

Master Thesis Business Administration
Causation versus Effectuation: Exploring the Impact of Educational Background on
Entrepreneurial Decision-Making Strategies.

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Abstract

In exploring the field of entrepreneurial decision-making, this study delves into whether MBA students' education, with its focus on planned strategies, mirrors the complexities faced by novice entrepreneurs, who may use a mix of planned and emergent strategies to navigate through unpredictability. By analyzing the decision-making processes of 20 Australian novice entrepreneurs via think-aloud protocols, this thesis uncovers the extent to which a study background in business and management influence their strategic preferences for causation versus effectuation. The findings suggest a nuanced relationship between education and decision-making styles, challenging the dichotomy between causation and effectuation. This continues the conversation about the effectiveness of MBA programs in preparing students, while also offering valuable perspectives to mentors and policymakers aiming for entrepreneurial success among novices.

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1. Introduction

1.1 Background

Firms, and their entrepreneurs, continuously face uncertainty in an entrepreneurial context (Smolka et al., 2018). In the domain of new venture creation, it can be argued that the study of entrepreneurial decision-making has historically focused on either (1) the entrepreneur as a person (Llewellyn & Wilson, 2003), or (2) the circumstances and attributes of the project and its environment that contribute to its potential success or failure (Thornton, 1999). According to this stance on new venture creation, individuals either possess the necessary traits for entrepreneurship or lacking them (Thornton, 1999). In the latter case, potential entrepreneurs are advised to focus on acquiring strategies and skills that enable them to identify, recognize, and capitalize on opportunities within their context (Sarasvathy, 2008).

Such strategies revolve around two different perspectives. The first school of thought highlights entrepreneurs who establish a business through a planned process of the exploration and exploitation of opportunities (Ansoff, 1991, 1994; Bhawe, 1994; Shane & Venkataraman, 2000). A second school of thought emphasizes the emergent nature of entrepreneurial processes, such as bricolage (Baker & Nelson, 2005), improvisation (Hmieleski & Corbett, 2006; Kamoche et al., 2003; Moorman & Miner, 1998) and effectuation (Sarasvathy, 2001). We can therefore distinct between planning strategies and emergent strategies (Mintzberg & Waters, 1985). The former is also called deliberate strategies, whereas the latter is often addressed as non-predictive strategies (Wiltbank et al., 2006). Planning strategies entail frequent analyses, searching for trends, and evaluating multiple alternatives to guide the firm towards its optimal strategy for the future (Wiltbank et al., 2006). Emergent strategies are commonly used in dynamic environments. If the environment is unstable and uncertain, planning ahead is of no use (Brinckmann et al., 2010). According to Honig (2004), **the majority of business schools teach how to write business plans instead of focusing on alternative approaches**. Examples of frequently used models and analyses in planning strategies are the competitive analysis of Porter (1997) or the matrix model of Ansoff (1980). In the context of entrepreneurship, the planned versus emergent discussion deals with the question of whether entrepreneurs should engage in careful planning and goal-oriented execution of actions, or if they should adopt an ad hoc approach, starting without a predetermined plan and adapting to contingencies as they emerge whilst facing uncertainty and dealing with contingencies (Brinckmann et al., 2010; Smolka et al., 2018). Given an ambiguous context, the entrepreneur may decide to pursue both planning and action approaches (Smolka et al., 2018).

To further explore entrepreneurial processes in this study, we need to touch upon research in entrepreneurship first. As entrepreneurship and new venture creation are interwoven with today's economy, the quest of reducing the rate of failure is a key objective in entrepreneurship research (Sarasvathy, 2001). Job creation and an increasing real per capita income in free market capitalism seems to rely on entrepreneurial activity, specifically through new venture creation, therefore fostering this quest (Sarasvathy, 2001). Within entrepreneurship research, a focus on new venture creation stresses out entrepreneurial processes. Read and Sarasvathy (2005) propose that the entrepreneurial process encompasses a series of decision tasks, including selecting an idea or opportunity to pursue, establishing a legal entity, acquiring resources, involving stakeholders, managing growth, and developing exit strategies. In line with this definition, Shane and Venkataraman (2000) put forth a definition of entrepreneurship that encompasses these specific activities, defining it as *"(...) the process of discovery, evaluation, and exploitation upon opportunities to create*

future goods and services." (p. 172). Entrepreneurial process models have been studied by many scholars. According to Moroz and Hindle (2012), 32 entrepreneurial models have been found. Yet, the precise content of entrepreneurship and its processes remained unclear, making it challenging for scholars to agree on (Sarasvathy, 2008).

In the entrepreneurial decision-making discussion, Sarasvathy (2001) identified two opposing constructs named causation and effectuation. In the light of planning or emerging approaches, entrepreneurial decision-making can be categorized into causal and effectual decision-making. **Causal decision-making involves (business) planning, selecting opportunities based on profitability and risk mitigation.** It assumes that resources are needed beforehand and emphasizes the importance of conducting intensive market analysis to compete with or even avoid rivals. **Effectual decision-making** diverges from causal approaches as it **is about the use of emergent strategies for opportunity development** (Sarasvathy, 2001). To further understand the planned versus emergent discussion and dive into entrepreneurial decision-making, we continue with the two opposing constructs of causation and effectuation in this study.

The causation process *"...takes a particular effect as given and focuses on selecting between means to create that effect"* (Sarasvathy, 2001, p. 245). Rephrasing this as a logic, a causal logic is based on the following premise: **"to the extent we can predict the future, we can control it"** (Sarasvathy, 2008, p. 17). Main drivers of causation are prediction and the identification of pre-existing market opportunities. As summarized by Fisher (2012), in the causal model, entrepreneurs choose a specific set of means to accomplish a predetermined goal. Once the goal is set, the entrepreneur follows an intentional, linear process that involves activities such as identifying and evaluating opportunities, planning, acquiring resources, and exploitation of opportunities. Considering the emergent approach, an effectuation process *"...takes a set of means as given and focuses on selecting between possible effects that can be created with that set of means"* (Sarasvathy, 2001, p. 245). Stating effectuation as a logic, it is based on the following premise: **"to the extent we can control the future, we do not need to predict it"** (Sarasvathy, 2008, p. 17). Effectuation is an intuitive approach in the domain of emerging entrepreneurial strategies. It can be seen as dichotomous to causation (Fisher, 2012). The key distinction between causation and effectuation lies in the choices available. Causation focuses on selecting the optimal path to attain a particular outcome, whereas effectuation involves making choices among multiple potential outcomes using a predefined set of means (Sarasvathy, 2001). Referring to the opposing constructs in the light of entrepreneurial processes, Sarasvathy (2008) states the importance to focus on the 'means' of an entrepreneur. According to Sarasvathy (2001), entrepreneurs begin with three categories of means: who they are, what they know, and whom they know. The first category refers to the entrepreneur's own traits, tastes, and abilities. The second category, what they know, refers to the knowledge corridors they are in. This includes the information and expertise they have access to. The last category refers to the social networks they are a part of, being personal or professional. In dealing with either causal or effectual entrepreneurial processes, the three categories of means as a starting point are fundamental in navigating the uncertainties and challenges of the entrepreneurial journey.

Both causation and effectuation are integral parts of human reasoning that can occur simultaneously, overlapping and intertwining over different contexts of decisions and actions (Sarasvathy, 2001). March's explanation of exploration and exploitation highlights that causal reasoning and effectual reasoning do not always conflict with each other. Instead, both can work conjointly (March, 1991). One final note from Sarasvathy (2001) in her seminal paper is

to realize that the intention is not to present effectuation processes as "superior" or "more efficient" compared to causation processes when it comes to creating entities like firms, markets, economies, and so on.

1.2 Context

In laying out the elements of entrepreneurial expertise, Sarasvathy (2008) carefully describes and interprets what can be found in 32 interviews with expert entrepreneurs using think-aloud protocols whilst traveling through the United States of America. The analysis of this qualitative study provides a deeper understanding of the dichotomy between causation and effectuation and a base model for effectuation. This thesis compromises a dataset of 20 Australian novice entrepreneurs, using think-aloud protocol analysis to capture their knowledge and experience, risk profile, several contextual factors and motivations, to grasp the difference between causal and effectual decision-making processes.

In the literature of entrepreneurial decision-making and the use of causal and effectual approaches, the differences between expert entrepreneurs and novice entrepreneurs is commonly dealt with (Grégoire & Cherchem, 2020). **Even though the literature has concerns of what expert and novice entrepreneurs exactly are (Arend et al., 2015)**, it is widely accepted that expert entrepreneur initially assess the means available to them, which could be their personal and professional network, their personal experiences, training, expertise, as well as qualities like trustworthiness, risk propensity, and other (unique) skills (Read et al., 2009; Sarasvathy, 2001). On the other hand, novice entrepreneurs have a goal-oriented mindset, where they set a future objective wherefrom sub-goals are derived that determine every individual to be involved. Their decision-making process is driven by growth intentions and achieving desired outcomes (Sarasvathy & Dew, 2005).

This thesis revolves around MBA scholars and novice entrepreneurs. It lies on their exploratory efforts to deepen the understanding of causation and effectuation as shown in different studies (Grégoire & Cherchem, 2020; Sarasvathy, 2008) as well as being a proxy for novice entrepreneurs. The latter case is dealt with in the literature by **Dew et al. (2009)**. In their study, **the authors explore the differences between expert entrepreneurs and MBA students in their decision-making processes**. The study reveals that expert entrepreneurs adopt an effectual logic whereas MBA students tend to rely more on a 'predictive frame' and follow traditional approaches (Dew et al., 2009). Indeed, the use of expert entrepreneurs is similar to the work of Sarasvathy (2008). Moreover, both studies make use of the think-aloud protocol analysis. In her seminal work, **Sarasvathy (2001) found that causation has been the predominant logic in MBA education and thus among MBA students starting as novice entrepreneurs**. So are MBA scholars truly representative for novice entrepreneurs? Dew et al. (2009) acknowledge that using MBA students as a comparison group for novice entrepreneurs has limitations. Furthermore, in the theory assessment on effectuation of Arend et al. (2015), questions are raised on the use of MBA students as a proxy of novice entrepreneurs in these studies comparing effectual logic of expert entrepreneurs and novices (Dew et al., 2009; Sarasvathy, 2001, 2008). While the debate states that MBA students may not perfectly represent novice entrepreneurs, Sarasvathy (2008) argues that their inclusion in research studies can still offer valuable insights. Their diverse educational backgrounds, exposure to business concepts, and potential for future entrepreneurial endeavors can contribute to a richer understanding of decision-making processes in entrepreneurship (Dew et al., 2009; Sarasvathy, 2008). The inclusion of novice entrepreneurs with an business and management related background offers a unique opportunity to evaluate the applicability of business

education in adopting entrepreneurial skills that are crucial for identifying opportunities, leveraging resources, and making decisions under uncertainty. This seeks to bridge the theoretical knowledge taught in business schools with the practical skills needed to flourish in entrepreneurship.

1.3 Research gap and question

Sarasathy's seminal work in 2001 provided a foundational understanding of causation and effectuation, frequently applied to the context of MBA students navigating their initial entrepreneurial ventures. Her research illuminated that **causation predominantly underpins the logical frameworks taught within MBA programmes, influencing MBA students who are often at the nascent stages of their entrepreneurial careers**. Dew et al. (2009) expanded upon this foundation, using MBA students as comparative subjects to explore decision-making differences between novice and expert entrepreneurs. Their findings showed that while expert entrepreneurs predominantly utilize effectual logic, MBA students tend to align with predictive frameworks and traditional approaches. In line with other studies, this body of literature collectively build a narrative where MBA students serve as a proxy for the novice entrepreneur, making critical decisions based on the causal logic based on their education (Chandler et al., 2011; Dew et al., 2009; Read et al., 2009; Sarasvathy, 2001, 2008).

Despite the substantive body of literature examining entrepreneurship through the lens of causation and effectuation, a notable research gap persists regarding the use of MBA students as proxies for novice entrepreneurs. In 2015, a critique of effectuation appeared in the Academy of Management review (Arend et al., 2015) followed by four dialog pieces responding to the critique (Garud & Gehman, 2016; Gupta et al., 2016; Read et al., 2016; Reuber et al., 2016). Arend et al. (2015) raise crucial questions regarding the validity of such representations, especially when comparing the effectual logic of expert entrepreneurs and their novice counterparts. This critique lies in the understanding that MBA students possess a unique set of experiences, skills, and educational backgrounds that might not mirror those of novice entrepreneurs in broader, more diverse contexts. Baron (2009) echoes similar concerns, emphasizing the need to approach novices as proxies with caution. The concern lies in whether the predictive, causal frameworks that MBA students use can accurately reflect the diverse, dynamic decision-making processes novice entrepreneurs face. Without clear empirical evidence validating MBA students as true proxy of novices, our understanding of decision-making processes and logic among novice entrepreneurs remains limited (Baron, 2009).

This thesis aims to contribute to this gap by analysing whether MBA students can be a proxy of novice entrepreneurs in studies exploring causation and effectuation. This thesis examines think-aloud protocols from 20 Australian novices. By delving into the experience and decision-making strategies of Australian novices specifically, this research contributes to our global understanding of entrepreneurship (Autio, 2005). Some of the novice entrepreneurs have a business and management study background, to assess if they predominantly use causation, akin to the presumed preference of MBA students. As summarized above, using MBA students a proxies for novices is debated. This serves as the need to investigate the narrative in this study. Therefore, we are shedding light on the decision-making of novices. **By not directly sampling MBA students but including related fields, it aims to provide insights into their decision-making logic, enriching the discussion on MBA students' as a proxy of novice entrepreneurs**. Hence, the following research question is stated:

To what extent can MBA students be a proxy for the entrepreneurial decision-making of novice entrepreneurs?

This practice assumes that MBA students' exposure to business education equips them with decision-making patterns similar to those starting new ventures, as presented in Sarasvathy (2001) and Dew et al. (2009). That is the main reason why we care about MBA students in this study, despite being not directly sampled. The extent to which MBA curricula, which often emphasize predictive and plan-based approaches, accurately prepare students for the unpredictable nature of entrepreneurship remains underexplored. By examining the decision-making strategies of the novice entrepreneurs in the context of causation and effectuation, this study aims to offer a nuanced understanding of how business education influences entrepreneurial processes.

1.4 Research design

This thesis comprises seven chapters. After the introduction chapter, the next chapter gives a comprehensive literature review and presents the propositions. Here, the fundamental principles of the two distinct approaches are explained. Furthermore, the literature review works towards presenting the two opposing constructs of causation and effectuation as a mode of action (Dew et al., 2009; Grégoire & Cherchem, 2020). Chapter three focuses on outlining the methodology and provides an explanation of the coding and the analysis done. It also clarifies the use of think-aloud protocols as a research method and specifies the samples in the datasets used in this thesis. Chapter four entails the data analysis of the decision-making process of the Australian novice entrepreneurs with the use of MAXQDA, SPSS and Python. In chapter five, the findings are discussed. It opens up the discussion on MBA scholars being true proxies of real novice entrepreneurs. This chapter gives both theoretical and practical contributions, addresses the limitations of the study, and provides recommendations for future research. Chapter six captures the conclusions of this thesis. The final chapter is used for acknowledgements.

2. Literature review and propositions

This thesis aims to deepen the understanding of causation and effectuation within the context of novice entrepreneurial decision-making. Central to this exploration is the analysis of how MBA students, serving as proxies for novice entrepreneurs (Dew et al., 2009), navigate entrepreneurial decision-making. In order to support that purpose, both constructs of effectuation and causation and their principles are described in this chapter. Additionally, this chapter defines expert- and novice entrepreneurs and shines light on their preferences and differences in entrepreneurial decision-making. It further delves into the reasons for selecting MBA students as proxies of novices, presenting their typical decision-making approaches. Eventually, this chapter explores the effectual problem space and states why we use and work upon effectuation and causation in this thesis through an analysis of relevant literature.

As presented in the discussion on planned and emerging strategies within entrepreneurial decision-making, Sarasvathy (2001) introduced two contrasting constructs known as causation and effectuation. The work of Sarasvathy (2001) is closely linked with decision-making theories as it specifically addresses the establishment of firms in uncertain conditions and ambiguous contexts.

Effectuation, or the dichotomy along with causation, is not the only decision-making framework that fits uncertain and unpredictable environments. **Earlier theories in entrepreneurial decision-making** largely focused on ration planning models, which assume a relatively predictable and stable environment. However, this perspective began to shift with the recognition of Knightian uncertainty (Sarasvathy, 2001, 2008). **Knightian uncertainty** deals with situations where outcomes are unknowable, making traditional risk assessment models insufficient. This uncertainty is rooted in entrepreneurship, where new ventures often emerge in the unknown. Another concept worth mentioning is goal ambiguity. **Goal ambiguity** highlights that entrepreneurial ventures often evolve their goals as they grow and learn, unlike established (mature) businesses with clear objectives. Here, goals are not always pre-defined but emerge through the process of venture creation (Sarasvathy, 2001, 2008). The concept of isotropy further contemplate traditional models. **Isotropy** relates to how entrepreneurs interact with their environment. Sarasvathy (2008) describes it as the challenge of choosing which aspects of the environment will be of influence and which are simply noise. The ongoing complexities in entrepreneurial decision-making research could not be captured by Knightian uncertainty, goal ambiguity and isotropy alone, and thus moving the research field towards a broader perspective (Gregoire & Cherchem, 2020). Theories such as **bricolage** (Baker & Nelson, 2005), which emphasizes making do with available resources, and effectuation started to gain traction. These emergent theories recognize the resource-constrained and uncertain nature of new venture creation (Fisher, 2012). Eventually, the arrival at effectuation is the pinnacle of this change in perspective, as most notably captured in the work of Saras D. Sarasvathy, particularly her seminal paper in 2001. In order to understand the dichotomy of effectuation and causation, it must be understood how decision-making works under uncertain circumstances and, typically, in the context of new venture creation. This is carefully dealt with in the literature (e.g. Brettel et al. (2012), Knight (1921), Gartner (1985), Bird (1992), and Sarasvathy (2008)). For now, we move to the construct effectuation and how it can be defined in an entrepreneurial context.

2.1 Effectuation

The concept of effectuation can be easily demonstrated by the following scenario from Sarasvathy (2001). Please note that this anecdote is typically used in research papers to present an effectual logic, which might prove how clearly it illustrates the concept. Therefore, we allow ourselves to state it once again in this thesis. Consider a scenario where a chef asked to cook dinner. In an effectual process, the host instructs the chef to explore the kitchen cupboards for potential ingredients and utensils, and then creates a meal. Here, the chef needs to imagine various menu options based on the available means, choose a menu, and proceed to prepare the meal. This is a process of effectuation, where the chef starts with existing ingredients and utensils and focuses on crafting one of several potential delightful meals (Sarasvathy, 2001, p. 245)

Effectuation is a decision-making framework used by expert entrepreneurs to navigate uncertainty and create new ventures (Dew et al., 2009). Effectual decision-making, or effectual reasoning, starts with a given set of means and focuses on creating new opportunities based on those means (Grégoire & Cherchem, 2020; Sarasvathy, 2001, 2008). It is known for its applicability in dynamic and unpredictable environments making it excellent to deal with contingencies and has gained significant attention in entrepreneurship (Grégoire & Cherchem, 2020; Sarasvathy, 2008). **Effectuation is rooted in the understanding that humans cause the future and therefore, the future can be controlled and/or created by human action** (Sarasvathy, 2008). Hence, the earlier mentioned logic *“to the extent we can control the future, we do not need to predict it”* (Sarasvathy, 2001, p. 252). Here, the ‘we’ is referring to those entrepreneurs willing to control the future of their firms. Therefore, effectuation is actor dependent (Sarasvathy, 2001). This is explained by the emphasis on the entrepreneur's central role in shaping the venture. Unlike traditional models that focus on market prediction and adaptation, effectuation, as outlined by Sarasvathy (2001), asserts that entrepreneurs create opportunities and direct their ventures based on personal resources, knowledge, and networks. Effectuation thus deals with the entrepreneur's characteristics and strategic choices, making it dependent on the individual actor.

Expert entrepreneurs

Creating a firm in an industry that does not yet exist calls for strategies very different from those used for penetrating a predefined and well-structured market (Sarasvathy, 2001). Expert entrepreneurs are known for doing the former and therefore linked to the use, or preference, of effectual decision-making (Dew et al., 2009). Before explaining the link and reasoning between expert entrepreneurs and their use of effectual logic, we start with how expert entrepreneurs are defined in the literature, and what makes them expert? An expert entrepreneur is defined as someone who has attained reliably superior performance in a domain, specifically in the creation of new ventures, new products, and new markets (Dew et al., 2009). Their approach is known as effectuation and is characterized by a focus on the means at hand, the use of contingencies, and the creation of new opportunities through the interaction of stakeholders. Definitions vary from using years of experience or a portfolio with multiple established firms (Dew et al., 2009), performance based definitions such as a public listed company (Sarasvathy, 2008), or stressing out ones management skills to cope with uncertainty and risk (Chandler et al., 2011). Several researchers have studied expert entrepreneurs in the light of their expertise, associated with deep personal abilities and knowledge derived from extensive practice and experience (Dew et al., 2009; Perry et al., 2012; Read et al., 2017; Sarasvathy, 2008). In the light of expertise and personal traits, Perry

et al. (2012, p. 843) defines expert entrepreneurs as individuals who "generally perceive risk and reward differently, and they differ in how they attempt to predict or control uncertainty." However, Arend et al. (2015) advocates to take caution when defining expert entrepreneurs and their expertise. The authors debate that the definition of an expert entrepreneur used in the work of Sarasvathy (2001) and Dew et al. (2009) may skew the sample towards older, more male, and more educated individuals, which may call into question what drove success and whether the effectuation theory should have used alternative sampling (see the work on effectuation as a theory in Sarasvathy (2008)). Moreover, the existence of expert entrepreneurs has been questioned by Baron (2009), who argues that expertise requires deliberate practice. Please see the debate on entrepreneurial expertise and deliberate practiced in the light of expert entrepreneurs in the literature (Baron, 2007, 2009; Baron & Henry, 2010; Ericsson, 2004).

Given the construct effectuation and the definition of expert entrepreneurs, we continue with expert entrepreneurs and their reasoning for using effectual decision-making. According to (Dew et al., 2009), expert entrepreneurs are linked to the use of effectuation because they tend to frame decisions using an effectual logic. The authors found that expert entrepreneurs tend to focus more on building the venture as a whole, identify numerous potential markets, pay less attention to predictive information, are more concerned with utilizing available resources and invest according to affordable loss, and prioritize their network of partnerships (Dew et al., 2009). These findings among expert entrepreneurs truly reflect an effectual logic and its principles. Here, the link lies in mastering the five principles and the use of effectual logic in creating successful firms. In the literature, understanding and applying the effectuation principles as an entrepreneur is often referred to as a set of skills and knowledge to navigate the uncertain environment of entrepreneurship (Dew et al., 2009; Read & Sarasvathy, 2005; Reuber & Fischer, 1999; Santos, 2012; Sarasvathy, 2001, 2008). Other studies refer to the expertise of an (expert) entrepreneur to highlight one's use of effectual logic based on the principles (Harmeling et al., 2004; Harting, 2004; Perry et al., 2012; Sarasvathy & Kotha, 2001). The study of Read and Sarasvathy (2005) confirms that expert entrepreneurs are more likely to adopt an effectual approach. Additionally, Grégoire and Cherchem (2020) found in their literature review that expert entrepreneurs tend to rely more on effectual logic than on causal logic when making decisions. Sarasvathy suggests in several studies that expert entrepreneurs are more comfortable with uncertainty and are better able to manage it through the use of effectual logic (Sarasvathy, 2003, 2008; Sarasvathy et al., 2013).

Effectual principles

We continue to describe the principles that capture the effectual logic of (expert) entrepreneurs. Throughout the process, expert entrepreneurs in particular apply the following principles, which challenge conventional decision-making criteria in traditional management practices and theories (Sarasvathy, 2008). At the core of effectuation are five principles that guide entrepreneurial decision-making, as presented below.

Means-driven action

This principle emphasizes starting with **one's available means**, including personal traits, knowledge, skills, and social connections. Sarasvathy (2001) puts these three types of means at the start of the entrepreneurial process: the entrepreneurs' knowledge of who he or she is, what he or she knows, and the knowledge in its network whilst illustrating it as the bird-in-

hand principle (Sarasvathy, 2008). Means-driven action as a principle has been drawn from the resource-based theory of a firm (Barney, 1991). As per the bird-in-hand principle, entrepreneurs identify what they already have, rather than solely focusing on external resources they lack. By leveraging their existing assets, they create innovative opportunities and seize contingencies (Sarasvathy, 2008).

Affordable Loss

Effectuation encourages entrepreneurs to set affordable loss thresholds rather than targeting specific expected outcomes. Instead of asking, "what can I gain?" entrepreneurs ask, "what am I willing to lose?" (Sarasvathy, 2008). Affordable loss extends beyond financial stakes, urging entrepreneurs to consider what they are willing to lose in a broader sense. This includes not only monetary aspects, but also time invested in the venture, personal effort, and even aspects of their ego or self-image (Sarasvathy, 2008). Such approach to assessing risk enables entrepreneurs to manage uncertainty more effectively and engage in ventures that align with their overall tolerance for loss and personal life goals (Dew et al., 2009).

Partnerships

Entrepreneurs build partnerships and networks with stakeholders who share the same vision and are willing to commit resources to the venture. This diverse set of stakeholders forms a "crazy quilt" of relationships that provides a foundation for growth and opportunity (Sarasvathy, 2008). This crazy-quilt principle reflects the importance of the entrepreneurs' network in the effectual logic. This involves that entrepreneurs should not limit to a specific set of partners and create new partnerships that result in new spikes in their hub of opportunities, even before the start of the entrepreneurial process (Read et al., 2017).

Leveraging contingencies

Referred to as the lemonade principle, the effectual approach of Sarasvathy (2008) suggests to embrace surprises and unforeseen events as potential opportunities rather than setbacks. Effectual entrepreneurs are 'experts' at pivoting and adapting their goals and strategies based on changing circumstances, transforming unexpected challenges into positive outcomes (Sarasvathy, 2001). When entrepreneurs put their available means, affordable loss, and network partners into use, unforeseen challenges are likely to arise (Dew et al., 2009). Meanwhile, uncertain conditions and contingencies may give rise to new opportunities during the entrepreneurial process (Sarasvathy, 2001).

Non-predictive control

Also known as pilot-in-the-plane principle, it states that entrepreneurs believe they can shape and influence the future through their actions. Rather than passively reacting to external forces, they actively engage in shaping their environment by taking intentional and decisive steps. The effectual logic as stated by Sarasvathy (2001, p. 252) saying "to the extent we can control the future, we do not need to predict it" is at the core of the principle of non-predictive control.

Following an effectual logic with the principles above, the literature suggests that effectuation is particularly well-suited for situations of high uncertainty, ambiguity, and resource constraints. It provides entrepreneurs with a flexible and adaptive approach to deal with the unknown and unpredictable nature of entrepreneurship (Read et al., 2017). By leveraging

their existing means, entrepreneurs can generate new opportunities and solutions, rather than waiting for external conditions to be favourable. Several studies with empirical evidence (Dew et al., 2009; Fisher, 2012; Perry et al., 2012; Read et al., 2009; Sarasvathy, 1998; Sarasvathy & Dew, 2005; Wiltbank et al., 2006) have shown that effectuation plays a crucial role in the decision-making process of successful entrepreneurs, however, its application may vary based on individual traits, prior experiences, and the context in which entrepreneurs operate.

2.2 Causation

The contrasting concept of effectuation is causation (Brettel et al., 2012; Chandler et al., 2011). In a landscape of new venture creation and growth, understanding the factors that lead to entrepreneurial success remains a critical area of research (Grégoire & Cherchem, 2020). At the heart of this investigation lies the concept of causation, another fundamental construct that guides decision-making and shapes the path of entrepreneurs and their firms (Sarasvathy, 2001, 2008). Causation, in the context new venture creation, **refers to the traditional approach of predicting and planning for future outcomes based on existing means and objectives** (Sarasvathy, 2001). The concept of causation, as a subconstruct presented by Chandler et al. (2011) and originating from Sarasvathy (2001), is known for envisioning goals, business planning, maximizing expected returns, competitive analyses to predict an uncertain future, and exploiting pre-existing knowledge. Entrepreneurs using causation define their objectives prior to starting a firm and systematically search for ways to achieve them (Fiet, 2002; Herron & Sapienza, 1992), evaluating and selecting opportunities that maximize expected returns (Drucker, 1998). This involves a systematic approach to planning and exploiting pre-existing knowledge and resources, with all efforts aimed at achieving the goal in mind (Chandler et al., 2011). Here lies one contrast with effectuation, where the means are known but the effects are largely uncertain (Brettel et al., 2012). Sarasvathy (2001) clarifies that in the causal model, the entrepreneur selects specific means to achieve a set goal, therefore describing entrepreneurship as a linear phenomenon characterized by causal relationships. This approach, with its linearity, seeks to prevent unwanted surprises arising from uncertainty as much as possible. It assumes that markets pre-exist, and that market-related information is freely available (Fisher, 2012; Sarasvathy, 2001). Systematic opportunity search and business planning are key in causation, and, given that much entrepreneurship literature is grounded in causation, it is unsurprising that entrepreneurship education emphasizes business planning techniques such as market research, competitive analysis, and financial forecasting (Chandler et al., 2011; Dew et al., 2009; Sardeshmukh & Smith-Nelson, 2011). Consequently, the business plan, which aims to boost profits through efficiency and increased sales (Honig & Karlsson, 2004), is a fundamental subject in business school education. When multiple business opportunities are available, following the causal approach typically results in selecting the option with the highest expected return.

We now demonstrate the concept of causation with the use of the same scenario as we have used in representing an effectual logic. Consider once again the scenario of a chef asked to cook dinner. Here, in a causal process, the host or client picks out a menu in advance. All the chef needs to do is list the ingredients needed, shop for them, and then actually cook the meal. This is a process of causation. It begins with a given menu and focuses on selecting between effective ways to prepare the meal. (Sarasvathy, 2001, p. 245)

Novice entrepreneurs

In the study of Dew et al. (2009), there is a focus on the use of causation among novice entrepreneurs. Similar to expert entrepreneurs and their use of effectuation, we start with defining novices as per the literature. A novice entrepreneur is an individual who is new to the field of entrepreneurship and possesses limited experience in starting and managing a business (Chandler et al., 2011; Grégoire & Cherchem, 2020). This lack of experience may lead to the use of causal reasoning, which focuses on predicting and controlling future outcomes, rather than the effectual approach often adopted by expert entrepreneurs (Dew et al., 2009; Read & Sarasvathy, 2005). As pointed out by Arend et al. (2015) and Sarasvathy (2001), such entrepreneurs might not have the skills, knowledge, or resources necessary for successful entrepreneurship. Novice entrepreneurs tend to use causation as it provides a structured and rational approach to venture creation and development.

First, the structured nature of causation makes it particularly appealing to novice entrepreneurs. As they often lack experience in venture creation and development, following a structured and rational approach helps reduce the complexity and uncertainty associated with starting a new venture (Chandler et al., 2011). This helps novice entrepreneurs to organize their thoughts, make informed decisions, and develop a clear roadmap for their venture (Fisher, 2012).

Secondly, the planned approach is heavily emphasized in entrepreneurship education and literature (Chandler et al., 2011; Dew et al., 2009; Sardeshmukh & Smith-Nelson, 2011) and aligns with the traditional management theories and practices that novice entrepreneurs are often familiar with (Mintzberg, 1978). As a result, novice entrepreneurs are often exposed to causation-based theories, models, and techniques during their education and training.

Moreover, the causation approach helps novice entrepreneurs to manage uncertainty and reduce risks (Sarasvathy, 2001). By focusing on selecting the means to create a particular effect, and using all available information to make informed decisions, it helps prevent unwanted surprises resulting from uncertainty.

Lastly, the causation approach facilitates the acquisition of resources, which is crucial for venture creation and development (Fisher, 2012). By developing a detailed business plan, novice entrepreneurs can clearly articulate their venture's value proposition, target market, competitive advantage, and financial projections. This helps them to secure funding from investors, lenders, or other stakeholders, as it demonstrates that they have thoroughly analysed their venture.

Causal principles

Novice entrepreneurs typically apply the following principles when using a causal logic. Drawing from the inherent nature of causal logic, causation consists of the following five principles: predictive modelling, goal-driven action, expected return, competitive analysis, and avoiding contingencies (Sarasvathy, 2001).

Goal-driven Action

Causation places a premium on goal-oriented strategies. Causal entrepreneurs **start with a clear vision or goal and then gather the necessary resources to achieve it** (Sarasvathy, 2008). The entrepreneurial process, in this case, revolves around desired outcomes or effects, followed by the sourcing of means tailored to these ends (Sarasvathy, 2008).

Expected Return

Causal entrepreneurship is rooted in the principle of maximizing expected return on investments (Sarasvathy, 2001). Here, ventures are not merely evaluated on the metric of how much loss an entrepreneur can afford. Instead, they're chosen based on the anticipated return-on-investment, ensuring that maximum possible gains are pursued (Sarasvathy, 2008). **The primary focus is on amplifying rewards** rather than limiting risks (Dew et al., 2009)

Competitive Analysis

Causation emphasizes a thorough understanding of the market landscape, fuelled by competitive analysis. Rather than expanding one's network indiscriminately, causal entrepreneurs **strategically position themselves as competitors to carve out a unique market niche** (Dew et al., 2009). Here, the objective is not just to collaborate but merely to outperform and differentiate from the competition.

Avoiding Contingencies

Causal logic aligns with **proactive risk management**, ensuring contingencies are anticipated and avoided (Chandler et al., 2007; Chandler et al., 2011). Causation strategies plan to mitigate any uncertainties (Dew et al., 2009). This ensures a smoother, more predictable entrepreneurial journey, with fewer disruptions and deviations from the planned path.

Predictive control

In stark contrast to effectual logic's emphasis on what can be controlled in the present, causation leans heavily on predictive methods to chart out the future. By relying on robust forecasting models, causal entrepreneurs aim to **pre-emptively address potential challenges and seize upcoming opportunities** (Dew et al., 2009; Sarasvathy, 2001; Wiltbank et al., 2006).

2.3 MBA students as proxies of novice entrepreneurs

The use of MBA students as proxies for novice entrepreneurs in entrepreneurial research is part of an ongoing debate. While some scholars state that MBA students' exposure to business concepts and a planned approach makes them represent novice entrepreneurs (Dew et al., 2009), others argue that this comparison might not fully capture the challenges faced by real-world novice entrepreneurs (Arend et al., 2015). This debate goes along with the broader question of how closely MBA curricula align with entrepreneurship in practice. On one hand, MBA programs are often criticized for overemphasizing theoretical frameworks and predictive models (Mintzberg, 1978; Sarasvathy, 2001). This detour raises concerns about whether MBA students, who are trained in more traditional, causation-based approaches, can adequately mirror the decision-making processes of novice entrepreneurs. On the other hand, advocates of using MBA students as proxies point to the comprehensive business education these students receive, which provides them with a broad understanding of various aspects of business and entrepreneurship (Chandler et al., 2011). Furthermore, as MBA students often engage in simulation-based learning or case studies that mimic entrepreneurial scenarios, some scholars argue that their decision-making processes in these controlled environments can offer valuable insights into novice entrepreneurial behaviours (Sardeshmukh & Smith-Nelson, 2011). However, this viewpoint is countered by the argument that such simulated experiences lack the reality of the pressures and constraints found in real entrepreneurial ventures (Baron, 2009; Ericsson, 2004). The debate extends to the diversity of the MBA students themselves. The variability in backgrounds and career goals among MBA students leads to a spectrum of perspectives and experiences, which may or may not align with those

of typical novice entrepreneurs (Baron & Henry, 2010). In summary, while MBA students offer an accessible sample for studying entrepreneurial decision-making, the debate underscores the need for caution and critical evaluation when generalizing findings from this group to novice entrepreneurs.

2.4 Effectuation and causation as a dichotomy

In addition to the work of Sarasvathy, many scholars have contributed to the effectuation literature (Alsos et al., 2014; Arend et al., 2015; Brettel et al., 2012; Chandler et al., 2011; Grégoire & Cherchem, 2020; McMullen & Shepherd, 2006; Perry et al., 2012; Werhahn et al., 2015). Sarasvathy (2008) explains that effectuation can be studied both empirically and theoretically but acknowledges that in order to have a better understanding about the construct, a dichotomous approach should be used in studying effectuation theoretically. In this thesis, we continue to use effectuation and causation as a dichotomy among novice entrepreneurs. The constructs causation and effectuation offer a novel perspective on the cognitive processes that entrepreneurs employ when making decisions (Sarasvathy, 2001, 2008). Using them as a dichotomy is valuable for several reasons (Chandler et al., 2011; Grégoire & Cherchem, 2020). First, causation aligns with established strategic models suggesting planned, predictive approaches (Brews & Hunt, 1999; Mintzberg, 1978). It relies on conditions where outcomes can be anticipated, either through calculation or statistical inference. In contrast, effectuation resonates with emergent strategies, suitable for unpredictable settings where statistical inference is not feasible (Mintzberg, 1978; Wiltbank et al., 2006). The dichotomy thus highlights the tension between predictability and adaptability in entrepreneurial decision-making, once referred to as a delineation (Chandler et al., 2011). Second, much of the earlier work on causation and effectuation is experimental or qualitative (Dew et al., 2009; Sarasvathy, 1998; Sarasvathy & Kotha, 2001). Emphasizing this dichotomy invites more rigorous, quantitative research. As posited by Wiltbank et al. (2009) and Edmondson and McManus (2007) there is a need for empirical tools measuring various dimensions of these concepts. Third, the discourse in entrepreneurial literature can be elevated. Such studies extend the foundational work of Sarasvathy (2001) by offering a systematic, empirically backed understanding of these strategies. Additionally, understanding when and why entrepreneurs use causation versus effectuation can have implications for areas such as venture funding, team formation, and strategic alliances (Grégoire & Cherchem, 2020). While the dichotomy stands as contrasting modes, in practice, entrepreneurs might shift from effectual to causal strategies as their venture matures (Dew et al., 2009). Recognizing this dichotomy allows stakeholders to better understand and anticipate the evolving needs and strategies of a growing venture (Chandler et al., 2011; Dew et al., 2009; Sarasvathy, 1998).

2.5 Propositions

Two propositions are derived to explore the dichotomy between causation and effectuation in the context of entrepreneurial decision-making, whilst examining if MBA students truly can be a proxy of novice entrepreneurs.

Proposition 1: MBA students are a good proxy for novice entrepreneurs.

In examining the role of MBA students as proxies for novice entrepreneurs, we have already found a nuanced debate. Further exploration into the debate reveals that while MBA students offer a convenient sample for studying entrepreneurial decision-making, generalizing findings

from this group to the broader novice entrepreneur population requires caution. The diverse educational backgrounds, experiences, or even career goals in an MBA environment may or may not align with those typical novice entrepreneurs (Baron & Henry, 2010). This diversity, while enriching our understanding, also complicates the assumption of MBA students as proxies for novice entrepreneurs. Given these insights, proposition 1 posits that MBA students, with their education in business and management, provide a valuable lens through which we can study the decision-making strategies of novice entrepreneurs. This proposition reflects the ongoing debate and the need to evaluate the use of such proxy for real-world novice entrepreneurs.

Proposition 2: novice entrepreneurs tend to utilize the use of causation strategies over effectuation strategies.

Novice entrepreneurs primarily use causation strategies in the first stages of venture creation, reflecting their trust on predictive, goal-oriented planning and risk mitigation approaches. Based on the works of Sarasvathy (2001) and Dew et al. (2009), this proposition explores the observed tendencies of novice entrepreneurs to follow causation logic. Novice entrepreneurs, often characterized by their limited experience in navigating new venture creation, resonate well with the predictability and control offered by causation strategies. As presented in this chapter, this preference is further underpinned by the structured and goal-driven nature of causation, which fits individuals starting their entrepreneurial journey. Furthermore, the educational backgrounds of these individuals, particularly those with business-related degrees, reinforce this tendency, as they are frequently exposed to causation-based theories, models, and techniques that use a systematic and analytical approach to business planning and decision-making. This alignment between education and the preference for causation strategies among novice entrepreneurs highlights the critical role of educational experiences in shaping strategic choices. As such, proposition 2 posits that the utilization for causation over effectuation among novice entrepreneurs is not merely a matter of personal preference but is significantly influenced by their educational background and the inherent desire for predictability and control in the uncertain journey of venture creation.

3. Methodology

This thesis aims to delve into the entrepreneurial decision-making process by examining the thought processes of novice entrepreneurs using the think aloud protocol method, which offers insights into real-time cognition (Ericsson & Simon, 1980; Van Someren et al., 1994). As the sample consists of real novice entrepreneurs, this thesis analyses if novices are aligned closely to causation (Arend et al., 2015; Baron, 2009; Dew et al., 2009). Moreover, this thesis explores if MBA students are a proxy for novice entrepreneurs as well. Considering the type of data, precise analysis is crucial.

3.1 Sample

This thesis uses the think aloud protocols as obtained in the work of Hal (2012), providing us a sample that consists of twenty Australian novice entrepreneurs, collected through the network of the Australian Centre of Entrepreneurship at the Queensland University of Technology. This eventually ended up in contacting universities throughout Australia to arrive at the sample set of twenty novices. For the purposes of maintaining uniformity in the sample, the original dataset used the following sample selection. Interviews were conducted exclusively with entrepreneurs who either were currently enrolled in university courses while simultaneously initiating a business venture or had graduated within the past two years and launched a business within that timeframe. Note that not all participants were following MBA programs, or specific MBA curricula. Perry et al. (2012) underlined the necessity of this approach, emphasizing “to sample subjects who are more representative of the individuals who are in the process of starting businesses, developing not-for-profit organizations, or engaging in other activities where effectuation might apply” (Perry et al., 2012, p. 13). Therefore, the eligibility for participation was extended to student-entrepreneurs from diverse business sectors. To get to the final sample of twenty participants, novices that started businesses in all kinds of areas were eligible to join.

The think-aloud protocols are retrieved from these twenty participants, however, sample characteristics were not available for all participants. The specifications of the sample are presented in Table 1. In examining the study background, a realignment of their educational fields was conducted to better align with the focus of this thesis. The category 'Business and Management Oriented' consists of participants from economics, business, finance, and entrepreneurship fields. This grouping is closely aligned with traditional MBA curricula, emphasizing the relevance of business and management education in shaping entrepreneurial strategies. Such an alignment is crucial for understanding how a business-focused educational background might influence a novice entrepreneur's tendency towards causation in decision-making processes. Other categories include Communication and Social Sciences, Technical and Quantitative Fields, and Engineering and Applied Sciences. While these areas offer diverse perspectives and problem-solving approaches, they are distinct from the direct business and management focus of an MBA. This thesis allows itself to compare with earlier research that made use of MBA scholars (Dew et al., 2009; Read et al., 2009; Sarasvathy et al., 2013). The study of Dew et al. (2009) used 37 MBA students as a comparison group for novice entrepreneurs. The MBA students were recruited from a top-ranked business school in the United States and had an average age of 28. Read et al. (2009), which was a meta-analysis that examined the relationship between decision-making style and entrepreneurial performance, including MBA students, focusing on effectual decision-making and entrepreneurial performance. Sarasvathy et al. (2013), which used a survey to examine

how MBA students' reason about the future, explaining the tendency to rely more on causal logic than on effectual logic.

Table 1 *Sample Characteristics of the Twenty Australian Novice Entrepreneurs*

Sample characteristics ¹	Cases (n=20)	Study background	
		Business and management related (n=7)	Other ² (n=11)
Missing ³	2		
Demographics			
Male	15 (83.3)	5 (33.3)	10 (66.7)
Female	3 (16.7)	2 (66.7)	1 (33.3)
Age, <i>M (SD)</i>	24.5 (2.706)	24.14 (1.773)	24.82 (3.219)
Education			
Bachelor	16 (88.9)	6 (37.5)	10 (62.5)
Master	2 (11.1)	1 (50)	1(50)
Study duration in years, <i>M (SD)</i>	4.14 (2.134)	3.5 (0.764)	4.55 (2.631)
Business exposure			
Work experience in years, <i>M (SD)</i>	5.39 (2.731)	5.29 (2.360)	5.45 (3.053)
Business sector			
Creative and communication industries	9 (50)	2 (25)	6 (75)
Finance, economics and sales related industries	0 (0)	0 (0)	0 (0)
Technology and innovation related businesses	4 (22.2)	3 (75)	1 (25)
Construction related industries	2 (11.1)	0 (0)	2 (100)
Other	3 (16.7)	1 (33.3)	2 (66.7)
Missing	0	1	0
Family background			
Entrepreneur	8 (50)	3 (37.5)	5 (62.5)
Public servant	1 (6.3)	0 (0)	1 (100)
Public company	7 (43.8)	4 (57.1)	3 (42.9)
Missing	2	1	1

¹ Variable distributions are reported as *n (%)* unless otherwise specified.

² Other study directions include Communication and Social Sciences, Technical and Quantitative Fields, and Engineering and Applied Sciences

³ For two respondents, subject characteristics are missing. Their think-aloud protocols are captured thus a n =20 is taken for the analysis.

Abbreviations: M, mean; SD, standard deviation.

In exploring the entrepreneurial decision-making processes of novice entrepreneurs, this study sets its lens on an interesting geographical context: Australia. Situated miles away from the more traditional hubs of entrepreneurship research, such as the United States and Europe, Australia provides a unique environment (Howard & Kuratko, 2010). The distinct economic landscape, characterized by a robust small and medium-sized enterprise (SME) sector, startup ecosystem, and supportive governmental policy development, offers a solid ground for researching the nuances of entrepreneurial decision-making. This is captured in the country's geographical isolation, along with its strong economic ties to both Western and Asia-Pacific markets, positioning Australian (novice) entrepreneurs in a unique setting of both global and local perspective (Hughes et al., 2007).

3.2 Method

The method used in this study are verbal protocols, with the use of think aloud protocols specifically. According to Van Someren et al. (1994), verbal protocols refer to the process of having participants verbalize their thoughts as they perform a task or solve a problem. This technique is commonly used in cognitive psychology and other fields to gain insight into the thought processes and decision-making strategies of individuals. For think aloud protocols specifically, participants are asked to verbalize their thoughts as they perform a task, or retrospective protocols, in which participants are asked to recall and describe their thought processes after completing a task (Van Someren et al., 1994). This method aims to gain direct insights into cognitive processes, effectively "looking inside the black box" of a person's thinking, in real-time, and proved to be suitable for studying decision-making (Dew et al., 2009).

In the ensuing think aloud sessions, participants were instructed to articulate continuously, verbalizing all thoughts occurring to them throughout the session's duration. Within the context of this research, participating student-entrepreneurs were engaged in working through a hypothetical case, wherein they navigated decision-making dilemmas characteristic of new venture development, pertaining specifically to a conceptual coffee company named Coffee Inc. The case presented to participants comprised ten decision-making challenges, with their construction informed and inspired by a case previously utilized in Sarasvathy (2008). While minor adjustments were made to these challenges to align with the thematic focus on a coffee company, the core issues addressed remained consistent. A detailed overview of the decision-making challenges is provided in appendix 1.

The challenges were deliberately crafted to avoid simplicity that might enable resolution with ease by participants (Van Someren et al., 1994). To help participants familiarize to the verbalization process, they were requested to read the case aloud. Prior to each session, participants received written instructions emphasizing the necessity of continuous verbalization of their thoughts. Each think-aloud session was recorded, with transcription following subsequently. In our study, we used MAXQDA software to code the think-aloud protocols. This process involved assigning codes to the protocols, converted to line numbered texts. MAXQDA facilitated the organization and coding of the qualitative data. Within MAXQDA, we chose line numbered texts as it enables us to reference and analyze data with high precision. This method allows for a more granular examination of text, facilitating detailed coding, and analysis (Kuckartz & Rädiker, 2019, p. 37).

Codebook

We have designed a coding framework for the evaluation of the transcriptions, based on the foundational principles established in the work of Sarasvathy (2001). The structure and details of the codebook is influenced by Sarasvathy's comparative illustration of causal and effectual logic (Sarasvathy, 2008, p. 53), as presented in appendix 2. For a list of the codes used, please see the coding scheme on general term as presented in table 2. Throughout the 20 protocols, 950 coded segments were retrieved within MAXQDA.

Table 2 *Coding Scheme*

Effectuation	Causation
B – Means-driven action	G – Goal-driven action
A – Affordable loss	E – Expected return
C – Partnerships	N – Competitive analysis
L – Leverage contingencies	K – Avoiding contingencies
P – Non-predictive control	R – Predictive control
X – Effectual (no subcategories)	Y – Causal (no subcategories)

Drawn from Sarasvathy (2001, 2008), the codebook used for this study is presented in appendix 2. To establish a refined codebook, we analyzed the critique given in the literature. In the introduction, we saw that the main critique on effectuation and causation (as a dichotomy) in entrepreneurial decision-making is from Arend et al. (2015) and Baron (2007, 2009). Their points mentioned are captured in appendix 3. Based on this, we incorporated three elements into the codebook. First, given the critique of ambiguity, we make an effort to differentiate each principle from related constructs in entrepreneurship or management literature. Second, to reduce ambiguity when coding, we described clear criteria or indicators that help represent the presence of each principle in the think aloud protocols. Third, since one of the critiques is the potential overlap between constructs, we highlight potential areas of overlap between different principles. The potential overlaps are listed in appendix 4.

3.3 Analysis

A think-aloud protocol analysis is a robust method for exploring cognitive processes in detail. This approach is particularly effective in understanding the decision-making processes of novice entrepreneurs (Dew et al., 2009), whether they are effectual or causal in nature. The methodology involves several key steps adapted from (Van Someren et al., 1994), tailored to our specific research context.

1. *Transcription of protocols.* This process involves capturing the verbalizations of participants accurately to ensure a comprehensive analysis. Transcriptions provide a detailed record of the participant's thoughts during the decision-making process.
2. *Segmentation and coding of transcripts.* The transcribed data is then segmented into meaningful units, which are called retrieved segments in MAXQDA. These segments are coded using the refined coding scheme informed by the theory of Sarasvathy and other work on entrepreneurial decision-making (Dew et al., 2009; Harmeling et al., 2004; Harting, 2004; Sarasvathy, 1998; Sarasvathy & Dew, 2005; Sarasvathy & Kotha, 2001; Wiltbank et al., 2009).

3. *Comparative analysis.* The focus here is on a comparative analysis that involves examining and contrasting the coded segments to identify patterns, themes, and insights relevant to the decision-making processes of novice entrepreneurs.
4. *Validation of the coding process.* The coding scheme's validity is assessed to ensure reliability and accuracy in the interpretation of the data. This is achieved by having multiple coders with whom a pilot test was performed on a subset of the data.
5. *Synthesis of findings.* This synthesis aims to draw meaningful conclusions about the cognitive strategies, patterns, and decision-making styles of novice entrepreneurs based on the think-aloud protocols.

We continue to use the analyses, as described above, to test the two propositions of this thesis. At first, the coded protocols provides us insights in the entrepreneurial decision-making apart from other data such as gender, age or study background. Within the set of twenty novices, we can control for study background by looking at business or management related studies. Here, we can make use of comparative analysis to compare the patterns found in novice entrepreneurs who have or don't have such background. This will strengthen the argument of MBA students as proxies for novice entrepreneurs. The above can be used to test the first proposition.

Proposition 1: MBA students are a good proxy for novice entrepreneurs.

To test the second proposition, the analysis will focus on quantifying the instances of causal and effectual reasoning expressed by each student-entrepreneur. Here, we will count the frequency of causal and effectual thoughts but also identify the specific principles of these two decision-making methods across different problem areas. By doing so, we can determine the causal and effectual reasoning per problem per respondent, resulting in 120 variables (twelve applicable codes across ten problem sets). To quantify participants' strategy use, we tallied occurrences of causation and effectuation for each. We then computed the total use for both causation and effectuation and continued with the normalized share difference by subtracting effectuation from causation instances and dividing by their total, yielding a scale from -100 (pure effectuation) to 100 (pure causation), with 0 indicating a balanced approach. This scale will indicate the extent to which causal reasoning is employed by the novices and be used to test the second proposition. Here, we look if the decision-making of the group of Australian novice entrepreneurs skews towards causation, drawn from a normalized share difference.

Proposition 2: novice entrepreneurs tend to utilize the use of causation strategies over effectuation strategies.

To ensure the robustness and reliability of our qualitative analysis, we determined the percentage of agreement. The protocols were coded by two coders. Following the initial round, we computed the agreement. Based on the mean of 0.88, the agreement reached over 80% which falls within an acceptable range (Van Someren et al., 1994). We continued the process of addressing disparities until full agreement was achieved. Text segments or sections were coded in accordance with the guidelines of Ericsson and Simon (1993). Next to the

percentage of agreement, we have employed Cohen's Kappa to assess the Inter-Rater Reliability. Cohen's Kappa is a statistical measure that is widely recognized for its effectiveness in evaluating the degree of agreement between two or more raters beyond chance. This method was chosen due to its relevance in ensuring the objectivity and reliability for think-aloud protocols. The application of Cohen's Kappa in this context is inspired by the work of Grégoire et al. (2010), who successfully utilized this statistical measure in their study on cognitive processes and opportunity recognition. In our study, Cohen's Kappa serves a similar purpose. It provides a quantifiable means to evaluate the consistency of our coding. A high Cohen's Kappa score would indicate a strong agreement and, by extension, high reliability of the coding process, which is essential for the validity of our qualitative analysis (Grégoire et al., 2010; Van Someren et al., 1994).

We used SPSS (v.29) for quantifying the decision-making strategies based on the codes assigned, the comparative analysis and to compute Cohen's Kappa. Additionally, specific Python libraries were used to visualize the data.

4. Results and data analysis

This chapter aims to present the results of our analysis. The data is broken down with a range of methods and visualizations. The different method of analysis is tailored to address specific aspects of the two propositions, providing a comprehensive picture of entrepreneurial decision-making carefully visualized where needed.

4.1 Predominance: normalized share difference between causation and effectuation

The analysis and exploration of the data starts with the normalized share difference between causation and effectuation. Here, we make a first effort to explore the predominance for each decision-making strategy. This exploration is crucial as it helps us visualize and quantify the balance between these decision-making strategies, linked to our first proposition. The normalized share difference between the use of causation and effectuation is presented for each respondent throughout the ten different problem sets. Here, positive values indicate a predominance of causation whereas negative values indicate a predominance of effectuation. The magnitude shows the extent of such predominance. Below we provide two examples of respondents AU-16 and AU-17.

Figure 1 Normalized Share Difference for Respondent AU-16

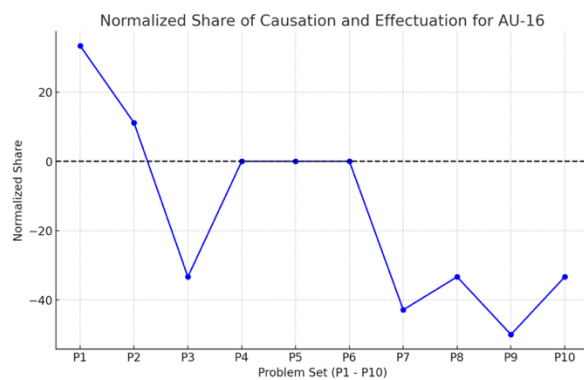
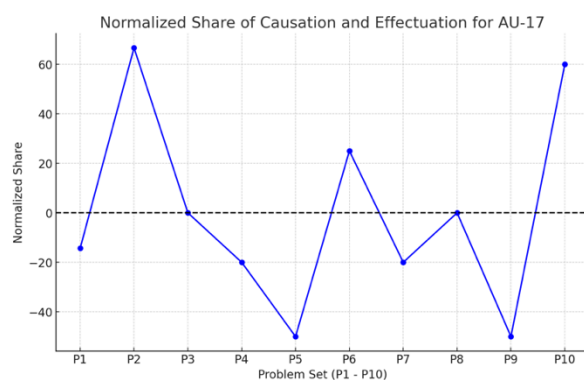


Figure 2 Normalized Share Difference for Respondent AU-17



If the value lies exactly on the horizontal axis, as seen with AU-16, it indicates an equal balance between the use of causation and effectuation. In other words, for these particular problem sets, AU-16 used causation and effectuation strategies to an equal extent. Here, the respondent did not predominantly lean towards either causation or an effectuation approach but rather employed a mix of both strategies in equal measure. This could imply an adaptable

decision-making style for these specific scenarios. The visualization of AU-17 illustrates how the decision-making approach fluctuates throughout the different problem sets. To further support the magnitude or balance as observed among the novices, we provide some quotes that support these tendencies. Below, two statements of respondent AU-02 are quoted. Retrieved from the transcript of problem 2, defining the market based on survey input, these quotes are an example of using causation and effectuation to an equal extent within the same problem set.

So then, with the market segment, with the opportunity that has been identified, you need to stay true to that, so you'd be targeting primarily the student. – AU-02, Pos. 68-70

The plan to stay true to a market (segment) as identified, and targeting this specific market segment effectively shows a goal-driven action. However, in the same segment, the respondent AU-02 states a contrasting effectual approach.

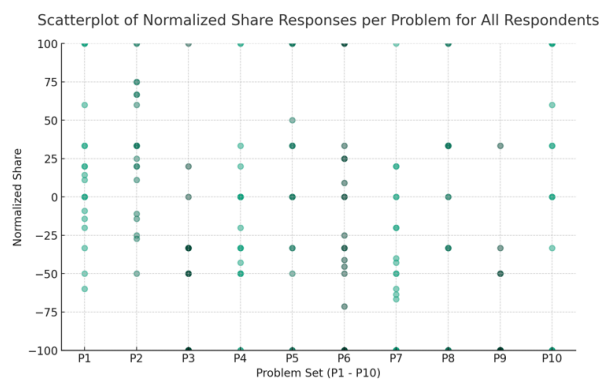
They are willing to pay a little bit more [...] for example to work out how much of a diversity of range you can offer, other than deviate from just your standard cup of coffee and small, medium or large size, you know, you have milk or no mil etcetera, if you start getting sort of unique or boutique coffee grinds [...] – AU-02, Pos. 71-75

Here, the entrepreneur is considering expanding the product range based on market demand. There is a willingness to adapt based on customer feedback, as an emerging opportunity. This hinges towards leveraging contingencies, contrasting the more goal-driven approach. One final quote is stated below to illustrate a highly effectual statement, showing the entrepreneur's own expertise. This is an excellent example of means-driven action, specifically stressing the sub-construct of *who I am* (Sarasvathy, 2008), where the entrepreneur leverages their interests and personal skills in design to undertake the project.

Well I guess with my background being in [...], I'd like to do it myself, just as a, it's something I'd enjoy to do and looking into, and planning it myself [...] like I said before at the start and a couple of time, it's my venture, my thing, I like to do, I reckon I have a pretty clear vision of how I like things to look and how I like things to work. – AU-04, Pos. 388-394

Additionally, we present a scatterplot of the normalized share values for all respondents throughout the problem sets. The use of this scatterplot will be two-fold. First, we can visualize the normalized share of both strategies for all respondents among the problem sets in one plot, allowing us to spot trends and outliers. Second, it can be used to identify any clustering to evaluate the robustness of the problem sets used in the Coffee Inc scenario. For the creation of the one-line graphs and the scatterplot, we utilized the Matplotlib library in Python, a widely used and powerful plotting library that provides a variety of graphing tools for visualizing data.

Figure 3 Scatterplot of Normalized Share Difference per Problem for all Respondents



The analysis based on the normalized share value is captured in Table 3. For this analysis, the mean value of the normalized share per respondent was computed. A threshold based on the standard deviation of the data is used to consider the data’s variability and to provide a threshold that adapts to the data’s spread, similar to social science research methodologies and the use of conventional statistical measures (Van Someren et al., 1994, pp. 145-146). Here, a balanced use was set within ± 1 standard deviation of the mean, whereas respondents more than two standard deviations away from the mean are considered outliers. We did not find domain-specific benchmarks or expert consensus that could define what constitutes as a balanced used of causation and effectuation strategies. Since we focus on the distribution of strategies within all twenty respondents, we did not used effect-size (e.g. Cohen’s d) as a threshold.

The overarching trend among the respondents is a dynamic shift between causation and effectuation strategies across different problem sets. Fifteen respondents are considered to have a balanced use, suggesting that a significant number of respondents do not strictly favour causation or effectuation but rather navigate between these strategies, reflecting a more nuanced approach to entrepreneurial decision-making. Certain respondents stood out as outliers, showing a strong preference for either causation or effectuation across most problem sets. Moreover, the analysis revealed no uniform pattern across all problem sets. The scatterplot, representing the collective responses of all twenty respondents across the problem sets, highlights this diversity and the nuanced applicability of causation and effectuation. Notably, the scatterplot also demonstrates areas of high density, where responses tend to cluster tightly, along problem sets with sparse distribution.

Table 3 Distribution of the Normalized Share Difference between Causation and Effectuation for all Respondents

Category	Count	Description
Inclination towards Causation	5	Respondents with mean value > 0
Balanced Use	15	Respondents with mean value within ± 1 standard deviation of the mean
Outliers	2	Respondents more than 2 standard deviations away from the mean

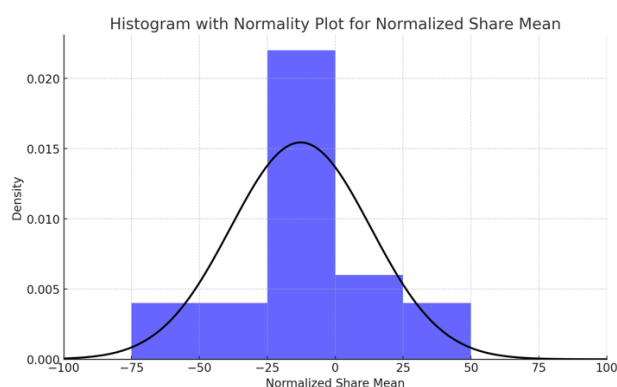
4.2 Skewness: the use of causation over effectuation among novice entrepreneurs

Next, we analyze the skewness in the use of causation among the Australian novices, which ties into the second proposition. It further represents the distribution between the two strategies as already explored with the normalized share difference above. This analysis involves computing the skewness and standard error, visualizing the distribution, and interpreting the significance of skewness through z-values.

We found a skewness of -0.194 which indicates a slight negative skew in the distribution of the normalized share difference between causation and effectuation. This suggests that the distribution has a minor tail to the left, implying a slight inclination towards effectuation strategies over causation strategies among the respondents. However, the skewness is relatively close to zero, indicating that this inclination is not pronounced. To assess the significance of the skewness, we calculate the z-value of skewness by dividing the skewness by its standard error: $z = -\frac{0.194}{0.512} \approx -0.379$

A commonly used threshold for significance is a z-value beyond ± 1.96 for a significance level of 0.05 (Field, 2009; Gravetter, 2013; Trochim & Donnelly, 2001). In this case, the z-value of approximately -0.379 does not exceed the ± 1.96 threshold, indicating that the skewness observed in the distribution is not statistically significant. The slight negative skewness in the distribution does not significantly deviate from what might be expected by chance in a normally distributed dataset. This suggests that, while there is a minor inclination towards effectuation strategies among the respondents, this inclination is not strong enough to be considered statistically significant. To validate our observations regarding (non)normality, we performed a Shapiro-Wilk test, particularly suitable for small datasets. The Shapiro-Wilk test conducted for the mean of the normalized share difference between causation and effectuation had a significance level of 0.144 for all twenty observations. This indicates that the data does not significantly deviate from a normal distribution. This suggests that the slight negative skewness in the data, with a skewness value of -0.194 , is not statistically significant and the data can be considered normally distributed for the purposes of this test. Figure 4 presents the histogram of the mean values for the normalized share, plotted in Python using Matplotlib and SciPy, which are the same libraries we used for the earlier plots.

Figure 4 Histogram with Normality Plot of the Mean Value for the Normalized Share Difference of all Respondents



4.3 Comparative analysis: control for study background

A comparative analysis is used for proposition 1, exploring whether MBA students can be a proxy for novice entrepreneurs in investigating entrepreneurial decision-making. We draw

comparisons by controlling for business and management-related study backgrounds as related to MBA curricula. In line with the study of Read et al. (2009), business and management students were selected for having sufficient knowledge to address the decision-making problems but not having extensive entrepreneurial experience, which implicitly suggests their use as a proxy for novices. The comparative analysis sheds light on the decision-making strategies that define the group with such business and management related study background, eventually related to MBA students (Dew et al., 2009, p. 9).

In our comparative analysis, we first conducted an independent sample t-test. Results showed that for business and management-related study backgrounds (group 1, N = 7) the mean normalized share difference between causation and effectuation was -4.257, whereas for other studies (group 2, N = 11), it was -13.022. This difference was not statistically significant ($p = 0.478$). Subsequently, an ANOVA was conducted to assess the mean normalized share difference among all four study backgrounds, thus not clustered into either business and management-related or other study backgrounds (please see Table 1). Despite finding a statistically significant model ($p = 0.036$), the low subject count in the group technical and quantitative fields (N=1) posed a limitation, making the post hoc comparisons unreliable. Thus, we resorted to the Kruskal-Wallis test, a non-parametric method. There was no significant difference in the decision-making strategies when considering study background, $\chi^2(2) = 6.272$, $p = 0.014$, with a mean rank of 10.71 of business and management-oriented background, 13.50 for communication and social sciences, 10.00 for technical and quantitative fields, and 5.33 for engineering and applied sciences.

These results suggest that, when controlling for study background, there is no substantial difference in the inclination towards causation or effectuation strategies. The independent sample t-test provided an initial overview, while the Kruskal-Wallis test offered a more suitable alternative given our sample distribution and sizes.

Table 4 Test Statistics used for the Comparative Analysis

Test	Test statistic	Df	Sig.(2-tailed)	Notes
Independent t-test	T = 0.727	16	0.478	Equal variances assumed
ANOVA	F = 3.770	3, 14	0.036	Post hoc test not performed due to small group size in one category
Kruskal-Wallis	Chi-square = 6.272	3	0.099	The test statistic is adjusted for ties

4.4 Reliability and validity: Cohen's Kappa

This section delves into the interpretation of Cohen's Kappa scores derived from our study, offering insights into the level of inter-rater reliability. By analysing these results, we aim to underscore the reliability and validity of our qualitative analysis, strengthening the credibility of our findings.

The coding intensity across the twenty protocols shows an acceptable level of consistency in how codes were assigned relative to the line count in MAXQDA (converted to line-numbered text; maximum chars per line = 100). In total, 950 codes were assigned throughout the 20 protocols, varying in length from 231 lines to 598 lines. The mean percentage of codes to lines is approximately 13.83%, with a standard deviation of 2.04%. This shows an acceptable and consistent intensity of coding throughout the protocols. The relatively low standard deviation further affirms that there are no outliers in the number of codes assigned to different line counts (length) amongst protocols. This study uses two indices for interrater reliability: the percentage of agreement and Cohen's Kappa. The percentage of agreement between the two coders was found to be 88% for the extensive alignment of protocol AU-02. The data used to analyse Cohen Kappa's is presented in Table 5 below.

Table 5 Cohen's Kappa computed for the Inter-Rater Reliability of Protocol AU-02

Metric	Value
Number of valid cases	120
Kappa value	0.775
Asymptotic Standard Error ⁴	0.053
Approximate T ⁵	10.500
Approximate significance	<0.001

The SPSS output indicates a Kappa statistic of 0.775, with an asymptotic standard error of 0.053 and an approximate significance level of less than 0.001. This Kappa value suggests a substantial agreement between the two coders. According to the guidelines by Landis and Koch (1977), a Kappa value between 0.61 and 0.80 is considered to represent substantial agreement, which means the coders are in strong concordance regarding the coding of the analysed items. This Kappa value combined with a high percentage of agreement confirms the reliability of the coding process applied to the data. It assures that the qualitative analysis based on the coding of protocol AU-02 is built on a solid foundation of inter-rater consensus.

⁴ Not assuming the null hypothesis

⁵ Using the asymptotic standard error assuming the null hypothesis.

Overall, the results indicated no significant differences in the decision-making strategies between individuals with business and management-related study backgrounds and those from other fields, suggesting that educational background does not significantly predispose individuals towards causation or effectuation strategies in our sample. The exploration of predominance, through the normalized share difference between causation and effectuation, revealed a dynamic balance among the respondents. Some exhibited a clear preference towards one strategy, while a significant number displayed a balanced use, indicating a flexible approach towards decision-making.

5. Conclusion and discussion

The aim of this study was to explore the decision-making strategy among novice entrepreneurs and whether MBA scholars are a good proxy for novice entrepreneurs in the light of their decision-making strategies, guided by two positions: the impact of study background on the decision-making strategy, and the understanding of causation and effectuation's preference among novice entrepreneurs. This study has not only aimed to bridge gaps in the existing literature but also got to offer fresh insights into the entrepreneurial decision-making amongst novices.

The investigation into the first proposition showed that educational backgrounds, specifically business and management, do not significantly dominance novice entrepreneurs towards either causation or effectuation strategies. Contrary to initial assumptions, our comparative analysis revealed a no significant difference in strategic preferences across various educational backgrounds, suggesting that factors beyond academia shape entrepreneurial. This outcome, as presented in the discussion chapter, challenges the conventional wisdom that MBA students can effectively stand in for novice entrepreneurs in decision-making research. It emphasizes the need for a broader understanding of the influences on entrepreneurial strategies, highlighting the complexity and diversity inherent in the decision-making processes.

The examination of predominance and skewness in decision-making strategies among novice entrepreneurs, our second proposition, unveiled a balanced application of causation and effectuation. This balance underscores a flexible approach, with entrepreneurs navigating between strategies as dictated by context rather than a predisposed inclination. Such adaptability refutes the idea of a dominant decision-making strategy and supports the concept of a 'hybrid' decision-making logic where both causation and effectuation are employed dynamically. We therefore advocate for viewing these strategies as complementary, challenging the traditional dichotomous perception from the literature and suggesting that the strategic choice is contingent on specific venture stages and situational demands. One possible reason behind the lack of significant dominance towards either causation or effectuation strategies among novice entrepreneurs, regardless of their educational background, might be the recent nature of entrepreneurship education itself. As a researcher deeply immersed in the literature and present practices in entrepreneurship, I have observed a gradual shift towards more integrated teaching approaches that blend both strategies. This shift could have influenced the balanced application of causation and effectuation we've noted.

Finally, by addressing the research question, our findings reveal that MBA students do not accurately stand as a proxy of novice entrepreneurs in terms of decision-making strategies. Instead, the novice entrepreneurs demonstrate a dynamic and context-dependent approach, characterized by a blend of causation and effectuation strategies. This adaptability, uninfluenced by educational background in our study, allows them to navigate the dynamic entrepreneurial landscape effectively.

5.1 Contributions to effectuation literature

The exploration of entrepreneurial decision-making within this thesis has provided insights with broader academic implications, particularly in challenging the conventional dichotomy in understanding effectuation. Our analysis begins by addressing the assumption in much of the existing literature (Dew et al., 2009; Rauch & Hulsink, 2015; Thornton et al., 2011; Trochim & Donnelly, 2001) that MBA students or scholars, utilizing their educational background, are

representative of novice entrepreneurs. This thesis proposed the lack of significant differences in decision-making strategies between novices with a business and management background and novices from non-business backgrounds. Such findings call into question the simplicity of this assumption and highlight the diversity and complexity inherent in entrepreneurial decision-making strategies, in line with Baron (2009). By combining critiques from the literature (Arend et al., 2015; Baron, 2009), we underscore the necessity for a more nuanced approach that considers a variety of factors including entrepreneurial decision-making beyond academic training or the role of education, see also similar arguments as discussed by Fayolle and Gailly (2015); Rauch and Hulsink (2015).

Further, our study supports the concept of a 'hybrid' decision-making logic, as suggested by Reymen et al. (2015), where entrepreneurs do not strictly adhere to causation or effectuation but rather employ a blend of both strategies. This finding aligns with the balanced use of causation and effectuation observed in our research and suggests that entrepreneurial decision-making is dynamic and context dependent. The identification of a hybrid logic challenges the dichotomous perception of entrepreneurial strategies and has implications for the stages of venture creation, indicating that the strategic approach of entrepreneurs may evolve in response to the changing demands of their venture's lifecycle (Maine et al., 2015; Reymen et al., 2015; Shirokova et al., 2021; Smolka et al., 2018).

Building upon the notion of hybrid decision-making, this thesis also engages with the critical analysis presented by Gregoire and Cherchem (2020), which advocates for viewing causation and effectuation not as opposing strategies but as complementary modes of action. This perspective falls in line with the academic discussion on entrepreneurial processes by suggesting that the interplay between causation and effectuation is a fundamental aspect of entrepreneurship. It encourages a departure from the dichotomy towards a more integrated understanding of how these strategies coexist and influence each other throughout the entrepreneurial journey (Reymen et al., 2015; Smolka et al., 2018).

These contributions, particularly the insight into hybrid decision-making logic, resonate with my observations of a growing consensus in entrepreneurship. My engagement with both academic research and real-world entrepreneurial narratives has led me to believe that this hybrid approach not only reflects a more realistic picture but also points towards a fresh perspective on how we conceptualize and teach entrepreneurial decision-making.

5.2 Practical implications

The insights derived from our study not only deepen academic understanding but also carry practical implications, particularly for educators in entrepreneurship training programs, policymakers involved in entrepreneurship support, and mentors or advisors.

First, entrepreneurship training programs stand to benefit from a more nuanced curriculum that reflects the dynamic interplay between causation and effectuation strategies, as seen in this thesis. Rather than presenting these approaches as a dichotomy, integrating case studies or simulations that illustrate complementary use should prepare entrepreneurs better for real-world challenges (Chandler et al., 2011; Fayolle & Gailly, 2015; Rauch & Hulsink, 2015; Sardeshmukh & Smith-Nelson, 2011). Moreover, a mindset that values flexibility and adaptability is vital. Training should therefore aim to make entrepreneurs comfortable with uncertainty and practice at navigating between strategies based on situational needs, thereby equipping them with the mindset necessary for success in the ever-changing entrepreneurial landscape.

Second, policymakers should consider the diverse backgrounds of entrepreneurs when designing support programs. Our thesis indicates that education background does not predispose individuals to a particular decision-making strategy. Thus, support programs should be inclusive and designed to acknowledge and leverage the wide array of backgrounds from which (novice) entrepreneurs emerge (Chandler et al., 2011; Sarasvathy, 2001, 2008; Sardeshmukh & Smith-Nelson, 2011). Regarding policymakers, this study also provides insights beyond academic circles. The insights gained from this study can help inform policy development in Australia's entrepreneurial ecosystem. This research identifies avenues for policy innovation, particularly in bridging the gap between academic preparation and real-world entrepreneurial challenges. Our key findings suggest that policy measures could focus on curricular integration to complement traditional causal models or academia-industry collaboration to strengthen ties and promote a more experiential learning, all in the Australian entrepreneurial landscape.

Third, mentors and advisors can use insights from this study to guide their approach to supporting entrepreneurs. Here, we think of incubator or accelerators as an example. Recognizing that hybrid-decision making strategies lead to more effective and real-world decision-making (Honig, 2004; Reymen et al., 2015), such mentors can tailor their advice to help entrepreneurs navigate between different strategies depending on the context. Incubators and accelerators could structure their programs or tutoring to specifically focus on developing flexible decision-making skills. This could involve bringing in experts from both traditional business (planning) backgrounds and those with experience in more improvisational, effectual approaches to entrepreneurship.

Observing the disconnect between traditional entrepreneurship education and the multifaceted challenges entrepreneurs face, it becomes evident that a mindset of adaptability and a skillset that spans across causation and effectuation, thus fostering hybrid decision-making, is critical. This personal conviction is reinforced by the study's insights, highlighting the importance of re-evaluating and reshaping how we support and educate emerging entrepreneurs.

5.3 Limitations and future research

While providing insights into the dynamics of entrepreneurial decision-making strategies, we also encounter limitation from which future research directions arise. The use of MAXQDA facilitated the coding and integration of qualitative data to uncover patterns in decision-making. The reliance on this software and the specific methodological choices we made also set the boundaries of our analysis. Future research could expand upon this by exploring the full potential of MAXQDA as a software for analysing qualitative and quantitative data (Kuckartz & Rädiker, 2019). However, our effort to quantify decision-making patterns within our relatively small sample size presented challenges. The richness of qualitative data, through case examples that could offer excerpts or quotes from cases that are highly effectual or causal, may have provided deeper insights. In future studies, such narratives could serve as powerful illustrations of how certain principles manifest in decision-making, offering a tangible connection to the theoretical frameworks of causation and effectuation. Given these reflections, future research should consider the strengths of MAXQDA in both quantifying patterns and qualitative insights. Studies could aim to have a more balanced use of this software, perhaps with the use of case examples or thematic explorations (Kuckartz & Rädiker, 2019).

Part of our methodological approach is the use of a scatterplot to analyse the decision-making patterns of novice entrepreneurs. The scatterplot provided not only an overview of the respondents' preferences but also a critical lens through which to assess the robustness of the problem sets utilized in this study and drawn from the original work of Sarasvathy (2008). Our analysis engaged with the existing critiques of Arend et al. (2015) that suggest that certain problem sets based on a hypothetical start-up may inherently steer respondents towards an effectuation or causation strategy. Specifically, we found this in the Coffee Inc scenario for problem sets two, nine and ten. Future research could involve the application of testing frameworks to evaluate the objectivity of such problem sets and the incorporation of feedback from a diverse range of entrepreneurs, both novices and experts.

Moreover, the review of Grégoire and Cherchem (2020) touches on the idea that several studies (Fisher, 2012; Reymen et al., 2015) provide data supporting the alternating or simultaneous occurrence of causation and effectuation, but often leave the deeper underlying reasons for such shifts unspecified. This gap in the literature points to an opportunity for future research to explore why and how entrepreneurs' strategic approaches might shift from effectuation to causation (or vice versa) as their ventures progress, just as proposed in our fictional case.

Together, these recommendations for future research address some of the limitations of our study. By embracing other methodological approaches, broadening comparative bases, and refining research tools, subsequent studies can continue to explore the complex landscape of entrepreneurial decision-making strategies.

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Appendixes

Appendix 1: decision-making problem sets

Introduction

In the following experiment, you will solve ten decision problems. These problems arise in the context of building a new company for an imaginary product. A detailed description of the product follows this introduction. Before you start on the product description and the problems, I do need one act of creative imagination on your part. I request you to put yourself in the role of the lead entrepreneur in building this company -- i.e., you have very little money of your own to start this company, but you have about five years relevant working experience in the area.

Description

Since some time, you have been thinking of starting a coffee-corner at your university. Your inspiration for this came from the fact that when you, as a student, want to get a fresh cup of coffee, there was no possibility. You did not like the coffee from the machines which are available in the university buildings. Next to that, you had to pay an amount of money, which was in no relation to the quality of the coffee. You have been working in a coffee corner in your hometown for 5 years, so you know what goes around. You saw the success of other coffee corners, but since these were from expensive franchisers, you thought that it should be possible to still start your own. In several reports in newspapers and magazines you read that there is an increasing demand for drinking coffee in your home country. You have taken all possible precautions regarding intellectual property. The name of your company is Coffee, Inc.

Problem 1: identifying the market

Before we look at some market research data, please answer the following questions, one at a time.

1. Who could be your potential customers for your coffee corner?
2. Who could be your potential competitors?
3. What information would you seek about potential customers and competitors? List questions you would want answered.
4. How will you find out this information? What kind of market research would you do?
5. What do you think are the growth possibilities for this company?

Problem 2: defining the market

In this problem you have to make some marketing decisions. Based on secondary market research (published sources, etc.), you estimate that there are three major segments who are interested in drinking coffee at your coffee corner:

Segments: students, staff members, and visitors (annually).

Estimated total size (respectively): 40000, 20000, 10000.

The estimated value of regular coffee sales in your home country is \$448 million.

The estimated value of specialized coffee sales is \$100 million.

Both are expected to grow at a minimum rate of 5% p.a. for the next 5 years.

The following are results of the primary (direct) market research that you have completed.

Survey 1

Students, staff members and visitors were asked via questionnaires to express their interest in a coffee corner. Also, they were asked to indicate what they were willing to spend on coffee. In total, 1000 people were asked and 500 filled out the questionnaire.

Willing to pay (€)	Students (%)	Staff members (%)	Visitors (%)
0.50 – 0.75	52	26	45
0.75 – 1.00	30	38	32
1.00 – 1.25	16	22	15
1.25 – 1.75	2	9	8
1.75 – 2.50	0	5	0
Total	100	100	100

Survey 2

The prices of coffee, offered during lunch breaks in between lectures

Willing to pay (€)	Students (%)	Staff members (%)	Visitors (%)
0.50 – 0.75	65	21	51
0.75 – 1.00	25	49	42
1.00 – 1.25	10	19	7
1.25 – 1.75	0	8	0
1.75 – 2.50	0	3	0
Total	100	100	100

Survey 3

Staff members of the university who participated in the focus group found the plan of the coffee corner very interesting – but indicated that the range of coffee could potentially be expended before they would be willing to spend €1,50 or more. With the current offer, they would be willing to pay €1,00 - € 1,25 and would demand a bonus system in which they could save up for discounts after a certain amount of coffee drunk. Both at the lunch and the focus group, participants are very positive and enthusiastic about the coffee corner. They provide you with good feedback on specific features and also extend suggestions for improvement. But the staff members are particularly keen on going beyond the regular coffee aspect; they make it clear that much more diversity would be required in trying to market the product to them. They e.g. indicate that there are companies which might be capable of printing advertisement on cups for discounts on the coffee.

Based on all of you market research, you arrive at the following cost estimates for marketing your product.

Internet: \$200 upfront + \$50 per month thereafter

Newspaper: ads could cost \$500 upfront

Cinema: \$2000 to \$4000 per month with \$1000 upfront

Commercials on local tv: \$5000 to \$10000 upfront

Direct advertisement: involves recruiting and training sales representatives

Competition

None of the following four possible competitors sell cheap quality cups of coffee in the centre of your hometown. You are unique in this respect.

Company	General price level per cup of coffee	Revenue	Where to be found
Starbucks	€ 5.00	€6.5 billion	Large cities / global
Peet's	€ 4.00	€225 million	Large cities / mostly USA
Coffee Bean	€ 4.50	€130 million	Large cities / global
Douwe Egberts store	€ 2.50	€25 million	Large cities/ Netherlands

The coffee corner companies are making a net return of 25% on sales.

At this point, please take your time and make the following decisions.

1. Which market segment/segments will you sell your product to?
2. How will you price your product?
3. How will you sell to your selected market segment/segments?

Problem 3: meeting payroll

You have started the company on a shoestring, using face to face promotion as your primary source of marketing. You are six months into marketing your product. You have priced the products at the low end of the surveys at 0.50 – 0.75 euro. You have about 3000 customers per month. Based on numerous suggestions provided by your customers, you believe you can start selling special coffees in the range of 1.25 – 1.50 euro. This would especially be the case when you would redesign the interior of the coffee corner to make it into a more upscale coffee corner.

You have invested the last of your savings and maxed out your credit cards in order to make sure you have the coffee asked for in stock-- You need this to participate in a competition on where 'Architecture meets Catering', where you will get a lot of exposure.

You have four employees -- and you are out of cash to meet the next payroll. You estimate you need 30,000 euro to survive the next three months and to come up with a supercool store design to be able to participate in the competition. You have the following four options.

1. Borrow from your girlfriend's parents. They are not overly wealthy, but could probably get their hands on \$30000 if they needed to.
2. Borrow from some old friends from the university and your old student job.
3. Convince your parents to take out a mortgage on their house.
4. Convince your employees to wait out the period.

Which of these options would you choose? Why?

Problem 4: financing

Your store design has won the first prize in the new talent category at the 'Architecture meets Catering' competition. This in turn has led to inquiries from large coffee suppliers such as Nestlé Netherlands B.V. to market the concept (with full multi-media exposure) nationally. You estimate that it will take you six months to develop the concept in more detail and about three months after that to actually roll it out on three main channels -- Web, national newspapers and national TV. The coffee will be priced at 4.00 euro per unit. You estimate that you will need 150.000 euro till break even (by the third quarter of the second year). This includes enhancing the concept, putting in place excellent (support) staff, full-blown advertising and web links, and the development of a small direct sales staff for selling on site. You estimate the following sales projections for the first five years. You are at the beginning of year 1 now.

	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	\$100,000	\$150,000	\$300,000	\$500,000	\$1,000,000
Profits	\$0	\$20,000	\$40,000	\$200,000	\$300,000

You have three financing options.

Option 1

A venture capitalist who specializes in startup companies in catering and adjacent areas, is willing to finance you \$150.000 for 48% of your company.

Option 2

A friend of the family who has extensive experience in catering is eager to go into partnership with you for 33% of the company. He is able to invest €150000 but wants to work for the company at a base salary of €40000 per year. He agrees to accept a minimum level of €30000 for the first two years to keep his family going and defer the rest to when the company starts making money. You like and respect this man and have no personal feelings against him.

Option 3

You can continue the company with internal cash flow, grow at a much slower pace.

1. Which option would you choose? Why?
2. If the venture capitalist is also willing to take only 33% of the company, which option would you choose?

Problem 5: leadership/vision

You have found the financing and have signed a contract with two major coffee suppliers to market your product. You have hired new staff and moved into new premises. A national newspaper is doing a series of stories on local entrepreneurs and wants to do a story on you. You know that this interview would be a defining moment in the development of your company, and you see this as an opportunity to convey to the world (and to your new

employees) your vision for your company's future. This newspaper article series has been very successful; it routinely gets picked up by other national papers and TV networks. One of the reasons for its success is its headline which consists of a one-line quote that captures the entrepreneur's vision for the company to be achieved by the year 2012.

You have come up with several possibilities for the one-liner.

1. Starbucks is the past. Coffee Inc. is the future
2. We aim to have at least a thousand employees by the year 2014
3. The fastest growing coffee caterer
4. Invest in Coffee Inc. – Enjoy the Dutch tradition

Which one of the above do you choose? Why? If you do not choose any of them and want to come up with ideas for an alternative, please do so.

Problem 6: product re-development (part 1)

You are almost at the end of your fifth year in operation -- you have just managed to break even (later than you projected). You have opened the doors to all three segments (students, staff, visitors). Sales, while they are steady and continuous, are rather 'colourless' and you start doubting whether you will ever reach your growth targets. You decide to conduct a serious market research initiative in order to find out how to grow your sales. You organize focus groups with both existing customers and potential new customers. The main problem seems to be the "great divide" between the regular coffee and the specialized products. Over 90% of the participants in your focus groups find the regular products very interesting. But when it comes to the specialised coffees, there is a clear division of opinion. The participants who primarily enjoy the regular coffees almost never bother to go and buy more expensive coffees and wonder why all that 'elite stuff' is there; and those who are primarily interested in the specialised coffees think that the regular products downgrade the atmosphere.

How do you respond to this feedback?

Problem 6: product re-development (part 2)

You go back to the origins and think of a concept which could provide solutions to both parties. You come up with a solution in which you have 1 existing shop and 1 new shop. Shop number 1 (the existing shop) is for more regular coffees, the new shop is for exclusive coffees and teas. With the exclusive shop one should think of specialized Asian, South American and African coffee specialties, which would result in a total amount of 30 different types of coffee. Teas will come in a variety of 20 types. Also, exclusive cakes and pastries are sold. Next to this, customers can also borrow books, read newspapers and have access to free wireless internet. In the regular coffee booth, you plan to sell 8 different regular coffees, like plain cappuccino, espresso, etc, and add 5 regular teas (e.g. China Blossom and Rooibos) and limited variety of donuts and muffins.

You first start to promote the idea with the exclusive shop with a variety of 15 different coffees and 15 different teas, and also a smaller variety of cakes and pastries than you

eventually will include. This together with free newspapers and free wireless internet is what you show to the focus group. It turns out that especially the exclusive shop is received very enthusiastically, and customers are willing to pay 2 to 2,5 times as much as asked previously.

One of the requirements is however that you have to extend to what you had in mind (the 20 teas, 30 coffees, the books, newspapers and free wireless internet). You have to decide whether to undertake this massive concept change or to focus completely on one of the two concepts. If you want to extend it will cost you as much as 200.000 euro and a separate marketing effort.

Year	1	2	3	4	5	6	7	8
Estimated sales in million \$	0.10	0.50	1	6	12	18	24	30
Actual sales in million \$	0.14	0.48	0.84	2.8	4.2			

Which of the two options do you choose? Why?

Assuming you have decided to go in for the extension, you have to choose one of the following three options.

Option 1

Undertake the redesign effort in-house. Estimated cost are \$250000

Option 2

Outsource the redesign to the new company within your home country. Estimated cost are \$200000

Option 3

Outsource the redesign to the new company outside your home country. Estimated cost are \$100000

Which option do you choose? Why?

Problem 7: growing the company (part 1)

You are almost at the end of the sixth year of business. You are now running two types of shops under the company of Coffee Inc.

Company 1: Plain Coffee

Sales between \$1 and \$5 where you sell a limited number of regular coffees and teas and a basic amount of donuts, muffins, and chocolates.

Company 2: Exquisite

Sales between \$5 and \$15 where you offer the 'complete picture'.

Your number of outlets and therewith the new coffee shop managers has swelled to twenty from the original three and you are continuing to expand your sales force and develop an

even better concept of Exquisite for more upscale areas in town. Greg Thomas, who is an excellent salesman (dealing with the regular coffees previously) and has headed the sales team since Day One, has clearly not kept up with the issues of growing the company. He is definitely not the person to lead the new Exquisite.

Year	1	2	3	4	5	6	7	8
Estimated sales in million \$	0.10	0.50	1	6	12	6	12	20
Actual sales in million \$	0.14	0.48	0.84	2.8	4.2	8.6		

How will you deal with this situation?

1. Fire him?
2. Hire a new sales manager to head the sales team? If so, would you consult with Greg before doing so? How would you break the news to him?

Please feel free to elaborate on any other way of dealing with the situation.

Problem 7: growing the company (part 2)

Although the company has been growing for a while now, you are trying to keep the entrepreneurial culture of the company alive. But you begin to notice that your partner is fostering a more “corporate ambiance”. Long and unnecessary meetings, complicated organization charts, colourful expense accounts, “consultants” to “optimize market potential”, and so on. When you try to talk with him about it, he argues that it is time for the company to go “corporate”. That such a “professional” image would actually be good for the bottom line.

How will you deal with this situation? Do you think it is time for Coffee Inc. to go corporate?

Problem 8: hiring professional management

You are now in the eighth year of your company. You are doing very well. Surpassing growth targets and building reliable market share. Your sales are \$27,5 million and you project a growth rate of at least 25% per year for the next three years.

Year	1	2	3	4	5	6	7	8
Estimated sales in million \$	0.10	0.50	1	6	12	6	12	20
Actual sales in million \$	0.14	0.48	0.84	2.8	4.2	8.6	20	27.5

Your Board’s advice is to hire professional management to run the company so you can focus on issues of new growth and new strategic initiatives. Assuming you have already developed a short list of three high-potential candidates to interview for the position of Chief Operating Officer (COO).

How would you prepare for the interview? List questions you would ask, techniques you would use, and critical issues you would take into account in hiring this person.

Problem 9: goodwill

At this point, you are approached by the principal of an inner city school in your area, who also works with 10 other schools such as hers. She believes that Exquise could be a perfect learning environment for her students in her catering study program. She requests you to work with a couple of really enthusiastic teachers to develop some elementary learning materials for the students to work on in the Exquise shops. The project would mean not only an investment of \$100000 for modifications, but also a substantial chunk of your time for about six months during development and then about 10 sessions of classroom participation per year for a couple of years at least. Note: your sales are \$27,5 million and you project a growth rate of at least 25% per year for the next three years.

Will you take the initiative for this project? If not, why not?

If yes, would you:

1. Donate the product?
2. Sell it at cost?
3. Sell it at your regular profit margin?

Why?

Problem 10: exit

You are now in the tenth year of your company. Exquise is a great success and thanks to your new targeted strategies, even Plain Coffee is growing satisfactorily. You have acquired three other profitable catering concepts. You are doing \$45 million in sales and project that you will reach \$70 million within a year. At this time, you face two possible directions for your company.

Direction 1

Your accountants and bankers think that this is a good time for you to take the company public. The Initial Public Offering (IPO) market is booming and catering is in a solid upward trend. They estimate you should make an initial public offering of 2 million shares at €30 per share. The company has a total of 12 million shares outstanding.

Direction 2

At this point in time, Starbucks approaches you and makes an offer for your company. It seems they have decided to get in on the more exclusive segment and have decided to enter the arena through acquisitions. They see you as a perfect fit for their strategy and offer you \$300 million.

Year	1	2	3	4	5	6	7	8	9	10
Estimated sales in million \$	0.10	0.50	1	6	12	6	12	20	30	45
Actual sales in million \$	0.14	0.48	0.84	2.8	4.2	8.6	20	27.5	38	70

Which of the above two directions do you choose? Why?

Appendix 2: codebook

Code	Construct (principle)	Clear Definition	Differentiating Constructs
B	Effectuation: Means-driven action	Entrepreneurs begin with their immediate resources, including personal traits, skills, knowledge, and networks. They examine the outcomes they can achieve with their current means (Sarasvathy, 2001, p.251). Key idea: start with what you have	IS: Entrepreneurs begin with their current means - who they are (traits, tastes, abilities), what they know (education, training, expertise, experience), and whom they know (social and networks) - and allow goals to emerge over time. IS NOT: A set end-goal or objective from the start (as seen in the goal-driven action principle of causation). It's distinct from the opportunity-driven mindset that many entrepreneurs are traditionally taught to adopt. Related construct: Resource-Based View (Barney, 1991)
A	Effectuation: Affordable loss	Entrepreneurs assess the potential downside of an opportunity. They evaluate what they are willing to lose and create strategies based on minimizing potential losses (Dew, Sarasvathy, Read, & Wiltbank, 2009, p.299). Key idea: invest what you can afford to lose	IS: Entrepreneurs focus on the acceptable downside or the amount they're willing to lose, rather than calculating expected returns. IS NOT: Maximizing potential profits or upside (as seen in the expected return principle of causation). It also is not just about risk aversion but a nuanced approach to managing risk. Related construct: Prospect Theory from behavioral economics, where decision-makers are more affected by losses than equivalent gains (Kahneman, 1977).
C	Effectuation: Partnerships	Entrepreneurs prioritize building partnerships and co-creating the future with stakeholders, including customers, suppliers, and even potential competitors. Through these collaborations, they jointly shape opportunities and secure resources (Sarasvathy & Dew, 2005, p.557). Key idea: collaborate and co-create	IS: Entrepreneurs prioritize co-creation and collaboration, seeking partnerships and building upon the agreement made with stakeholders. IS NOT: Going to market alone or having a competitive-only mindset (as seen in the competitive analysis principle of causation). Related construct: Stakeholder Theory, emphasizing mutually beneficial engagements with stakeholders (Freeman, 1984).
L	Effectuation: Leverage contingencies	Entrepreneurs perceive unforeseen events and uncertainties as opportunities. They remain flexible and adapt to surprises, turning them to their advantage (Wiltbank, Dew, Read, & Sarasvathy, 2006, p.993). Key idea: embrace and exploit surprises	IS: Entrepreneurs embrace surprises, both positive and negative, and adapt to them, turning potential obstacles into opportunities. IS NOT: The avoidance of uncertainty, as seen in causation. It is distinct from traditional crisis management as it is about proactive adaptation, not just damage control. Related construct: The concept of ambidexterity in organizational theory. Here, it is about balancing exploitation (current competencies) and exploration (of new possibilities) (Tushman & O'Reilly III, 1996).

P	Effectuation: Non-predictive control	Entrepreneurs believe the future is unpredictable but can be controlled through their actions. Rather than attempting to predict the future with certainty, they focus on activities within their control, shaping the future through their decisions and actions (Dew et al., 2009, p.576; Sarasvathy, 2001, p.251). Key idea: shape the future through actions	IS: Entrepreneurs believe they can control aspects of the future through their own actions, rather than trying to predict it. IS NOT: The belief that the future can be forecasted with enough data and research (as seen in the avoiding contingencies principle of causation). Related construct: Locus of Control, where individuals believe they can influence events and their outcomes, as opposed to attributing outcomes to external causes (Rotter, 1966).
X	Effectual	Includes components which are still effectual but which cannot be identified as one of the effectual principles	
G	Causation: Goal-driven action	Entrepreneurs begin with a clear goal or objective in mind. The end goal is predefined, and strategies are formulated to achieve this target (Dew et al., 2009, p.293; Sarasvathy, 2001, p.251). Key idea: start with a set goal in mind	IS: This principle emphasizes the primacy of objectives. Here, the entrepreneur or manager defines a specific target or goal first, then assesses and gathers the necessary resources to achieve it. IS NOT: It is not about starting with available resources and seeing what can be accomplished. It is not about being adaptable to the changing situation based on the means at hand. Related construct: Goal Setting theory (Locke & Latham, 2002).
E	Causation: Expected return	Entrepreneurs evaluate opportunities based on their potential returns. They assess the potential upside of an opportunity and focus on maximizing these returns, often using tools like forecasting and market research (Read et al., 2009, p.3; Sarasvathy and Dew, 2005, p.390). Key idea: aim for maximum potential profit	IS: It is about calculating potential returns or benefits before making a decision. It emphasizes maximizing potential gains. IS NOT: It is not about determining what one is willing to lose or assessing risk solely through the lens of acceptable losses. Related construct: Expected Utility Theory (Tversky & Kahneman, 1992)
N	Causation: Competitive analysis	Entrepreneurs emphasize understanding the market landscape, including potential competitors. They craft strategies to position themselves favorably in the market, seeking a competitive advantage (Read et al., 2009, p.3; Sarasvathy, 2001, p.252). Key idea: analyze the market and seek to outcompete	IS: It focuses on understanding the competitive landscape, defining competitors, and devising strategies to outcompete them. IS NOT: It is not about co-creation, collaboration, or building partnerships with potential competitors. Related construct: Porter's Five Forces (Porter, 1979)
K	Causation: Avoiding contingencies	Entrepreneurs aim to reduce or eliminate uncertainties. They engage in extensive planning, research, and risk management to avoid unforeseen events and obstacles (Dew et al., 2009; Read et al., 2009, p.3; Sarasvathy and Dew, 2005, p.390). Key idea: plan thoroughly to mitigate surprises	IS: The emphasis is on the external environment as a primary influencer of outcomes, believing that firms need to adapt or react to these uncontrollable forces. IS NOT: It is not about creating or shaping the future through one's actions or believing that individuals have control over outcomes. Related construct: SWOT analysis (Hill & Westbrook, 1997)
R	Causation: Predictive control	Entrepreneurs believe that the future, while uncertain, can be predicted through careful analysis and planning. They invest in gathering data, market research, and forecasting to chart out the best course of action (Dew et al., 2009, p.290; Read et al., 2009, p.3; Sarasvathy, 2001, p.251; Sarasvathy and Dew, 2005, p.390). Key idea: predict the future through analysis and planning	IS: The emphasis is on thorough market research, forecasting, and predictive analytics to guide decision-making. IS NOT: It is not about adapting to surprises or leveraging unexpected events for advantage. Related construct: PESTEL analysis (Basil, 2018)
Y	Causal	Include components which are still causal but which cannot be identified as one of the causal constructs (principles).	

Code	Construct (principle)	Operationalization (indicators)
B	Effectuation: Means-driven action	<ul style="list-style-type: none"> • Mentions of personal skills, knowledge, or resources. • Descriptions of actions based on current means rather than desired ends. • Talk about leveraging personal networks, experiences, or education. • Statements indicating a starting point with what they have.
A	Effectuation: Affordable loss	<ul style="list-style-type: none"> • Discussion of risks in terms of acceptable losses rather than expected returns. • Statements about the amount they are willing to lose or the boundaries they have set for losses. • Mentions of trails, small experiments, or steps they are willing to undertake without a guaranteed outcome. • Talk about setting loss limits or creating boundaries for potential failures.
C	Effectuation: Partnerships	<ul style="list-style-type: none"> • Mentioning or discussing partnerships, collaborations, or co-creation opportunities. • Talking about stakeholder commitments or seeking external feedback/input before making decisions. • Expressing intent to evolve goals based on partner feedback or market feedback. • Statements indicating an iterative approach to goal setting with stakeholders.
L	Effectuation: Leverage contingencies	<ul style="list-style-type: none"> • Mentioning or viewing surprises as opportunities rather than obstacles. • Expressing the intent to pivot or adapt based on new information. • Talk about reinterpreting events, results, or feedback positively. • Viewing contingencies or unpredicted events as a chance to re-evaluate and adjust the direction.
P	Effectuation: Non-predictive control	<ul style="list-style-type: none"> • Expressing a belief in control over the venture's outcome. • Mentions of active shaping or influencing the future direction of the venture. • Talking about proactiveness in response to external factors rather than reactivity. • Statements indicating a belief that the future can be created or constructed rather than predicted.
X	Effectual	
G	Causation: Goal-driven action	<ul style="list-style-type: none"> • Explicit mention of predefined objectives or targets. • Descriptions of actions or decisions made to achieve a particular outcome. • Talk about specific milestones or benchmarks set for the venture. • Statements that reflect a vision or end-goal guiding their decisions.
E	Causation: Expected return	<ul style="list-style-type: none"> • Expressions of intent to achieve the highest possible returns or profits. • Discussions about ROI, maximizing profits, or ensuring best outcomes. • Mentions of competitive advantage, capturing market share, or beating competitors. • Statements centered on optimization, efficiency, or maximizing resources.
N	Causation: Competitive analysis	<ul style="list-style-type: none"> • Talk about following established business models or strategies. • Mention of emulating successful entrepreneurs, businesses, or trends in the industry. • Statements suggesting to align with market norms, standards, or best practices
K	Causation: Avoiding contingencies	<ul style="list-style-type: none"> • Mention of minimizing risk or avoiding uncertainties. • Statements indicating discomfort with ambiguity or the unknown. • Talk about backup plan, safety netss, or insurance against potential failures.

R	Causation: Predictive control	<ul style="list-style-type: none"> • Mention of forecasting, predicting, or projecting future outcomes. • Discussions about market research, trends and the use of data for guiding decisions. • Statements suggesting a reliance on historical data or past experiences to guide decisions. • Talk about scenarios or 'if-then' logic.
Y	Causal	

Construct	Code	Construct (principle)	Sub-construct
Effectuation	B	Means-driven action	Whom I know What I know Who I am Sarasvathy, S. D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. <i>Academy of Management Review</i> , 26(2), 243-263. doi:Doi 10.2307/259121
	A	Affordable loss	Monetary loss Non-monetary loss Reymen, I. M., Andries, P., Berends, H., Mauer, R., Stephan, U., & Van Burg, E. (2015). Understanding dynamics of strategic decision making in venture creation: a process study of effectuation and causation. <i>Strategic entrepreneurship journal</i> , 9(4), 351-379. Martina, R. A. (2020). Toward a theory of affordable loss. <i>Small Business Economics</i> , 54(3), 751-774.
	C	Partnerships	
	L	Leverage contingencies	
	P	Non-predictive control	
	X	Effectual	No sub-categories given
	Causation	G	Goal-driven action
E		Expected return	
N		Competitive analysis	
K		Avoiding contingencies	
R		Predictive control	
Y		Causal	No sub-categories given

Appendix 3: critique on effectuation theory

Table 6: critique as presented by Arend et al. (2015) and Baron (2007; 2009)

Context	Critiques
Definition ambiguities	The authors argue that there is some ambiguity in the definition of effectuation, particularly concerning the differentiation of the effectual process from other entrepreneurial processes (Arend et al., 2015)
Empirical validity	The authors raise concerns about the empirical validity of effectuation. They discuss potential issues with measurement and the operationalization of effectual constructs (Arend et al., 2015). Baron has emphasized the need for more rigorous empirical testing of the effectuation framework. This includes examining whether it offers superior predictive validity compared to other decision-making models in the entrepreneurship (Baron, 2009).
Construct ambiguities	The theory assessment study suggests that the original constructs of effectuation are not distinctly different from other constructs in entrepreneurial literature, making it harder to delineate effectuation from other theories (Arend et al., 2015). One primary concern Baron has raised is the clarity and distinctiveness of the principles of effectuation. He questions whether these constructs are truly distinct from other, more established constructs in the entrepreneurship and decision-making literature (Baron, 2009).
Boundary conditions	The critique emphasizes the importance of understanding where, when, and for whom effectuation is most relevant. This aspect touches on the criticism that effectuation might be not universally applicable across all stages of entrepreneurship or all types of entrepreneurs (Arend et al., 2015).
Refinements	Despite their critiques, the authors recognize the value and contribution of effectuation theory. They provide suggestions for refining the theory, making it more robust, and better distinguishing its unique attributes (Arend et al., 2015).
Generalizability	Baron has noted that while effectuation might be suitable for specific contexts, it might not be as applicable or beneficial in more structured, predictable environments (Baron, 2009).
Operationalization	Baron has voiced concerns about how effectuation principles are not operationalized correctly, they might overlap with other constructs, making it difficult to discern their unique contributions (Baron, 2009).
Dichotomy	Effectuation is often positioned in opposition to causation. They argue that the two are not necessarily diametrically opposite, and entrepreneurs might employ both based on circumstances (Arend et al., 2015).

Appendix 4: potential overlap between principles

Table 7: overlapping principles within causation and effectuation principles according to theoretical discussion

Principles	Overlap
Means-driven action vs. Affordable loss	Both principles operate within the boundaries of existing resources. While the means-driven principle focuses on starting with one's current means, the affordable loss principle emphasizes the acceptable limits of potential losses.
Means-driven action vs. Partnership and cooperation	Both principles emphasize collaboration and building upon available means. Means-driven action is about starting with what you have, and the partnerships and cooperation principle stresses co-creating with stakeholders.
Non-predictive control vs. Affordable loss	Both principles involve a sense of control over the venture's outcome – affordable loss by predetermining acceptable risks and non-predictive control by emphasizing co-creation of the future.
Non-predictive control vs. Leveraging contingencies	Both principles involve leveraging contingencies. The 'lemonade principle' is about adapting and utilizing surprises, while the non-predictive control principles relates to controlling certain elements of the future.
Goal-driven action vs. Competitive analysis	Goals are often set after a rigorous competitive analysis, understanding where the company stands in comparison to competitors.
Goal-driven action vs. Predictive control	Both involve strategic foresight and planning. While the goal-driven principle is outcome-specific, aiming at a pre-determined result, predictive control works through forecasting future scenarios based on present data.
Competitive analysis vs. Predictive control	Predictive logic often deals with elements of competitive analysis to forecast market trends and make future business decisions.