly interesting is that during the first stages of startup lifecycle entrepreneurs do not rely on the effectual way of thinking as much as during the final stages. Our results showed only 63% and 67% for discovery and val-

idation stage, respectively. These percentages are obviously higher than the 50% but still the difference is not as significant to argue that effectuation totally prevails when startups only begin their development.

Taking a closer look, and since the main aim of this study is not just examine an entrepreneur's general preferences for the effectuation and causation but to decompose these preferences in accordance with four stages of startup development, this section turns to the discussion of findings in the context of each stage separately. Figure 7 below displays the percentage of effectuation and causation logic adapted to particular startup' lifecycle stage calculated over all twelve cases.

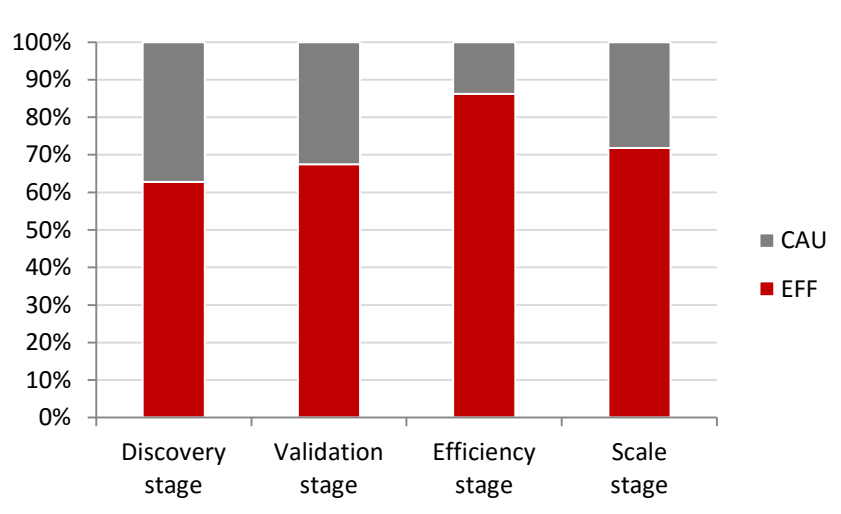


Figure 7 - Importance of effectuation and causation reasoning with regard to the startup stages average for all cases.

While the Figure 8 shows a dynamic how preferences to one or another decision-making logic have changed over the eleven events aligned with startup's stages (cf. Table 14).

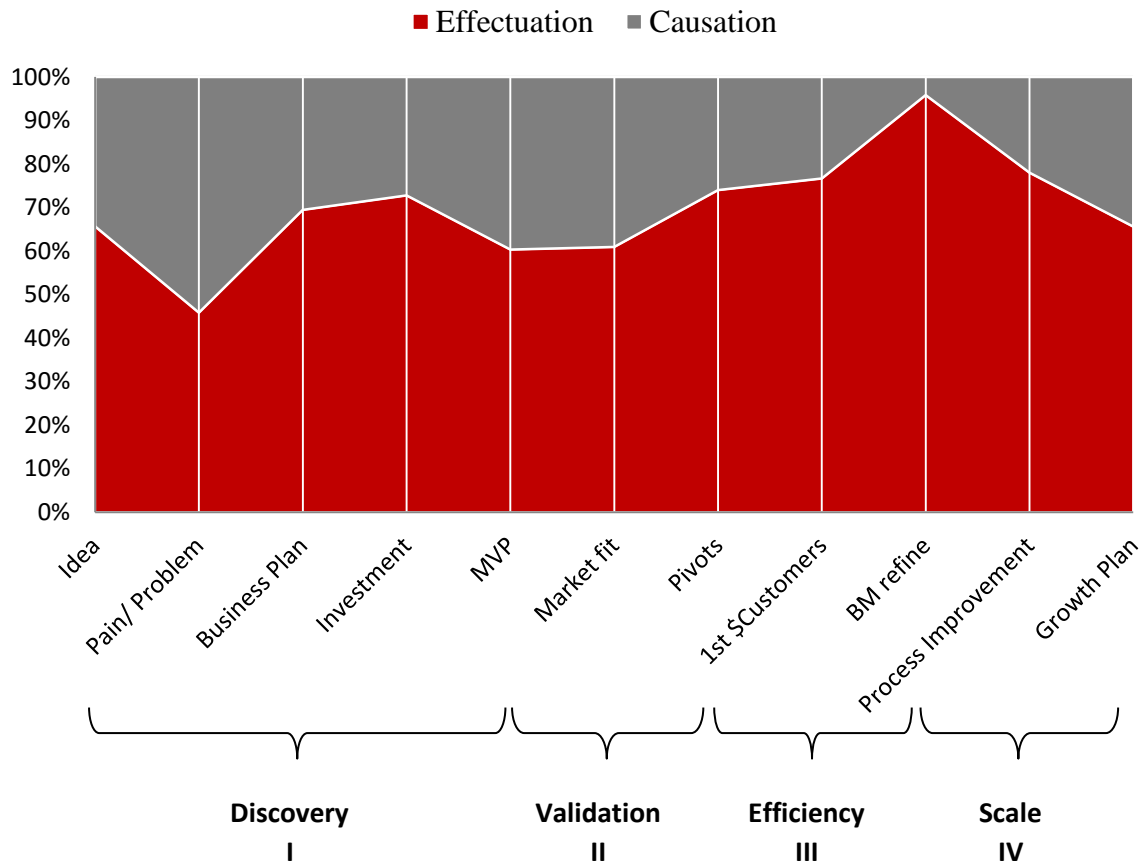


Figure 8 - Effectuation and causation reasoning and the events of startup lifecycle.

Figures 7 and 8 show that neither effectuation nor causation decision-making logic can be called a foundational or exceptional logic. This empirical study gives evidence that decision-making processes in startup are complex and multidimensional, and do not necessary follow only one particular way of reasoning throughout the whole lifecycle. It can be argued that startup is much more heterogeneous as a single artifact that had been suggested by Sarasvathy. Its four stages and related events frequently imply different challenges and, therefore, the way of thinking also can vary depending on the stage. Nevertheless, it is clearly seen that entrepreneurs prefer to use hybrid reasoning instead of permanently stressing only causal or effectual logic.

Our results seem surprising. It was not expected to find that discovery stage, the one with the highest level of uncertainty can show low percentage towards effectuation. Does it mean that effectuation theory not tilt against uncertainty in real business context? Or maybe just entrepreneurs do not consider initial stage to be as ambiguous and puzzling as is commonly believed? Let us show what answers we found to these questions.

4.1.1. Discovery and Validation stage and types of startups

First, what we found important for influencing the choice of a decision-making logic is not even the level of uncertainty itself that startups face when entering the game but it is the fact that there are some types of startups to whom the uncertainty level is assessed differently depending on several determinants.

With our sample of IT startup, it was defined 3 groups of startups: ‘on thin ice’ startups, ‘safe’ startups and ‘progressing’ startups (see Table 16, cf. Table 17)

Table 16 - Startup’s typology.

	‘On thin ice’ startups	‘Progressing’ startups	‘Safe’ startups
Demand uncertainty	high	low	medium
Market uncertainty	high - medium	low - medium	low - medium
Market type	B2B2C (and B2C)	predominantly B2B	any
Investment dependence	usually require big financing since the very beginning	medium to low investment dependence	low investment dependence
Time to ‘Go LIVE’	Often set by investors or limited by financials	Often set by partners and determined by their needs	Only depends on ENT’s decisions
Dependence on the partners involvement into startups decisions	relatively high	high	any
Preferable decision-making logic in the discovery stage	preferably causation	both	preferably effectuation

Source: Author

First group of startups was called ‘*on thin ice*’ startups because they are highly dependent on many factors which are often hard to predict and impossible to control. These startups belong to the Internet startups type (quite often a platform or B2B2C but not necessarily). First, they are heavily dependent on the number of users that will be interested in the solutions offered by a startup (startups: 1, 2, 7, 8, and 10). All founders of these startups highlighted that even before the real business creation, or any MVP testing they had to find what is their market potential and check using elementary techniques (for example, break-even point) how many customers/users do they need to have at least to pay off their costs. Even for startups that operate in new markets (7,8) it was necessary to understand if it is worth to become a business

for the region they wanted or with the customer group they pre-selected. Second, these startups, to some extent, are not quickly transformative (even if it is necessary they cannot instantly change their business model) due to their responsibilities to partners or other potentially involved stakeholders (from the B2B side). That is why it is essential for them to understand the market potential even before they could define their competitive advantages and key features and, actually, take a decision to open a startup. Coincidentally, all these startups appeared to be goal-focused in the first 3 events. This means that they had a certain goals about how they see their startup development since the beginning. Since these startups sometimes required a quite big investment in the initial stages, they are likely to attract venture investors, therefore, they are often asked for the business plan, growth estimations, and business scalability. To deal with all issues mentioned above these startups definitely appeal to the causal reasoning that suggest estimating a market size, examining competitors, studying potential customers, and predicting customers' interest to the possible future solution.

Second group is the 'progressing' startups. They are called 'progressing' because they developed their idea as a consequence of precedent event and, thus either have a strong support from their network/partners from another activity (3,9) or might already have agreement with potential first customers (4,11). All these startups are B2B. They have lower demand uncertainty level while the output of their activities is, most of the times, under their control because of the close relationship with potential partners, customers, even competitors (3) and other stakeholders. These startups tend to start much more effectually than 'on thin ice' ones. They are not burdened by any predictions; they can enjoy the decision-making 'in progress', to act safely by focusing on activities within their control and desired outcomes.

Third group is the 'safe' startups (5, 6, and 12). The main characteristic of this group is that they were not created driving by the purpose of becoming an entrepreneur's cash cow projects. They completely began with the entrepreneur's means and personal interests. Moreover, these startups did not have certain time constraints such as, for example, the date when MVP has to be launched or first paying customers have to be acquired. The entrepreneurs of this startup type usually have other parallel projects, which they can use to sponsor their new passion. But it also might be a first startup. In the IT area, such startups can be often developed from the university's projects or co-working conferences. Usually, in the beginning entrepreneurs do not even know how to monetize their project; they try many business models and test ground piece by piece. This type of startups is characterized as well by the low dependence from any pre-selected stakeholders. They definitely can benefit from the interactions

with potential partners on their earlier stages but they do not actively looking for them. These startups are almost the ideal type for effectuation reasoning. The entrepreneurs can experiment to the extent they can afford these experiments to be financed. They are not strongly tied with their partners because they do not pursue just commercial-exchange interactions. They almost entirely rely on transformative strategy and do not have any long-term plans.

These startups' types are defined entirely based on the primary data obtained from the interviews. Such startup's categorization helped us to understand what are the factors that actually influence the choice for causation or effectuation way of thinking. As seen from the description, uncertainty level is not the only factor influences the choice of entrepreneurs, and rather the context, market type's rules and entrepreneur's initial motives play much higher influence on the adopted combination of effectual and causal reasoning. Table 17 presents the percentage of the adoption of effectual and causal reasoning with regards to introduced above startup's typology.

Table 17 – Adoption of causation and effectuation and startup's typology.

	N	Startup's Name	Average Factor (Discovery stage)	EFF	CAU
On thin ice	1	Boleia	1.99	40%	60%
	8	Nomadmovement	2.34	47%	53%
	7	ZARCO	2.66	53%	47%
	2	Newton.ai	2.68	54%	46%
	10	Last2ticket	2.70	54%	46%
Processing	3	Globinnova	3.03	61%	39%
	9	Invisible clouds	3.28	66%	34%
	4	SCRAIM	3.57	71%	29%
	11	EZ4U	4.47	89%	11%
Safe	6	Musicverb	3.35	67%	33%
	5	Infraspeak	3.68	74%	26%
	12	Running-photos	3.87	77%	23%

To conclude, Sarasvathy's hypothesis (Sarasvathy & Kotha, 2001) about predominant usage of effectuation logic is not fairly applied to the all types of startups. In the situation where startups are heavily dependent from investment flows, many decisions are encouraged by the venture investors who traditionally used to behave through causal thinking. They got used to

compare startups from their NPV, requested return, market potential and customer future coverage. Due to this reason they asked the entrepreneurs all those plans and clear explanations of what are their short and long-term goals of the startup.

Additionally, if the startups operate on the B2B2C market they perceived to be less adaptive and not favorable to any rapid changes regarding their business model. The reason is simple; changing one element in B2B side frequently involves adaptation in B2C side and vice versa. In this matter, the entrepreneurs cannot just rely on the commitment from one part (B2B). They have carefully study if their solution can add value to both parts unless they want to lose the trust and pre-commitment from B2B with zero response and interest from B2C. These startups cannot exclusively use effectuation logic because it is too risky for their business to avoid careful estimation of what their target segments (market study), and their value proposition and competitive advantage (competitive analysis). However, there is the one type of startups that definitely benefits from the effectuation logic – ‘safe’ startups. They are not required intensive financing in the beginning; they do not have a time pressure to became a well-paid businesses; they are not even a businesses as we used to think about a ‘business’ notion – they are born from the passion activity that would be transformed to the business accidentally.

4.1.2 The stages of lifecycle and the effectual principles’ influence level

Due to the fact that Discovery and Validation stages consist of higher number of events, it was possible to conduct a deep examination of the context and environment where startups operated, trace some patterns in the relationship between entrepreneurs and stakeholders, and finally group startups into three types that provide explanation why some startups are more favorable to effectuation logic and other less. For the Efficiency and Scale stages, our analysis is mainly based on the interpretation of the effectual principle influence on the certain events in these stages, which are also discussed in relation to the Discovery and Validation stages.

- *'Means' principle*

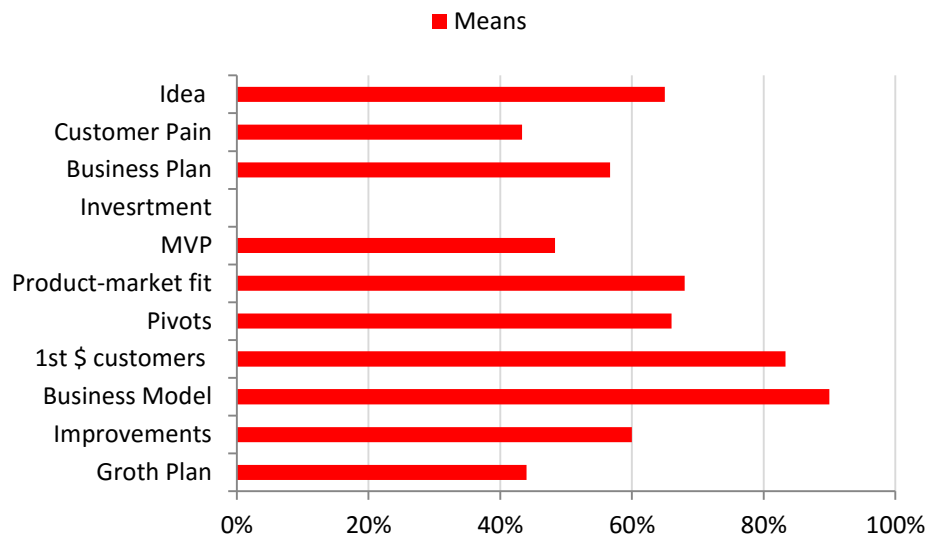


Figure 9 - Distribution of the 'means' principle per event.

Concerning means-vs.-goals principle, it was found that the efficiency stage is the one with exceedingly high recognition for effectual 'bird-in-hand' concept corresponding to 90% and 83% for business model correction event and attracting first paying customers period respectively.

Overall, it might be resumed that constant investigation of daily changeable startup's capabilities, values and networks perceived is an essential activity to understand how business should grow. For example, processes of business model refining are derived from continuous and repetitive learning from customers and partners feedback. These processes of learning imply that every participant involved in an interrelationship with startups might bring new inputs that from different angles could lead to new opportunities, challenges and improvements. So, constant analysis of rapidly changed inputs and, consequently, startup's means can lead to fortunate discoveries not just by accident but through manageable process of learning and means principle crafting. In short, the nature of business model refining processes favors the constant checkup of means activation. In rough terms, it might even be said that some of the processes of business model changes overlap with the processes of means examining.

Regarding the phase of first customer acquiring, founders emphasize that the majority of their first customers are seen and, in most of the cases, act as their partners demonstrating high level of commitment (as even referred to the entrepreneurs 'they bet on us' by (1, 2, 3, 5, 6, 11) and desire for mutual upgrading or improvement. From such positions customers-partners

are anticipated as potential network influencers, which persuade startups to monitor their means even more often with deeper expertise.

On the other hand, more goal-oriented phases belong to exploring and validating customer pain – with only 43% for effectual concept, MVP creation - 48%, and growth plan - 54%. These events correspond to two different startup stages: discovery and scale but have one thing in-common – they might relatively easy explain what should be the result from activities during these phases.

For example, regarding discovering the customer pain, the result should be crystal clear on whether or not the pain exists for a specific target customer group. In this context, the entrepreneur can define potential customer segments to which he wants to address a solution, chose distribution channels to translate benefits from his possible solution to customer, and finally decide on how the feedback from customers will be structured and analyzed. Such processes logically seem to be managed easier when they organize through a goal-tree perspective when the top level is the result (yes or no) entrepreneur is looking for.

Analogically, the first MVP is created with the purpose of getting customer feedback whether or not solution solves customer pain. The final result of this phase should be right/wrong functionality of the first MVP. The entrepreneur can also set some estimates, rules or conditions regarding how to interpret obtaining results. For example, startup (1) set the minimum number of leads for the first month after the launch, (4) established the rate of acceptable numbers of bugs and number of features to avoid slow services downloads, (10) accomplishing first request for ticket managing without system fall.

Nine founders (1, 2, 3, 4, 7, 8, 9, 10, and 11) agree that goal stated method helped them to speed up the process of launching MVP while result-oriented vision assists to minimize dispersed and unfocused activities during this stage. The key focus on speed and result suggests using the traditional causal decision-making.

The same apply to the scale stage. If startups have already found their position on the market, they tend to set more defined goals and narrow their scope to strengthen market position and enhance the trust and credibility of their stakeholders. These activities can be based on controlled projections that suggest using causal planning rather effectual transformation.

- *'Affordable loss' principle*

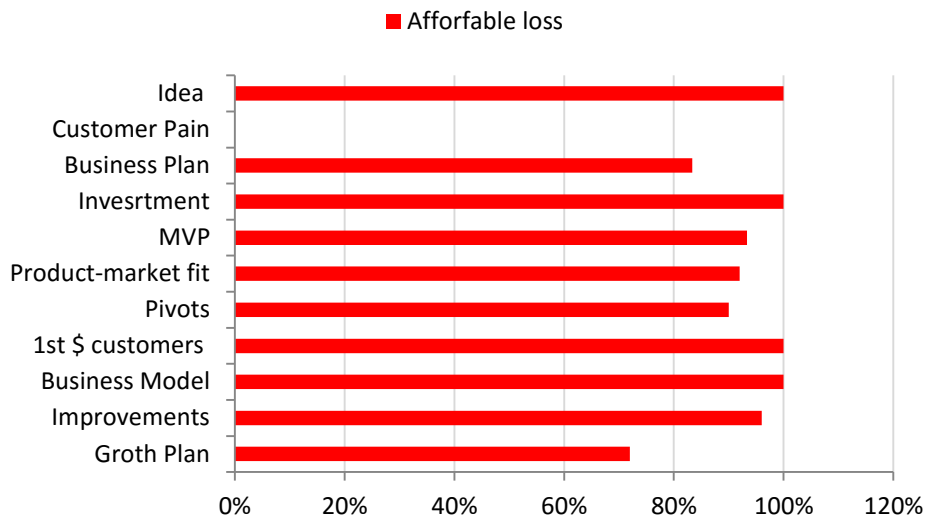


Figure 10 - Distribution of the 'affordable loss' principle per event.

The affordable loss principle showed the highest possible influence level in the majority of the events. This principle is the only one that can be definitely perceived as a contrast concept to the causal reasoning with requested returns. In the majority of the cases, startups either used affordable loss or requested return as mutually exclusive ones. And this fact can be explained by the number of decisions taken on each of the studied events. It usually equals to the one decision-case where startups do not have any alternative decision-cases to compare their choice with. Plus, one of the barriers to adopting the causal logic that implies any calculation similar to the requested return is the uncertainty level. To conduct a robust calculation startups have to estimate future sales and possible risk that constitute a cost of capital. However, these estimations unlikely provide a reasonable and trustful result due to the information that they were based on is rarely reliable itself if the market uncertainty is high. To calculate affordable losses an entrepreneur only has to know his/her current financial conditions and readiness to face the worst-case scenario. As seen from our analysis all of the entrepreneurs relied on the 'simpler' option to take financial decisions while ignoring any massive calculations. Nevertheless, it is seen that there is small shift in the growth-plan event. This happens because during this event and, particularly, at the scale stage, startups are beginning to offer new ideas of their future development and entrepreneurs finally get the different options to invest money in. Together with the decreasing level of uncertainty, entrepreneurs put their focus and more often on maximizing returns by selecting optimal strategies.

- *'Control' principle*

The level of acceptance of the control-based strategies is relatively consistent throughout the startup lifecycle and stays as 70% in average. However, the idea-initiating event equally values control-based and predictive-based strategies, while the business model refining event values to the greatest possible extent a control-based strategies. This may be due to the lack of needs to predict market reaction when a startup is already managing its improvements and changes based on priory gathered market information or/and earlier predictions.

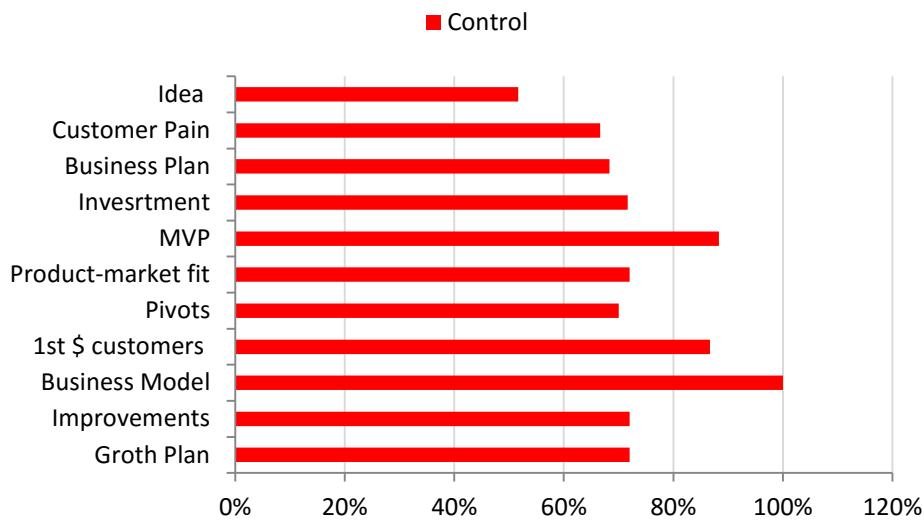


Figure 11 - Distribution of the 'control' principle per event.

We also did not find support for another Sarasvathy's assumption that startups in the beginning of their lifecycle should rely on the elements under their control more than during the latest stage.

First, we did not find that the preference to effectual reasoning is significantly different in the beginning of the lifecycle compare to the latest stage. The effectuation influence is reasonably similar throughout the lifecycle and equals 70% that might support the fact that all startups prefer control-based strategy over prediction and collection of the market information.

However, there are some events, where startups opt for prediction more than in average, such as idea initiating (52%), or do not value the accurate predictions at all, such as the business model reframing (100%). Which triggers drive entrepreneurs to rely on the market information in the discovery stage was already discussed in the previous section. It might be added here, that startups in their very initial stage start with the defining future event spaces but, at

the same time, position the firm for quick responses to uncertain and unpredictable events as they emerge.

But why during the event of the business model reconstruction none of the startups used any causal methods. The answer can lay in the nature of the considered event. First, of all business model changes are dominantly associated with the startup's means (See Diagram 6). 'Doing what you know' is the main driving force for practicing control-based strategies that seems to be enough to apply for the changes of business models. Startups no longer need to study the market and its participants to get the information of 'knowing what to do', they are already have the number of insights, feedbacks, requirements and suggestions inherited from the validation stage. It is time to act now and experiment with this information according to the startup's current means, resources, and disposable investments.

- *'Partnership and pre-commitment' principle*



Figure 12 Distribution of the 'partnership' principle per event.

Partnership principle is highly relevant for the idea initiating event, and then it decreases its importance for the rest of events in discovery and validation, while staying stable at the average percentage of 80% for efficiency and scale stage.

- *'Leverage contingencies' principle*

The leverage contingencies principle is likely to occur in the idea initiating and growth plan events that are perceived by entrepreneurs as highly uncertain periods. In the idea initiating, uncertainty is related to the entry into the market; in the growth plan, uncertainty is related to the aggressive sales and competitors' and startup's stakeholders (here, providers and suppliers) reaction to the new startup's strategy.

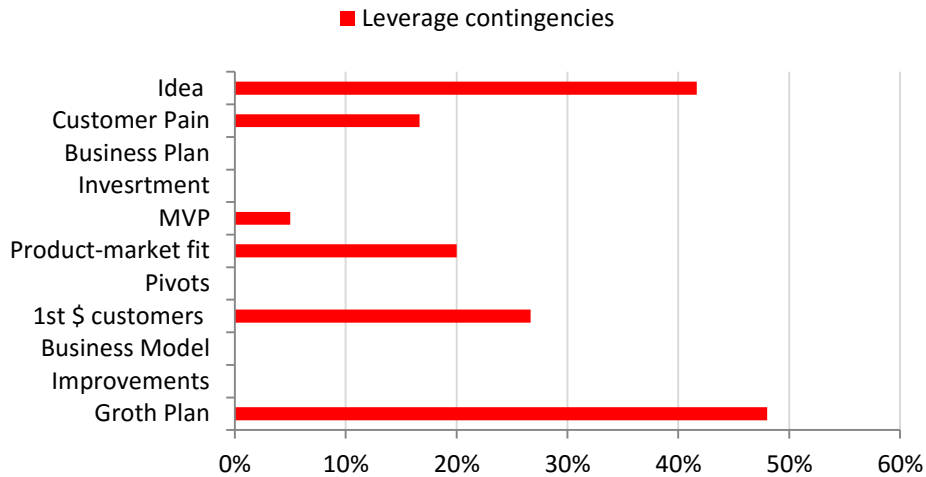


Figure 13 - Distribution of the 'leverage contingencies' principle per event.

The leverage contingencies principle is likely to occur in the idea initiating and growth plan events that are perceived by entrepreneurs as highly uncertain periods. In the idea initiating, uncertainty is related to the entry into the market; in the growth plan, uncertainty is related to the aggressive sales and competitors' and startup's stakeholders (here, providers and suppliers) reaction to the new startup's strategy.

- *Sum up of lifecycle analysis*

To sum up all the findings regarding the effectuation and startup's lifecycle stages, we designed Table 18 that reflects the results of the first supportive research question 'Are there any stages of startup's lifecycle when crafting/executing strategy with emergent approach is perceived as more useful than the planned approach?'

Table 18 - Importance of effectuation and causation reasoning and events of startup lifecycle.

Principle	Idea	Pain/Problem	Business Plan	Investment	MVP	Market fit	Pivots	1st \$ Customers	BM Refine	Process Improvement	Growth Plan	Entire lifecycle
M	65%	43%	57%	-	48%	68%	66%	83%	90%	60%	44%	62%
LC	42%	17%	-	-	5%	20%	-	27%	-	-	48%	26%
AL	100%	-	83%	100%	93%	92%	90%	100%	100%	96%	72%	93%
PA	70%	57%	-	47%	67%	58%	70%	87%	93%	84%	92%	72%
C	52%	67%	68%	72%	88%	67%	70%	87%	100%	72%	72%	74%
EFF	66%	46%	69%	73%	60%	61%	74%	77%	96%	78%	66%	70%

To display the results in this table, we used a three-color scale, where red represents the effectual reasoning’s considerable advantage (adoption) over causal reasoning; dark grey represents the predominant use of causal thinking over effectuation; light grey depicts the equal importance of effectuation and causation in entrepreneurial decision-making.

Herewith, an event that favors effectual logic the most was found to be a business model refining gained averagely 96% of influence on entrepreneurial decision-making. Other events that also showed relatively high preference to effectuation are adjacent event paying customers acquisition (77%) that also belong to the efficiency stage and event from the scale stage – process improvement (78%). On the other hand, the discovery stage and its corresponding events showed fewer influence of effectual thinking with the smallest influence of 66% for idea initiating event. Interestingly, 66% also refers to the growth plan event in the scale stage suggesting that preference to effectuation logic changes wavelike with the smallest level on the edges and highest in the efficiency stage.

Regarding to effectuation principles, the ‘affordable loss’ principle (93%) showed the highest influence throughout the whole period of lifecycle. The partnership and control principle also gained relatively high results with 72% and 74%, respectively, while leveraging contingencies is only relevant for particular events, therefore, holds the fewest influence of 26%

4.2. Entrepreneurial expertise

The cross-cases findings were gathered from the analysis of data over all twelve cases and their intersections. Taking into account the diversity of our sample (see Table 12), there is a possibility to compare mutual variables between the present study and prior effectuation studies with regards to following levels of analysis: entrepreneur’s expertise, new market creation, new product creation and type of market. Table 19 summarizes the findings concerning the level of expertise of entrepreneurs. The other dimensions will be discussed in the following sections.

Table 19 - Importance of effectuation and causation reasoning and entrepreneurial expertise.

Level of analysis	Independent variables	Number of startups	Entire Lifecycle	Discovery	Validation	Efficiency	Scale
ENT expertise	Novice ENT	6/12	73%	60%	70%	92%	85%
	Expert ENT	6/12	68%	63%	56%	89%	72%

As seen from the Table 19, four levels of analysis and nine independent variables were considered. The ‘Entire lifecycle’ column displays the percentage of number of entrepreneurs using preferably effectual reasoning during the all lifecycle. It has been calculated through following steps:

1. The startups satisfying the condition of the certain independent variable were selected such as, for instant, 6 startups founded by novice entrepreneurs.
2. Among selected startups only these had been shortlisted whose average percentage of preference to effectuation reasoning were more than 50%. This means that for every event we counted the number of startups (1) who were evaluated with factors of 5, 4 and 3 according to the coding agenda per each effectuation principle.
3. In the final step, we found the average percentage of the counted number of startups (3) for event that allowed us, consequently, calculate for the entire lifecycle.

The example of calculation for the startups who entered the market with a new product (in this case all 12 startups) is illustrated in the Appendix 4.

Coming back to the analysis and comparison, findings suggested by Dew et al. (2009) with regards to novice and expert entrepreneurs’ decision-making logic display that expert entrepreneurs tend to use effectual reasoning more frequently than novice, in particular, “over 63% of the expert entrepreneurs used effectuation more than 75% of the time. 78% of the MBA students (refer to novice) did not use effectuation at all” Dew et al. (2009, p. 289). Our findings indicate that 73% of experts act effectively more than 80% of the time (throughout the whole lifecycle period) while difference with novice entrepreneurs is not significant with 68% of entrepreneurs adopting effectual mindset.

Even though, there is a quite notable difference between novice entrepreneurs’ decision-making preferences for Dew et al. and this study. This might be explained by several reasons. First, the distinction in sample plays an important role. For example, for Dew et al.’s study MBA students were chosen as the novice sample while, for the present study, those entrepreneurs whose startups considered being their real entrepreneurial experience were coded as novice.

Therefore, MBA students, as was stressed by Sarasvathy and Dew, did not have an entrepreneurial experience, however, they do have a strong business knowledge and “primary experience in managerial roles in large and complex organizations” (Dew et al., 2009, p. 301). This fact, can suggest that Dew et al.’s novel sample has initially a strong predisposition to causal

thinking even when tackle entrepreneurial problem solving and decision-making (especially experimental problems and not the real ones). Moreover, there is no evidence that these students would ever create their first startup and, if they do, there is questionable that they will behave the same as for this experiment where no stress-, time-, resource-factors were considered. Especially, the lack of the real-context characteristics for ‘control’ and ‘partnership’ principles will likely have no demonstration of effectual thinking in any decision-event considered in the research.

In contrast, this sample imply some novice entrepreneurs with no business background (4 out of 6), or both tech and business education (2 out of 6). Thus, it seems to be less causal-dependent while fairly more appealing to the ‘real life example’ of novice entrepreneurs.

Second reason, the logic of data analysis and calculation is obviously different. For Dew et al.’s study, each separate decision taken by entrepreneurs under this experiment was coded either as effectual or causal one. Then, in the end it was found how often entrepreneurs used either one or another way of thinking. For this study, during the coding agenda step, and then coding process itself it was found that each single event (out of 11 possible) might and, in the majority of the cases, implies decision-making process affected by two reasoning simultaneously in various proportion. And this is, particularly due to the different level of influence from each effectual principle (or causal) principle for the single event. This again raises the question what should be accepted as a decision taken under effectual reasoning, only one decision-event satisfying with one principle as in Dew et al.’s or complex investigation of the event (sometimes with more than one decision-event) corresponding to all five principles to some extent.

As for example, for the identifying customers’ pain event, entrepreneur can conduct a survey (one-event – causal logic) or can already have an insight about customer pain coming with his expertise in any relative to the business fields (first event – effectual logic - means), insight from pre-selected stakeholders (second event – effectual logic - partnership), make an experiment to test the first ground (third event – causal logic – field analysis) or even face some contingencies that facilitate in customer pain recognition (forth event – effectual logic).

In this vein, mentioned before 73% and 68% were calculated as the percentage of number of novice entrepreneurs whose decisions for each sub-case (principle by event) were identified as the ones with the highest influence of effectual reasoning – factor of 5 (100%) and 4 (80%), meaning that entrepreneurs either entirely relied on effectual principles or used them

in composition of 80% by 20% (causation) proportion. Thus, it was assumed that such proportions might be considered as interchangeable with the time scope. So, when the effectual aspect corresponds to 80%, it means that for particular sub-case entrepreneur dedicated 80% of his time to effectual logic and 20% to causal. The tables with calculations are presented in Appendix 5-6.

Table 20 - Importance of an effectual reasoning, level of entrepreneurial expertise and lifecycle stage.

	Novice ENT		Expert ENT	
	more than 60% of the time	more than 80%	more than 60% the time	more than 80%
Entire lifecycle	73%	59%	68%	57%
Discovery	60%	48%	63%	51%
Validation	70%	56%	58%	50%
Efficiency	98%	78%	89%	83%
Scale	85%	67%	72%	50%

Coming back to the results, Table 20 suggests that the perceived important does not vary significantly between novice and experts, and these variations might be neglected. However, we found some patterns for novice entrepreneurs. They tend to rely a lot on their means and, furthermore, they rely highly on their self-confidence that, sometimes, leads to bypass causal dimensions, such as market analysis, competitor’s investigations or structured experimentations. Expert entrepreneurs demonstrate their precaution to particular situations perceived to be potentially risky (as it was with their previous startups) and thus, they address more causal reasoning based on consistent market study and near-future prediction rather than novice who might simply do not know when and where to look for pitfalls. However, to check this suggestion, a larger sample is required. Since, this was not the aim of this research further discussion will not be provided. Even though, it is essential to mention that this finding was found while examining not a single decision but a dynamic process affected by five effectual principles throughout startup lifecycle.

4.3. Market newness

Similarly, it was found no significant difference between new market and existent market in the matter of effectuation logic preference, as depicted in Table 21.

Table 21 - Importance of an effectual reasoning and market newness.

Level of analysis	Independent variables	Number of startups	Entire Lifecycle	Stages			
				Discovery	Validation	Efficiency	Scale
New markets	Existent Market	9/12	74%	66%	69%	91%	80%
	New Market	3/12	47%	48%	53%	-	-
New product	Startups EFF-preferable	12	68%	62%	54%	91%	72%
	Startups EFF – absolute (C1)	12	42%	41%	33%	81%	28%

In our sample, 9 cases pertain existing market and 3 cases new markets. It was not possible to obtain results for the all four stages since considered startups that involved in new market creation passed only two stages (discovery and validation). Thus, analysis was performed only for these particular stages. Nevertheless, it was found that 68% and 51% of entrepreneurs used effectual reasoning for the decisions regarding existent and new market creation respectively. Despite of the difference by 17%, it is not significant variation for this sample to argue that causation logic is used preferably while creating a new market. There are a several assumptions why such percentages were obtained.

First, all three cases for ‘new market’ variation happened to be referred to B2C that might shift the results to the causal side. Moreover, two out of three cases refers to startups with expert entrepreneurs, which showed patterns in favor of causal reasoning. On the other hand, cases for ‘existent market’ show higher preference to effectuation due to some context factors (or market characteristics). For example, since the uncertainty level is lower in an existent markets, the degree to which entrepreneur controls his activities or part of the business environment is definitely higher; at least, because entrepreneurs already know how the competitors will react not necessary based on predictions, but rather because of the interdependent nature of their relationship, same applies to partners, provides, suppliers. Plus, stakeholders’ commitment is easier to achieve under conditions of existing markets, and this simply because the business society has already formed, potential partners and other stakeholders are easier to be found and targeted. Moreover, stakeholders are naturally and faster getting in-

volved into new mutual businesses within the same existent market due to, again, wider range of ‘control’ factors.

In this matter, Dew et al. (2009) provided an analysis of the correlation between new market creation and entrepreneurial expertise. They found evidence that expert entrepreneurs that follow transformative strategies produce a larger number of new market ideas than novice, who adopts causal search and selection processes to find a spot for new market. They also interpret it from the position of entrepreneur’s stakeholder relationships. These authors state that “the experts were significantly more likely than novices to suggest building a market for venturing by stitching together a network of stakeholder partnerships” (Dew et al., 2009, p. 305).

Even though, we did not study a correlation between new market creation and entrepreneurial expertise, we could find the evidence that the level of market newness e marker is crucial for the entrepreneur– stakeholder relationships and, thus existent market can benefit more from the effectual reasoning in control and pre-commitment dimensions than new market. Therefore, the transformative strategy suggested by Wiltbank et al. (2006) which is linked to the effectual reasoning (it aims to transform current means into co-created goals with others who commit to building a possible future) is seen quite often to be adopted by entrepreneurs who operate on existent markets.

4.4. Types of target markets

This section provides some understanding for effectual thinking in accordance to three different types of market: B2B, B2C and B2B2C or platform type. B2B2C platforms are commonly used in internet startups and combine both B2B and B2C business models. They are designed to develop mutually beneficial service and product delivery channels: for improving the lives of the consumers (B2C); and serving and facilitating the growth of the enterprises (B2B). Therefore, they always have to define a mirroring value proposition for B2C and B2B customers while managing separate distribution channels, revenue and costs flows, and strategic partners related to one or another type of customers. That is why B2B2C startups include both B2B and B2C characteristics and, thus become particularly interesting to be analyzed for this study. The overall findings on this dimension are displays in Table 22.

Table 22 - Importance of effectual reasoning, target markets and lifecycle stages.

Level of analysis	Independent variables	Number of startups	Stages				
			Entire Lifecycle	Discovery	Validation	Efficiency	Scale
Type of Market	B2B2C	4/12	66%	56%	63%	89%	74%
	B2B	5/12	83%	78%	80%	93%	89%
	B2C	3/12	51%	54%	55%	-	-

The findings for B2C and B2B2C did not show a significant preference to one or another logic, 66% and 51% of effectuation adoption, respectively. For B2B cases, however, it was found that 83% of the time entrepreneurs make decisions stressing processes suggested by effectual mindset, while only 17% of the time they rely on causal methods and procedures. The same logic and proportions keep for the results in accordance to lifecycle stages.

To understand what are the determinants that encourage B2B startups to adopt effectual decision-making to a higher degree than B2C or B2B2C startups we decompose the analysis according to the effectuation principles, as represented in Figure 14. Another aspect that may help us understand why entrepreneurs who operate in B2B market emphasize

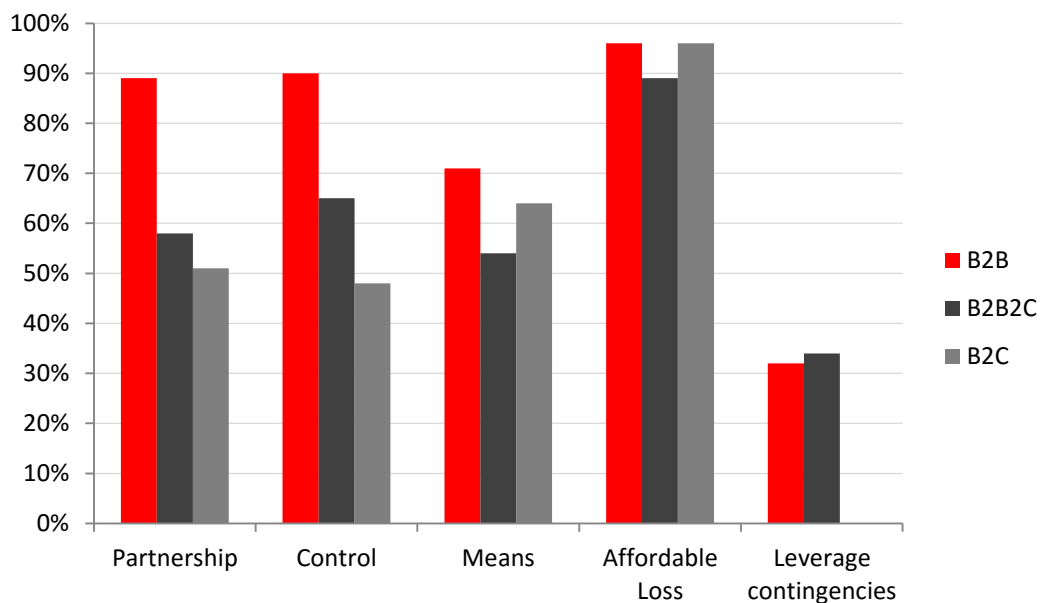


Figure 14 - Effectual reasoning decomposed by effectuation principles with regards to target market.

Figure 14 clearly shows the difference between B2B and B2C markets in their relationship to both partnership/pre-commitment and control aspects of effectuation. Here, 89% over against 51% in partnership; 90% in contrast with 48% in control principle for B2B and B2C market, respectively. Once again, we do a close-up of the market context.

It is not a secret that B2B and B2C markets often hold different views with respect to marketing, communication, sales and other strategies dealing with customer base. Some of the distinctions are determined by nature of demand (derived vs. direct), number of customers, volume per customers and lead to a different level of proximity and time-lasting of startup-customer relationship on B2B and B2C markets (Kotler & Pfoertsch, 2006). Thus, in B2B arena, the companies try to build a closer relationship with their customers using one-to-one approach. Every customer is a distinct entity, who most likely needs products and solutions adjusted to its business. Even if it is a unique transaction or a strategic partnership, the actual deal closes only if the customer obtains competitive advantages in concordance with his business goals. In B2B markets, the number of customers is, by norm, smaller. Additionally, especially in the beginning of startup lifecycle, trustful and close relationships with potential customers are important for entrepreneurs from the first word. Such close relationship initially assumes flexible and adaptive approach to the working process mostly from the entrepreneur side (Pels, Gummeson, & Polese, 2009; Vargo & Lusch, 2011). Frequently, even if an entrepreneur has a defined idea of what his business about, when he faces the business reality and first customers' requests he might see many business opportunities coming from outside.

And if an entrepreneur will be open to these opportunities, willing to adapt and to re-shape his product he will likely obtain a true responsive commitment from his customers, or any other involved stakeholders. In this vein, one of the B2B market rules – to obtain a close relationship with your customers, so called relationship marketing, together with startup's flexibility and adaptiveness encourages commitments from their stakeholders and increase the possibility of new product or solution to be born. The pre-commitment aspect and close relationship with customers also affected the control principle. Thus, the stronger trustful relationships between startup and its stakeholders the wider a circle of activities and competences those are under startup's control.

In contrast, on B2C market customers hardly ever enter the scene before the product or solution is already designed and waits to be tested. This happened due to the potential number of customers to whom the solution will be addressed. B2C startups does not depend on certain two-ten customers whom preferences must be essentially negotiated to design a product, a

value proposition or a full business model as for B2B. Instead, their target audience often exceeds 100 customers (or even 1000-5000 for some B2C startup types) and B2C startups rather appeal to generalized information about them: common pain/problem, paying capacity, location etc. with regard to potential solution (Elliott, 2002; Timmers, 1999; Vanhala & Saarikallio, 2015). Their customers are not the part of ‘co-working’ or development processes and, thus an entrepreneur has nothing left to do but to predict how customers will react to new solution/feature and what would they like in it. Evidently, behind the prediction process there are certain time spent on market analysis, customer preferences analysis and etc., all those procedures refer to causal reasoning. Overall, B2C customers are less likely than B2B customers to be considered as startup’s partners, whose activities, expertise or thoughts are anyhow under entrepreneur’s control. Partly because of the above mentioned reasons, the value of control and pre-commitment factors, a litmus test for effectual logic, are almost two times more for B2B than B2C companies.

There were no previous studies regarding effectuation adoption among entrepreneurs whose startups operate on different markets. Therefore, these findings can be considered as a new contribution to the effectuation theory.

4.5. Barriers to the adoption of an effectuation logic

Through analysis of the embedded factors discussed above we could identify three barriers that inhibit adoption of effectuation way of thinking.

First, it was found that the effectuation reasoning is less adopted by the startups that operate on the B2B2C market and face *double demand uncertainty both for B2B and B2C customers*. Thus, these startups perceive any changes in business model as a double risk. For instance, in case of changing value proposition for the B2C side they can face the risk that B2C customers will not be interested in the new value proposition (demand risk) and, at the same time, this decision might force startup to make changes in the revenue model or distribution channels for the B2B side that can lead to image risk or even to the risk of relationship termination with certain B2B customers. This double-side risk makes a startup’s strategy less transformative and experimental while, simultaneously, more favorable to market and customers investigation and stressing stable and well-structured roadmap of product development.

The second barrier that decreases the influence and importance of the effectuation logic in entrepreneurial decision-making is *a level of investment-intensity*. The amount of invested

money alone cannot be considered as a barrier but there are two common characteristics of high-investment projects that can lead to discordance with the idea of effectuation. There are *time to profitability and time to scalability*. Very often the venture capitalists when investing into a new startup determine the time when it has to acquire first paying customer, when it has to reach a breakeven point and, finally, when it has to pay back all the money invested. They based their calculation on the on the market examination, risk estimation and predictions and often pressure entrepreneurs to stick to the time periods that were estimated. These time-indicators imposed by the investors force startups to act very systematic and acting according to a fixed plan. Thus, the entrepreneurial decision-making is often limited by the pre-defined plans coming from the investors that endorse the adaptation of causal methods and dismiss the effectuation reasoning.

The third barrier that has been detected is that the effectual logic should not be chosen for the decision-making when *the notorious result is expecting* such as, for example, the event of discovering customer pain where an entrepreneur should be focused narrowly on the yes/no result - whether or not customer's pain exists for the pre-selected customer segment. The decision-making process for this event is reasonably easier managed through a goal-tree model including on the top level the result (yes or no) entrepreneur is looking for. The effectuation logic, in contrast, can negatively contribute to the decision-making process by shaping it to be more dispersed and unfocused that, in its turn, can increase the time to obtain the final yes/no decision.

4.6. Summary

Overall, our conceptual model (cf. Figure 4, Chapter 3) was built on the assumption that startup's lifecycle, expertise of the entrepreneur, newness of the market and type of target market might influence the perceived contribution of both effectuation and causation logic in the development of startup ventures.

We found that the entrepreneur's perceived contribution in the defining a viable and successful strategy is highly depends on certain events, stages in startup's lifecycle, and type of target markets. Entrepreneurial expertise and the level of market newness do not show any considerable evidence of persuading a shift in entrepreneur's decision-making to either causal or effectual logic.

The in-depth context and process analysis of the decision-making patterns during certain lifecycle stages facilitated the introduction of a new startup's typology with regards to the level of favorability to effectual reasoning.

Additionally, we compared our findings with the results of prior studies on entrepreneurial expertise, level of market newness and effectuation. Herewith, some of our findings correspond and align with the main conclusion of other researches, while other provide distinct results and fresh interpretation diverging from the ground concept of effectuation theory introduced in 2001.

Therefore, the next chapter will highlight main findings of this study in accordance to their theoretical and practical implication and suggest several aspects for future research.

5. Conclusions

This chapter includes three sections. Section 5.1 reflects on the main findings of the research in terms of its contributions to knowledge and theory. Section 5.2 provides contributions to management, and final section 5.3 acknowledges the main limitation of this study, and suggests some avenues for future research.

5.1. Contribution to theory

This conclusion reflects on the main findings of the study, by revisiting the original research theoretical model, and considering how the examined case studies have developed understanding in the area of entrepreneurial decision-making under market, demand and technological uncertainty.

The main research goal of this study was to provide a better insight on '*How do entrepreneurs perceive the contribution of effectuation logic in defining a viable and successful strategy when compared to a traditional-planned or causal logic?*' This issue was examined taking in account four influencing factors: startups' lifecycle, the level of entrepreneurial expertise, the type of target markets, and the level of market newness.

The findings suggests that the entrepreneurs do not use uniquely neither causation nor effectuation logic. Most of the time, they prefer a hybrid model that facilitates entrepreneurial decision-making through the combination of causal and effectual methods and practices. Moreover, this combination is not stable and varies over time according to the main startups' challenges in different stages.

We found that the discovery stage is the one where the adoption of causation reasoning prevailed over effectuation if compare with other startup's stages. Nevertheless, the absolute proportion of the effectual logic in the discovery stage is slightly higher than the causal and equals averagely 60%. This fact aligns with the Sarasvathy's (Sarasvathy & Kotha, 2001) argument that entrepreneurs practice effectual reasoning when creating a new venture. However, the difference between causation and effectuation methods used during the idea initiating, product-customer fit, MVP launching and business plan creation events cannot be considered significant to argue that effectual logic can support a more viable and competitively stronger strategy for startups.

Considering the initial investments decisions in startups, they are perceived by the entrepreneurs as the most favorable and convenient area to apply the effectuation logic. All entrepreneurs stressed that the affordable loss principle together with their means examination are perceived as the best possible reasoning to take a decisions about their first investment. In contrast, the event with the customer's pain identification during the discovery stage is perceived as the one when entrepreneurs valued effectuation and existing market information analysis almost equally.

The analysis of the validation stage did not provide any substantial difference compared to the discovery stage. At the same time, the efficiency stage is characterized by the highest influence of every effectual principle; in particular, business model refining event favors the effectuation logic up to 96%. This high value is explained by the startup's context being full of continuous and repetitive learning from customers' and partners' feedback during the efficiency stage. The processes of learning imply that every participant involved in interrelationship with startups might bring new inputs that from different angles could lead to new opportunities, challenges and improvements that encourage entrepreneurs behave effectually.

In the scale stage, the process improvement event continues to follow the same rationale as the preceding event but with lower percentage: 78%. The pace of following the effectuation logic is getting slower because the importance of testing ideas decreased and startup's means examination considerably conceded to goal-oriented strategies. By the time of the last event in the scale stage, entrepreneurs have already defined which business model to use to scale the business and, thus adopt preferably effectuation logic only if they plan to broaden the venture scoping. Additionally, this period is the adjoining period with the second investment round meaning, where the entrepreneur has to know how to explain and what information to provide when asking investors for money. Therefore, entrepreneurs are facing necessity to analyze both market (outside) and inside information that brings the shift from the effectual reasoning toward causal methods during this stage.

In addition to the findings related with the certain startup's stage, we could identify the three types of IT startups that have a different level of acceptance toward effectuation principles. There are 'on thin ice', 'progressing', and 'safe' startups. The first group of startups appeared to be mostly B2B2C or B2C startups that are faced with the high level of demand uncertainty and technological uncertainty. Their success or failure are linked to the comprehensive understanding of users' (B2C customers) needs and leveraging those needs with the value that startup is able to add for their B2B customers. These startups are highly vulnerable to the

sudden changes in users' preferences or customers' business models. Therefore, they favor causal practices to explore the market information in case of maximum reduction of the unexpected deviance in their user/customer relationship. Second group 'progressing' startups are those whose startups were created with some insights from either potential partners or potential customers. These startups face lower market uncertainty because their concerned parties can contribute to the market information accessibility and thus, favor effectuation to a higher degree than 'on thin ice' startups. And finally 'safe' startups are these that use the effectuation way of thinking averagely 80% or more of the time. They do not have a strong time pressure or any time limit to show projected sales and revenue. They do not require big investments in the beginning and, therefore, are not oriented by fast pay off. These startups very often appear as the output of an entrepreneur's hobby and passion activities.

Moreover, considering the level of entrepreneurial expertise and newness of market, we compared our results with prior studies' conclusion. No significant difference was found between novice and expert entrepreneurs' decision-making with regard to effectuation. The findings provided no evidence to demonstrate that novice entrepreneurs favor causation and expert entrepreneurs effectuation as was suggested by (Dew et al., 2009). Furthermore, we also did not find a significant evidence to one of the first Sarasvathy's hypothesis that effectuation is more effective while applying for the new markets rather than for existent markets.

To sum up, this study contributes to the literature on effectuation. The process-oriented approach toward entrepreneurial decision-making is one of the important contributions that provide evidence that effectuation and causation logics are not opposite and incompatible concepts but rather are mutual complementary parts of one great hybrid model for entrepreneurial decision-making. This approach also assisted detailed explanation why certain stages in startup lifecycle favor or deny effectual over causal reasoning and facilitated to avoid being merely descriptive of the phenomenon. Moreover, this study provides an expansion on effectuation principles and their importance throughout different stages in startup lifecycle.

Nonetheless, it can be questioned that effectuation logic only positively affects startup's performants or its survival aspects and thus, it requires additional researches narrowly focused on the objective startup's performance characteristics and not solely on the rather subjective entrepreneurs' perception.

5.2. Contribution to management

From a practical perspective, the findings developed in this research acknowledged and clarified the certain decision areas and startup's phases when the influence and adoption of one if the decision-making logic (causation or effectuation) is preferable over another. Therefore, entrepreneurs might benefit from this knowledge in order to speed up and increase efficiency of startup creation processes and its survival.

Additionally, the introduced in this study startup's typology can be helpful when entrepreneurs decide on whether or not to emphasize on planned or emerging strategy in the beginning of their startup development.

And last but not least is that, our findings regarding barriers to the adoption of an effectuation logic can help an entrepreneur to understand why in the certain situation causal reasoning will be easier and efficient to implement instead of relying on and pushing an effectual way of thinking.

5.3. Limitations and Suggestions for Future Research

The limitations of this study are directly linked with the assumptions made before the data collection and analysis processes.

First, it was assumed that the entrepreneurs during the interview will acknowledge both negative and positive moments that influenced their decision-making. In fact that no other sources of information besides interviews were involved in this analysis, it is believed that all entrepreneurs honestly answered an interview's questions and did not hide any 'wrong' decisions that negatively affected their venture performance. Otherwise, the accuracy and completeness of findings will be downgraded. Future researches can minimize this limitation by taking under account other secondary data (startup's business plan, financial documents, any other internal documents, and press releases). Focusing on both the interview's responses and the second data examination can help to verify whether the entrepreneur actually acted the way that they mentioned in interview, and whether their decisions definitely contribute to the startup's success and just are perceived to do so.

Another limitation of this study is that the data was coded in accordance to the interpretation of the verbal protocol solely of a single researcher. Despite the fact the all coding rules were

designed to precisely follow the theoretical definition of the effectuation and its principles, the interpretation of the primary data is considered to be subjective unless it is compared and aligned with the interpretation of other researchers. In this vein, other researches may test this interpretation and narrowly focus on specific aspects of this study can use the tables with the first-step of analysis in Appendix.

It is also necessary to mention that the sample size of this research sometimes limited the possibility to compare and describe the degree of relationship between different variables, decreasing the generalizability of the results for certain lifecycle stages and events. In this vein, future researches can reiterate this study with a larger sample size to increase accuracy rate particularly for a quantitative method.

Since all our findings are connected to the IT startups characterized by the demand and technological uncertainty, future research can examine other industries where the level of technological uncertainty is replaced by another uncertainty type. It is also interesting to compare whether established companies use similar hybrid model to manage their projects and processes in the growth and maturity stages. In this vein, the examination of large corporations and mature companies are endorsed to be investigated for the future researches about the effectuation theory.

Moreover, our study provides a theoretical contribution to the effectuation theory considering the effectuation principles and different market type correlations. Although we found that certain market types benefit more from the effectual reasoning following, there is an inviting opportunity to analyze this aspect with a larger sample and distinct methodology.

In conclusion, it is clearly apparent and capable of being logically proved by our findings that hybrid model is commonly used among entrepreneurs and, thus, requires more examination under different conditions and levels.

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Appendix - 1 Table Methodological consideration of similar studies.

Article	Research question/ subject (s)	Sample	Method	Data analysis	Level of analysis	Principle	Theoretical contribution	Research Level	Expert ENTs	Novice ENTs	New ventures	Mature firms	Dev. stages
Sarasvathy and Kotha (2001)	Do entrepreneurs use effectual processes when faced with Knightian uncertainty?	1 ⁶	Case study	Verbal protocol through emerging patterns	Decision-events	AL, PA, LC	ENT when faces with uncertainties act on EFF logic.	CON	+	-	+	-	+
Harting (2004)	Do established firms use an EFF when exploring entrepreneurial OPP?	1 ⁷	Case study	Semantic chunk	OPP exploring	AL, PA, C	EFF preferably for early stages and CAU in later phase of the corporate entrepreneurship	NAS	-	-	-	+	+
Harmeling (2005)	How do new ventures come into existence under the high level of uncertainty?	1	Case study	Semantic chunk	New venture early stage	AL, PA, LC, C	Owners use EEF logics when uncertainty is high.	NAS	-	-	+	-	-
Dew et al. (2009)	Do expert ENTs frame decisions using EFF reasoning more often than novices do?	27 expert ENT and 37 MBA students	Experiment	Verbal and think aloud protocols	Decision-events	AL, PA, LC, M, C	The expert ENTs were more likely to think holistically about business, were more means-driven, were less concerned with expected return, and were more interested in developing partnerships than students.	INT	+	+	-	-	-
Wiltbank et al. (2009)	Do investors' use of predictive and non-predictive control strategies relate to their investment success?	121 angel investors	OLS regression	Quantitative analysis of investment success	An angel investor	C	Uncertainty → Emphasize control strategies as opposed to prediction	INT	-	-	-	-	-
Read, Song, et al. (2009)	How EFF principles affect venture performance?	9897 new ventures	Meta-analysis	Quantitative analysis of venture performance	Venture performance	M, P, AL, LC	M, P and LC positively related to performance. AL – negatively but result is not significant	INT	-	-	+	-	-

⁶ RealNetworks - a leading audio/video streaming firm

⁷ Circuit City's CarMax - a used car retailing unit from its origins as part of a planning effort in 1991 to the one-year anniversary of its opening in 1994

Morrish (2009)	How effectuation and causation logic influences portfolio formation among entrepreneurs?	15 established firms	Multiple case-studies	Verbal protocol interpretation through emerging patterns of data	Portfolio development	P, AL, LC	EFF gives way to CAU with maturation of the portfolio	INT	-	-	-	+	+
Chandler et al. (2011)	Validation of causation and effectuation approaches to new venture creation and adding associated sub-dimensions.	307 young firms	Survey	Exploratory and confirmatory factor analysis	Survey item	C, P, AL, LC	CAU negatively associated with uncertainty, while EXP positively. EFF and CAU can be measured differently.	INT	-	-	+	-	-
Harms and Holger (2012)	What are the antecedents and consequences of causation and effectuation in the entry mode selection?	65 ⁸ gazelles	OLS and logistic regress.	Survey addressed to CEOs	Foreign market entry decisions	C, P, AL, LC	EFF decision-making applies to foreign market	INT	-	-	-	-	-
Nielsen and Lassen (2012)	How ENT educators can place more emphasis on identity related struggles involved in the entrepreneurial effectuation process?	10 students ⁹ over a one-year period	Case-study	Qualitative data for theory-guided analysis with shared pattern investigation	Student's decision-making	C, P, AL, LC	Students develop a sense of ENTal identity through EFF logic	INT	-	+	+	-	-
Kaufmann (2013)	How EFF and CAU influenced the targeting of the biotechnology sectors and what limits they targeted?	2 ¹⁰	Two case-studies	Interviews with self-reporting method for theory-guided analysis	Performance of a project	M, C, P, AL, LC	Neither CAU nor EFF alone produced desired results. Combination is needed (Singapore-CAU/Israel-EFF)	INT	-	-	-	+	-
Solesvik and Gulbrandsen (2013)	How EFF and CAU influence open innovation process.	1 ¹¹	Case-study	Semi-structured interviews and author's iterative analysis	Open innovation process	M, P, AL, LC	EFF is preferable to open innovation.	INT	-	-	-	+	-

⁸ Gazelles – a high-growth independent and owner-managed firms

⁹ Here students as novice entrepreneurs

¹⁰ Singaporean bio-innovation program – CAU, Israel's innovation biotechnology policies -EFF

¹¹ Late-stage open-innovation projects aimed at creating a hybrid ship that uses liquid natural gas and hydrogen as power sources.

(Bonazzi and Perruchoud (2014))	How to combine the notion of “causation”, “effectuation” and “lean startup” in a coherent model?	7 startups	Case-study	Design research methodology	LEAN startup processes	M, PA	The lean approach appears to follow a linear mindset (“causation”).	INT	-	-	-	-	-
Welter et al. (2015)	What are the highlighting bricolage, effectuation and opportunity creation theories overlaps and divergences?	-	Content-analysis	Design research methodology	Bricolage, EFF and OPP creation theories	M, LC, C, PA	EFF employs means-based heuristics to create possible business. BRI uses resources on hand to solve an existing problem in a new way	CON	-	-	-	-	-
(Agogue et al. (2015))	How nascent technology entrepreneurs in action combine causal and effectual decision-making logics?	13 ¹²	Multiple case-studies	C-K design theory	Tech ENTs’ decisions	M, LC, C, PA	EFF and cognitive preference should not favor towards CAU.	INT	-	-	+	-	-

Source: Adapted from and author’s own literature overview

Legend for Table

- EEF – effectuation
- CAU – causation
- ENT – entrepreneur
- OPP – opportunity
- LC – leverage contingencies
- M – means
- C – control
- PA – partnership
- AL – affordable loss
- CON – concept
- NAS – nascent
- INT - intermediate
- EXP - experimentation
- BRI -bricolage

¹² Teams of technology entrepreneurship students in a venture creation program

Appendix - 2 Table Quantitate base of analysis

Stage	I																				II														
Event	1					2					3					4					5					6					7				
EFF	M	LC	AL	PA	C	M	LC	PA	C	M	AL	C	AL	PA	C	M	LC	AL	PA	C	M	LC	AL	PA	C	M	LC	AL	PA	C	M	LC	AL	PA	C
1	2	5	5	0	0	2	0	1	2	2	2	1	5	3	3	0	0	5	1	4	4	5	5	0	2	5	5	3	5	4					
2	1	0	5	5	5	2	0	5	5	5	3	5	5	5	5	0	0	2	5	5	0	0	1	5	5	5	5	5	5	5					
3	2	5	5	2	2	2	0	3	3	2	3	4	5	0	3	2	5	5	3	4	4	0	5	4	5	5	5	5	5	5					
4	4	0	5	5	4	5	0	5	5	2	5	5	5	0	3	2	0	5	5	5	5	1	5	5	5	5	0	5	5	3					
5	4	0	5	3	3	3	0	4	4	2	5	4	5	0	3	5	4	5	1	5	5	0	5	2	2	2	1	4	5	5					
6	3	5	5	2	0	1	5	2	2	1	5	2	5	5	2	2	0	5	2	2	1	0	5	5	5	5	5	2	5	3					
7	5	5	5	5	5	5	5	5	5	5	5	5	5	0	5	5	0	5	5	5	5	5	5	5	2	5	5	5	5	4					
8	5	0	5	5	5	5	0	2	3	5	5	5	5	2	5	5	0	5	3	4	5	0	5	3	2	5	5	5	5	2					
9	3	0	5	4	1	1	0	1	1	2	2	2	5	5	2	1	0	5	3	5	3	0	5	2	3	5	2	5	5	3					
10	2	0	5	2	1	1	0	1	1	1	3	2	5	1	2	0	0	5	1	4	2	0	5	1	5	5	3	5	2	5					
11	5	1	5	3	4	2	5	5	5	3	1	4	5	3	5	2	4	5	2	5	2	3	5	5	5	5	0	5	5	5					
12	5	0	5	5	5	5	0	5	5	5	4	5	5	4	5	5	0	5	5	5	5	0	5	5	4	5	3	5	5	5					
Stage	III										IV																								
Event	8					9					10					11																			
EFF	M	LC	AL	PA	C	M	LC	AL	PA	C	M	LC	AL	PA	C	M	LC	AL	PA	C															
1	2	0	5	5	3	4	1	5	4	5	5	0	5	4	4	1	0	2	5	4															
2	5	0	5	5	5	5	0	5	5	5	1	0	4	5	3	5	5	5	5	3															
3	4	3	5	3	5	5	0	5	5	5	3	3	5	4	5	5	5	5	2	3															
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-															
5	5	0	5	2	5	5	0	5	4	5	2	0	5	4	3	1	0	2	3	4															
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-															
7	5	3	5	5	5	5	0	5	5	5	4	5	4	3	2	3	5	5	4																
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-															
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-															
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-															
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-															
12	4	0	5	5	3	3	0	5	5	5	-	-	-	-	-	-	-	-	-																

Legend
 1-12 – Startup’s number according
 I – Discovery Stage
 II – Validation Stage
 III – Efficiency Stage
 IV – Scale Stage
 1-11 – Events according to Table 14

Appendix - 3 Table First-round analysis according to the coding agenda designed for this study regarding the Discovery stage.

I Discovery stage					
1. How did you come up with your business idea?					
	Means	Leverage contingencies	Partnership/ Pre-commitment	Affordable loss	Predict and control
Boleia.net	Analysis of entrepreneur's means didn't play a major role in the decision of creating a company. With the exception of 'Who I am?' layer "desire to live in Hungary, carpooling lover, confidence with knowledge to start the business". 'Whom I know?' didn't influence a decision to open a company. No network connections in carpooling area, but some contacts with mentors from Porto incubators who value and develop social economy. 'What I know?' didn't affect as much. Might be classified as a goal-oriented activity derived by overcoming contingencies - To start own business.	LC is the main factor affected a startup creation. Bad situation - no job - led to intention to start a company. 'I found myself a little bit limited. There was a problem: I wanted to stay in Hungary but couldn't be able to work there. I thought it's not normal to go somewhere else to work. I should work where I want to live and not leave somewhere where I can work.'	Not a key factor and even referred as a problem, "The fact that I was mainly alone in this project trying to define and implement strategy brought some issues with prioritizing my time for different types of work. I knew I had to focus on marketing but I didn't have time to do this. Sometimes there was no time to do anything besides selling... However, I have a mentor to whom I could address any time when some advices are required."	AF is absolutely applied because to start the business entrepreneur had to quit his job. To do so he started first looking for investment, and only when the investment was arranged he started the business. 'Honestly, I couldn't have started to do anything without seed capital; I couldn't just leave my job without even having a small salary to survive while developing product. I knew what I would lost if something goes totally wrong.'	Prediction prevailed in this stage. The analysis of business potential was made based on prediction and not a 'practical outcome'. Tried to do a raw estimation for market size in Portugal, Hungary.
	Category 4/ Factor 2	Category 1/ Factor 5	Category 5/ Factor 1	Category 1/ Factor 5	Category 5/ Factor 0
SCRAIM	Goal-oriented start. Within the experience in the industry as the service company ENT initiate the idea of creating a product that might be potentially cross-sold along with consultancy service. 'What I know?' the knowledge about the industry where startup and its customers work affected initiating.	Doesn't apply to this sub-case	PA might be considered as a key factor. Current customers were analyzed through the relationship (close) marketing approach. And customers committed with the accordance to active participation in the discovery of future product functionality and their certain needs.	LA applied entirely. Startup didn't have any required return estimation. 'We started small. Basically during the free time we were exploring opportunities, studying market and trying to develop something that will remind a prototype in future. Since we didn't want to be distracted from the main activity, we were doing everything very slow'	Focus on control. All the input to analyze the needs and pain of customers came from control expertise.
	Category 5/ Factor 1	-	Category 1/ Factor 5	Category 1/ Factor 5	Category 1/ Factor 5
Last2ticket	All three aspects influenced the decision to open a company but rather slightly than pushy. Wide network in IT sphere helped to build a team with accordance to tech knowledge for team-members since the beginning. Might be classified as a goal-oriented activity driver by overcoming contingencies - To start own business (desire to grow as a specialist and manager).	Affected as the major influence. Unclear situation with the company where ENT worked plus the desire to personal and professional growth as well as hesitation about the future career after MBA program led to business creation	Not a key factor. However, contacts with IT specialists helped to hire strong team since the beginning. Competitors were not considered as a potential partners at the stage of company creation, while some entities were interviewed with the purpose of recognizing their pains and problems who shared some commitment to startup but without any mutual interest in cooperation (at that time)	Applied entirely. Startup didn't have any required return estimation for investment. And, moreover, risk has been carefully analyzed and accepted with the accordance to another option (returning to the job in big international company)	Rather the prediction than control factors was used. Mainly because founder operated under high uncertainty and didn't interact previously with the companies who might be potential customers to get any insight from them.
	Category 4/ Factor 2	Category 1/ Factor 5	Category 4/ Factor 2	Category 1/ Factor 5	Category 5/ Factor 0

Globinnova	All three aspects applied to the decision to open a company. Very strong knowledge about the industry (14 years of experience) drives to understanding of market potential and its development stage, large network (100 communications before starting the business) contributed to the recognition of potential customers and competitors' activities. Business started from the intention to apply founder's knowledge to growing industry. ENT sees the world as one in which all of the pieces are there, but must be assembled which is correspondent to causal way of thinking.	Doesn't apply to this sub-case	Might be considered as a key factor. Large network (100 communications before starting the business) contributed to the recognition of potential customers and competitors' activities. Also since the beginning some of the business partners showed a high commitment and interest in cooperation.	Applied entirely. Startup didn't have any required return estimation for its investment.	Control factors probably prevails prediction because some interactions with potential customers and industry entities were made before the startup creation. Moreover, all the resources and means to create the product were under control of founder and didn't require any external support.
	Category 3/ Factor 3	Category 1/ Factor 5	Category 1/ Factor 5	Category 1/ Factor 5	Category 1/ Factor 4
Musicverb	All three elements play a major role. The desire to work in a music industry (began as a musician then run the festivals and manage entertainment project), solid work experience in music industry (over 10 years) - 'The musicverb is a merge of my competences and interests'. Established contacts with the potential customers or other influencers. No clear vision of company. Means-oriented	Doesn't apply to this sub-case	Might be considered as a medium importance factor since founder has a wide network of potential customers who showed interest in the idea of new solution and were ready to commit with the cooperation.	Applied entirely. Startup didn't have any required return estimation for its investment. Seed funds to create a company have been taken from another project in order to develop a new startup with great potential. But no return of potential new venture was calculated.	Control and prediction are probably at the same level of importance. With the little domination of control factors such as strong knowledge about the industry, no need for external support neither for tech component not for investment. Prediction played role in the potential customer interests about the core product functionality and customer segmentation.
	Category 2/ Factor 4	Category 1/ Factor 5	Category 3/ Factor 3	Category 1/ Factor 5	Category 3/ Factor 3
Newton.ai	Analysis of entrepreneur's means played a moderate role in starting a company. Project came up after the refining a goal and key offer from another related project that couldn't be developed as planned. The elements Whom I know? and What I know? applied predominantly. The question Who I am? mostly refers to ENT with his passion to technology and HR. Thought project haven't started as a complete goal-driven venture.	Affected with the high influence. Since the former project required more resources and financing to continue the decision was taken in favor of new startup creation and closing the previous project.	Might be considered as a low importance. Founder has some contacts from former project but they were not intended to co-operate with the new venture.	Highly applied. Startup didn't have any required return estimation for its investment. Though the decision to close another startup for creating this new one was associated with the casual logic of trading-off two businesses	Prediction prevailed in this stage. The analysis of new business potential was made based on prediction and not a 'practical outcome'. The decision to open the company arises from the prediction of HR market needs, lately it is supported with the feedback about potential value of the product and its functionality. Customer pain was rather assumed that had any proof from the potential partners, users or customers.
	Category 3/ Factor 3	Category 1/ Factor 5	Category 4/ Factor 2	Category 1/ Factor 5	Category 5/ Factor 0
EZ4U	Company initially has been created as a consultancy service and lately with the accident event it developed its current business model and core product. However, the What I know? element (strong tech knowledge) played high importance throughout all the decision taken in global shifts of the company. Moreover, the founder himself refers that the starting business was an accidental luck.	Affected as a major influence. Unplanned idea how to create the most efficient solution for the company-partner that wasn't required any improvements except sms service pushed founders to experiment on their own sms service as the solution for such a pain.	Idea was initiated with the intention of customer who was served with consultancy advices. This customer fully committed to the idea with the support (testing, checkups) necessary from him.	Since startup hasn't required a big funds the decision to take some money for new solution development from the income of consultancy service indicate the affordable loss consideration.	Control factors played the major role. The combination of founders' means led to startup creation and product designing. Additionally, the decision to develop a new solution came from the interaction with partners as another element under control.
	Category 5/ Factor 5	Category 1/ Factor 5	Category 1/ Factor 5	Category 1/ Factor 5	Category 1/ Factor 5

Running- rhotrac	The elements Who I am (megaphones runner) and What I know influence the most in starting the company. Additionally, the support from marathons organizers contributed to the idea of such a business. Totally based on all understanding and potential combination of all of the means together.	Doesn't apply to this sub-case	Idea couldn't be realized without the support from partners. Founder had to have an access to the data bases of partners. Full commitment factor.	No expectation regarding even future revenue. Based entirely on affordable loss principles	Control factors played the major role. The combination of founders' means led to startup creation and product designing. Idea came from the ENT's need itself.
	Category 5/ Factor 5	-	Category 1/ Factor 5	Category 1/ Factor 5	Category 1/ Factor 5
ZARCO	The idea came from the task for entrepreneurship course and then was supported with the financial help from previous investors. Didn't have any structured analysis about the business potential and simply was born from the needs of founder. What I am? – traveler lover - high influence means.	Doesn't apply to this case	Commitment from the team shifting from another startup. Commitment from the investor who accepted restructuring of investments between two projects. (no interactions with potential customers or any other key pre-selected stakeholders)	Based entirely on affordable loss principles. "We knew what we risk leaving another project without full attention and reducing the number of its team members"	Rather prediction than control factors was used. Mainly because founder operated under high uncertainty and didn't interact previously with any potential customers to get useful insight from them.
	Category 5/ Factor 3	-	Category 4/ Factor 2	Category 1/ Factor 5	Category 5/ Factor 1
Nomadmove ment	The idea came from the founder through his wants as a traveler. He trade-off his full time job to create this product. Rather goal-oriented than means oriented business creation.	Doesn't apply to this case	PA not a key factor and didn't present during this event from the aspect of effectual logic.	No expectation regarding even future revenue. Based entirely on affordable loss principles.	Rather prediction than control factors was used.
	Category 5/ Factor 2	-	Category 5/ Factor 1	Category 1/ Factor 5	Category 5/ Factor 1
Invisible Clouds	Effectual means logic presents in initiating the idea but with the small part of causal reasoning that suggests exploration of market opportunities. Moreover, this idea came only when startup was looking for the project they can easily and quickly develop to sponsor another B2C idea. "Idea came from one of the founders who worked as an economist in a credit recovery company. From his experience all existent systems who work to tackle the problem with supporting invoices are almost non-automatic and many easy thinks have to be done manually or even using an excel spreadsheet".	Initial thoughts of the ENT were to create a B2C product with IC cards. "However, this project required a lot of financials and we decided we can do another B2B project very quick, for 4-5 months. And when we started approach potential B2B customers with our possible solutions almost everyone told us – Bring this solution for us tomorrow, we are ready to use it. Thus, we forgot our B2C and focused on this product"	While the idea was discovered startup almost immediately got approval from Microsoft to be supported for the short time period. This Though, there was no significant commitment to start mutual business but rather the support for product validation that might be (might be not) later integrated with Microsoft solutions.	When creating this startup I got already another company that I as well have to Managing and maintaining and planning for growth, Moreover, I had to invest some money in new startup so from my position as well as from my associates we definitely used affordable loss concept".	Control factors played the medium role because many part processes in the beginning were determined by assumptions and projections (like the acceptance of project by potential strategical partners, clients pain and clients solvency and payable capacity)
	Category 2/ Factor 4	Category 1/ Factor 5	Category 1/ Factor 5	Category 5/ Factor 5	Category 4/ Factor 2
Infraspeak	Since the first solution was not developed as a commercial solution but simply as a university project which only two years after turned to be seen as a business opportunity offering competitive solution that might be quite easily monetized. The idea of startup creation followed by the means-oriented approach.	Doesn't apply to this case	Idea started as project but soon with the commitment from university it was shifted to R&D and when it turned commercial, first customers were working as a guarantee of quality and even as the sale force.	Solution that had been developed only turns to commercial project whet it was fully tested by first partners and seemed to be overpassing other solutions on the market. We didn't do any math for potential market share or cash flow and revenue estimations. We only wanted to check if it truly will be preferable by potential customers and what is actual demand. So, after their feedback we could do some clear assumption and estimations about the marketing".	Control factors played the major role. The combination of founders' means led to startup creation, additionally almost since the beginning startup gain a key partner – FEUP representatives that committed with feedback about functionality of the solution.
	Category 5/ Factor 5	Category 5/ Factor 0	Category 1/ Factor 5	Category 1/ Factor 5	Category 1/ Factor 5

Appendix - 4 Table The number and percentage of startups following Effectual reasoning over Causal reasoning throughout startup’s lifecycle.

		Discovery Stage																					
1	N of startups with EFF logic	8	5	12	8	7	4	2	6	7	6	12	8	12	6	9	5	1	12	8	11	7	2
2	N of startups with clear EFF	3	5	12	6	4	2	2	5	5	2	4	3	12	3	5	3	0	8	5	9	5	1
3	% of startups with EFF	67%	42%	100%	67%	58%	33%	17%	50%	58%	50%	100%	67%	100%	50%	75%	42%	8%	100%	67%	92%	58%	17%
4	% of startups with clear ¹³ EFF	25%	42%	100%	50%	33%	17%	17%	42%	42%	17%	33%	25%	100%	25%	42%	25%	0%	67%	42%	75%	42%	8%
5	average % (3) by stage																					62%	
6	average % (4) by stage																					41%	
		Validation Stage										Efficiency Stage											
1	N of startups with EFF logic	9	5	6	5	0	10	7	7	5	2	6	6	6	6	-	6	6	6				
2	N of startups with clear EFF	8	3	4	4	0	7	4	3	3	1	6	4	4	4	-	6	4	6				
3	% of startups with EFF	75%	42%	50%	42%	0%	83%	58%	58%	83%	33%	100%	100%	100%	100%	-	100%	100%	100%				
4	% of startups with clear EFF	67%	25%	33%	33%	0%	58%	33%	25%	50%	17%	100%	67%	67%	67%	-	100%	67%	100%				
5	average % (3) by stage									54%											91%		
6	average % (4) by stage									33%											81%		
		Scale Stage										% of startups using EFF more than CAU over all stages											
1	N of startups with EFF logic	3	0	5	5	5	2	3	3	5	5												
2	N of startups with clear EFF	1	0	4	1	1	0	1	2	4	0												
3	% of startups with EFF	60%	0%	100%	100%	100%	40%	60%	60%	100%	100%												
4	% of startups with clear EFF	20%	0%	80%	20%	20%	0%	20%	40%	80%	0%												
5	average % (3) by stage													72%	68%								
6	average % (4) by stage											28%	42%										

¹³ With factor of 5 or those in Category 1

Appendix - 5 Table The percentage of number of entrepreneurs (novice and expert) following preferably effectual reasoning over causal reasoning 80% of the time.

		Discovery Stage																			
1	N of startups/ Novice ENT	2	3	6	3	3	1	1	3	3	1	5	4	6	0	2	1	0	6	4	4
2	N of startups/ Expert ENT	3	2	6	4	2	1	1	2	3	2	5	3	6	3	3	2	0	6	2	5
3	% of startups 1 with EFF	33%	50%	100%	50%	50%	17%	17%	50%	50%	17%	83%	67%	100%	0%	33%	17%	0%	100%	67%	67%
4	% of startups 2 with EFF	50%	33%	100%	67%	33%	17%	17%	33%	50%	33%	83%	50%	100%	50%	50%	33%	0%	100%	33%	83%
5	average % (3) by stage																				48%
6	average % (4) by stage																				51%
		Validation Stage									Efficiency Stage										
1	N of startups/ Novice ENT	3	2	6	3	4	2	5	2	3	3	1	4	3	2	3	4	4	4		
2	N of startups/ Expert ENT	2	0	3	2	2	2	3	2	2	2	0	2	1	2	2	2	2	2		
3	% of startups 1 with EFF	50%	33%	100%	50%	67%	33%	83%	33%	50%	75%	25%	100%	75%	50%	75%	100%	100%	100%		
4	% of startups 2 with EFF	50%	0%	75%	50%	50%	50%	75%	50%	50%	100%	0%	100%	50%	100%	100%	100%	100%	100%		
5	average % (3) by stage										56%										78%
6	average % (4) by stage										50%										83%
		Scale Stage										% of startups using EFF more than CAU over all stages									
1	N of startups/ Novice ENT	2	3	3	2	0	1	2	3	2											
2	N of startups/ Expert ENT	0	2	2	0	1	1	1	1	1											
3	% of startups 1 with EFF	67%	100%	100%	67%	0%	33%	67%	100%	67%											
4	% of startups 2 with EFF	0%	100%	100%	0%	50%	50%	50%	50%	50%											
5	average % (3) by stage													67%	59%						
6	average % (4) by stage											50%	57%								

Appendix - 6 Table The percentage of number of entrepreneurs (novice and expert) following preferably effectual reasoning over causal reasoning 60% of the time.

		Discovery Stage																			
1	N of startups/ Novice ENT	3	3	6	3	3	2	1	3	4	3	6	4	6	2	5	2	1	6	4	5
2	N of startups/ Expert ENT	5	2	6	5	4	2	1	3	3	3	6	4	6	4	4	3	0	6	3	6
3	% of startups 1 with EFF	50%	50%	100%	50%	50%	33%	17%	50%	67%	50%	100%	67%	100%	33%	83%	33%	17%	100%	67%	83%
4	% of startups 2 with EFF	83%	33%	100%	83%	67%	33%	17%	50%	50%	50%	100%	67%	100%	67%	67%	50%	0%	100%	50%	100%
5	average % (3) by stage																				60%
6	average % (4) by stage																				63%
		Validation Stage										Efficiency Stage									
1	N of startups/ Novice ENT	5	2	6	3	4	3	6	4	5	3	2	4	4	4	4	4	4	4	4	4
2	N of startups/ Expert ENT	2	0	3	2	2	2	4	3	2	2	0	2	2	2	2	2	2	2	2	2
3	% of startups 1 with EFF	83%	33%	100%	50%	67%	50%	100%	67%	83%	75%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%
4	% of startups 2 with EFF	50%	0%	75%	50%	50%	50%	100%	75%	50%	100%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%
5	average % (3) by stage										70%										92%
6	average % (4) by stage										56%										89%
		Scale Stage										% of startups using EFF more than CAU over all stages 73% 68%									
1	N of startups/ Novice ENT	3	3	3	3	1	2	2	3	3											
2	N of startups/ Expert ENT	0	2	2	2	1	1	1	2	2											
3	% of startups 1 with EFF	100%	100%	100%	100%	33%	67%	67%	100%	100%											
4	% of startups 2 with EFF	0%	100%	100%	100%	50%	50%	50%	100%	100%											
5	average % (3) by stage										85%										
6	average % (4) by stage										72%										