INTERSECTION OF ENTREPRENEURIAL

PROCESSES:

THE EFFECT OF INTEGRATING CAUSATION AND

EFFECTUATION PROCESSES ON VENTURE

PERFORMANCE

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Title of Study: INTERSECTION OF ENTREPRENEURIAL PROCESSES: THE EFFECT OF INTEGRATING CAUSATION AND EFFECTUATION PROCESSES ON VENTURE PERFORMANCE

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Abstract: Entrepreneurs rely on a variety of decision-making heuristics when implementing entrepreneurial processes in small ventures. Researchers have suggested that entrepreneurs use effectual logic to utilize their available means and create the desired effects for their venture creations. This stands in contrast to causal logic that uses a variety of planning and prediction techniques to determine the entrepreneurs' desired effect and means available to launch a viable venture. Building upon recent research, I plan to continue the investigation on whether causation and effectuation are interchangeable in entrepreneurial ventures. In this study, I have used a sample of ventures across five industries with fewer than 100 employees. The preferences shown by entrepreneurs for causation and effectuation processes have been analyzed. I introduce stepping-stone options that provide a way for venture owners to mitigate risks while selecting a process. By incorporating multiple streams of literature, I have performed a rigorous examination of the processes used by entrepreneurs as the degree of uncertainty of increases. Using survey data collected from 211 entrepreneurial ventures, this study reveals that effectuation could be related to profit growth in environments of high technical and market uncertainty.

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CHAPTER I

INTRODUCTION

Background

Until 2001, researchers studying entrepreneurial processes typically focused on

causation (i.e., rational conduct). Causation is used in planning- and prediction-based

processes (i.e., rational conduct). Sarasvathy's (2001) seminal article on effectuation

revealed that causation involves processes that emphasize control—entrepreneurs lose

only what they can afford to lose; they form partnerships and leverage contingencies

(Sarasvathy, 2001). Research on causation-based processes in small firms identified a

positive relationship between strategic planning and profitability in turbulent

environments (Miller & Cardinal, 1994). It also posited that small firms benefit from the

adaptable aspects of strategic planning more than large firms (Miller & Cardinal, 1994, p.

1662).

To discuss entrepreneurial processes, it is necessary to provide a precise definition

of the term "entrepreneur." In this study, an entrepreneur is anyone who perceives an

opportunity (whether in an established or a new market), puts forth some type of

investment (e.g., time or capital), and subsequently incorporates these processes into an

organizational form by which to pursue that investment as an entrepreneur (Bygrave &

Hofer, 1991). As per this definition, effectuation employs a framework approach to guid

the use of effectual processes by entrepreneurs. Effectual logic is based on five principles: using available means, ascertaining affordable losses, leveraging contingencies, forming partnerships, and focusing on control (rather than prediction). It operates in a fashion similar to strategic planning principles. According to Sarasvathy (2001), the principle of available means focuses on entrepreneurs who use only what they possess, such as finances, talent, and knowledge. Affordable loss posits that entrepreneurs who only risk resources that they can afford to lose can recover quickly from setbacks and build a stronger venture from their learning experience (Sarasvathy, 2008). Each principle of effectuation provides entrepreneurs with decision frameworks that allow venture owners to form judgments about their environment and come to a generalized best course of action (Sarasvathy, 2011).

Entrepreneurs who use effectuation would start with their available means, which would allow them to align venture creation with what they physically and cognitively possess (e.g., financing, prior business knowledge, training). The element of control is central to effectual logic and to the method used by entrepreneurs to mitigate uncertainty (e.g., affordable loss, leverage contingencies) and to identify opportunities advantageous to the venture (e.g., partnership formation). Effectuation centers on individual entrepreneurial characteristics, including the financial means available to the entrepreneurs, their industry knowledge, and their strategic partnerships (Sarasvathy, 2005). To provide theoretical clarity, I pair Sarasvathy's effectual logic construct with Lachmann's individual-based subjectivism to avoid ontological oscillation. Lachmann's (1943) view of economic action relies on the individual's mental alertness and ability to adapt to an ever-changing business environment. This study adds value to Lachmann's views by proposing that actions performed by entrepreneurs require high degrees of adaptability and mental alertness. The alignment of the

entrepreneurial process selection and Lachmann's view on individual-based subjectivism allows us to understand entrepreneurial heuristics as the core of selecting and executing causation and effectuation processes.

Like effectuation, causation requires the individual entrepreneur to select and execute the process. Although both causal and effectual processes rely on entrepreneurial heuristics, the planning and prediction techniques of causation differ from that of effectuation; causation employs the careful analysis of alternatives to determine the most optimal effect, and effectuation employs non-predictive strategies (Sarasvathy, 2005). Traditionally, researchers have believed that actors only employ causal processes in linear business environments and that this is the only context in which they will be effective (Sarasvathy, 2001). Linear business environments are those in which entrepreneurial ventures experience low to moderate market and technical uncertainty. This study examines both causal and effectual processes as effective bases for mitigating uncertainty and creating entrepreneurial ventures in iterative and non-linear environments (Hofer & Bygrave, 1991).

Responding to the calls from Baron (2009) and Arend, Sarooghi, and Burkemper (2015) to provide a clear theoretical rationale regarding how and why entrepreneurs employ entrepreneurial processes, this study incorporates stepping-stone options as a moderating variable. Real options, specifically stepping-stone options, allow both causal and effectual entrepreneurs to manage uncertainty by pursuing high-quality performance outcomes while putting forth investments only if conditions are favorable (McGrath, 1999). The inclusion of stepping-stone options also allows both expert and novice entrepreneurs to have a tool to discern and mitigate uncertainty. This tool can be applied to both causation and effectuation processes (McGrath & MacMillan, 2002). If causal entrepreneurs use stepping-stone options

to bridge the gap between causation and effectuation processes, then they will realize the optimal effects while mitigating uncertainty. Similarly, stepping-stone options also benefit effectuating entrepreneurs by potentially minimizing the investment of available means to launch viable ventures successfully.

Researchers have traditionally understood effectual logic theory as diametrically opposed to causation; this study builds upon emerging research which suggests that entrepreneurs use causal and effectual processes interchangeably (Smolka et al., 2016). Each process is integral to human reasoning and subsequently reflects on the importance of the entrepreneur's ability to either plan systematically (i.e., causation processes) or to draw on the means that are available at the outset of venture creation (i.e., effectuation processes) (Politis, 2005). For this reason, I have developed a proposed model (Figure 1) to illustrate the roles of each construct and depict how they are theoretically related to each other in entrepreneurial ventures.
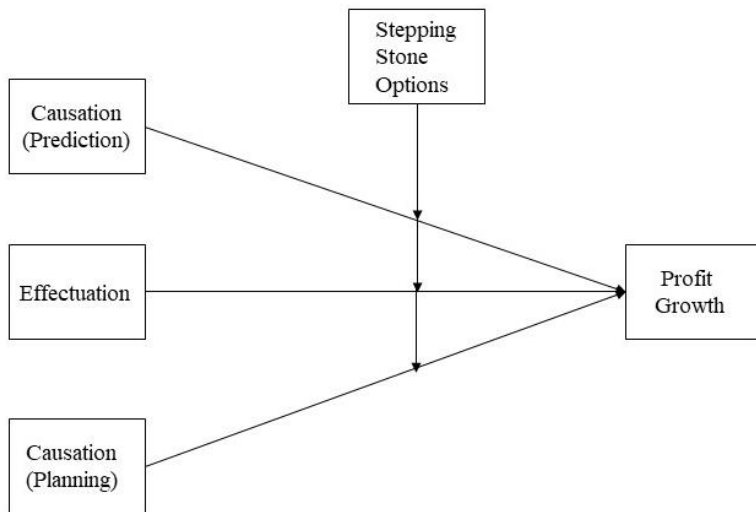

Figure 1. Proposed Theoretical Model Adapted from Trost (2015).

This study aims to investigate the effect of entrepreneurial process selection and performance of 211 ventures across five industries. This research strives to find answers to three significant questions:

1) How does the degree of uncertainty present in small ventures affect the degree to which entrepreneurs use causation process or effectuation processes?

2) How do stepping-stone options assist the entrepreneurs to select and execute entrepreneurial processes?

3) As the degree of uncertainty rises in entrepreneurial ventures, which of the two processes do entrepreneurs tend to use more: causation or effectuation processes?

I have adopted the theoretical model proposed by Trost (2015) and have used the theory building guidelines of Shepard and Suddaby (2017) to expand the current theoretical underpinnings of causation and effectuation process selection. Based on the proposed theoretical model, I used the individual-based subjectivism of Lachmann (1943) as the foundation of effectuation. I also used the strategic planning and predictive strategies of Stigler et al. (1952), Ansoff (1965), Mintzberg (1994), and Steiner (1969).

Contributions to Literature

First, this study seeks to contribute to the field by providing a clear rationale and empirical evidence for improving the understanding of how causation and effectuation processes affect entrepreneurial performance. Clarifying the constructs of effectuation and causation by using clear theoretical links is an essential step in the field of entrepreneurship to legitimize effectual theory further. Second, this study addresses multiple calls in literature to bring forth a theoretical bridge for effectual entrepreneurs to select processes.

Furthermore, as previously mentioned, evidence has been mounting that entrepreneurs execute causation and effectuation interchangeably (e.g., Smolka et al., 2016).

This study continues the theoretical conversation and provides empirical evidence that entrepreneurs use causation and effectuation processes interchangeably. This study provides evidence that stepping-stone options play a crucial role as a theoretical and practical resource for entrepreneurs when they decide whether to apply causation process or effectuation processes. It proposes that stepping-stone options are advantageous because they mitigate technical and market uncertainty.

Overview

The first chapter introduces causation, effectuation, and stepping-stone options. It describes the current knowledge and the key theoretical components necessary for the development of this study. This first chapter elaborates the importance of the topic under study. It then describes current knowledge concerning the core variables, essential aspects, and the relationships that require further study. After that, it briefly describes the theoretical rationale underpinning this study and outlines the fundamental contributions of this study.

The second chapter provides the theoretical framework for the study beginning with a review of causation, effectuation, and stepping-stone options. It then discusses the moderating effect of stepping-stone options as the theoretical underpinning that explains how entrepreneurs select between causation and effectuation processes while mitigating high degrees of technical and market uncertainty. The third chapter describes the methodology employed in this study, including a description of the sample, the measures, and the statistical procedures. The fourth chapter provides the results of the statistical data analyses.

The fifth chapter presents a discussion of the findings, contributions, limitations, and conclusions.

CHAPTER II

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Integration of Causation and Effectuation

The word "effectuate" derives from the Medieval Latin word "effectuat" (meaning "caused to happen"). According to the Oxford Dictionary, "effectuate" means "to put into force or action. "Causation" derives from the medieval Latin word "causation" (meaning "the action of causing"). According to the Oxford dictionary, "causation" means "the act of causing something to happen." Studying the root meanings of these words helps us understand the subtle differences in meanings between them. An example of how these differences function was given by Knight (1921) who observed that the relationship between the concepts of induction and deduction are intimate, and a rigid separation between the two or a rigid contrast between them can be misleading (p. 7). Sarasvathy's original study (2001) of decision making based on the thinking aloud of expert entrepreneurs found that a clear majority invoked both effectual and causal processes. This original study led to the general acknowledgment of the potential co-occurrence of causal and effectual logic in subsequent studies; it was found that entrepreneurs used both causal and effectual reasoning based on their circumstances (Sarasvathy, 2008).

Sarasvathy (2003) repeatedly stated that regardless of the occurrence of causal and effectual reasoning in the decision-making processes used by entrepreneurs, it makes sense (theoretically) to analyze causal and effectual approaches as a strict dichotomy. Similarly, other researchers have acknowledged that research should not view the effectuation–causation distinction as "all-or-nothing" even though theoretically, the logic that underlies each do not overlap (Dew, Read, Sarasvathy, & Wiltbank, 2016). The portrayal of effectual processes, as opposed to causal processes, has led researchers to view these constructs as mutually exclusive, which subsequently drives researchers away from formulating or testing hypotheses that would consider them as related in any way (Brettel, Mauer, Engelen, & Küpper, 2012).

It is unlikely that causal and effectual logic are entirely separable and never overlap. Causation and effectuation rely on the entrepreneur who consciously and willingly makes the decision/distinction of selecting and executing the processes. Several researchers have recently investigated effectuation and causation as parallel or sequential constructs that co-exist separately (Berends, Jelinek, Reymen, & Stultiëns, 2014; Maine et al., 2015; Reymen et al., 2015; Sitoh, Pan, & Yu, 2014) or as complementary processes (Agogué, Lundqvist, & Middleton, 2015). For example, it was found that when the principles of effectuation were practiced in mature firms, the R&D performance improved for "highly innovative" projects (Brettel, Mauer, Engelen, and Küpper, 2012). However, they claimed that in contexts characterized by lower levels of innovativeness, causation principles led to better decisions. Similarly, Berends, Jelinek, Reymen, & Stultiëns (2014) investigated product innovation within entrepreneurial firms and found that they routinely used both processes but relied more upon effectual processes during

the initial stages of new product development and used a combination of effectual and causal processes in the later stages. However, their longitudinal study of five firms did not test the relationship between these processes and performances.

Smolka et al. (2016) examined 1,453 entrepreneurs in 25 countries and found that ventures benefit from using effectual and causal logic in tandem. The "think first" versus the "act first" concept posited by Mintzberg and Westley (2001) is similar to the integration of causal and effectual logic in entrepreneurial process selection. Agogué et al. (2015) investigated mindful deviation through a combined causal–effectual decision-making framework concerning the conceptualization of recent technology; they observed that new concepts emerged through effectual decision making and were then translated into causal goals after they had been identified. This study builds upon and expands this logic by examining both causal and effectual processes commonly used by entrepreneurs and examines their subsequent effect on venture performance. It aims to further the current evidence that while causation and effectuation have unique components, entrepreneurs use both these processes interchangeably and simultaneously to differing degrees depending upon the degree of uncertainty encountered in the venture lifecycle.

In contrast with the previous studies on causation and effectuation processes (Werhahn et al., 2015, Smolka et al., 2016), this study makes the role of uncertainty more central. Specifically, the definition of uncertainty used is the one given by Knight (1921). Knight defined uncertainty as "situations where a specific probability or outcome cannot be assigned" (LeRoy & Singell, 1987). Next, this study aligns entrepreneurial process selection with Lachmann's views on individual-based subjectivism. In the Lachmannian spirit, this study suggests that planning, prediction, and non-predictive strategies (i.e.,

effectuation) can be viewed as choices made by the entrepreneur regarding the venture's available means and existing knowledge along with the degree of technical and market uncertainty faced by it (Mathews, 2010). Taken together, Lachmann and Knight provide a basic framework for the strategizing entrepreneurial firm (Mathews, 2010).

Knightian Uncertainty

An entrepreneur's ability to interpret and respond to uncertainty can often determine the degree of success or failure achieved within the venture (McKelvie, Haynie, & Gustavsson, 2011). In the entrepreneurial selection process, the degree of uncertainty can inform whether causation, effectuation, or a combination thereof is the most effective (Smolka et al., 2016). In fact, situations of uncertainty are defined as "when the decision-maker is unable to assign probabilities to events as it is not possible to calculate chances" (Runde, 1998). Entrepreneurial process selection is not probability based; rather it is a situational estimate based on the degree of technical and market uncertainty present in the venture. Estimates are defined by Knight (1921) as "individuals combining physical and cognitive resources to create a given outcome." The entrepreneurial outcome of these estimates enables the entrepreneur to adapt to uncertainty and subsequently make profits (Knight, 1921).

As described by Knight (1921), estimation occurs in the normal functioning of the enterprise—that is, when entrepreneurs select between entrepreneurial processes (i.e., causation and effectuation) to mitigate uncertainty (McMullen & Shepard, 2006). In fact, this theory is congenial to this study because it focuses on how entrepreneurs determine whether to select causation and effectuation processes based upon the degree of technical and market uncertainty in the venture. Knight's theory does not focus on equilibrium and

disequilibrium (Schumpeter, 1934; Kirzner, 1979); instead, it focuses on how entrepreneurs leverage standard functions and processes in the face of uncertainty to take advantage of opportunities (McMullen & Shepard, 2006). This nuance is important because it changes the question from "Is this an objective opportunity to seize?" to "How firmly does the entrepreneur believe he or she can leverage processes to create a viable and profitable venture?" (McMullen & Shepard, 2006).

Therefore, as Knight (1942) stated, "Profits must be earned in disequilibrium." This is the region of economic space where entrepreneurs flourish using their imagination, entrepreneurial processes, and judgments to formulate the best path forward to manage disequilibrium and generate profits (Mathews, 2010). It is also the region where "strategic opportunities" may be created and seized (Denrell et al., 2003). For example, venture owners look to invest in some novel activities, and they do this by combining available means and entrepreneurial processes into some new packages that are deemed by the entrepreneur as likely to be able to add value in the new situation (Mathews, 2010). Specifically, this study proposes that testing processes in the marketplace is the only method that exists for confirming the effectiveness of entrepreneurial processes in the face of Knightian uncertainty.

For this study, the marketplace consisted of 211 entrepreneurial ventures that were made up of five industries (healthcare, retail, technology, services, and manufacturing/engineering). These 211 entrepreneurial ventures were surveyed based on their preference for causation, effectuation, or a combination thereof. Stepping-stone options acted as additional resources to mitigate uncertainty by providing entrepreneurs with an entrepreneurial process selection medium to interchange between causal and

effectual logic. Within these 211 responses, Knightian uncertainty was measured using questions relating to the levels of technical and market uncertainty in the primary owner's entrepreneurial venture. This study escapes the determinism implied by the equilibrium paradigm (e.g., Schumpeter, 1934; Kirzner, 1979) and transforms it into the stances taken by radical, subjectivist economists (e.g., Lachmann, 1943). Accordingly, this study incorporates the Lachmannian view of individual-based subjectivism. The premise behind incorporating Lachmann's views of individual-based subjectivism is twofold: 1) it integrates the entrepreneur's unique decision-making capabilities and 2) it fits with causation and effectuation constructs (Chiles et al., 2008).

Lachmannian Individual-Based Subjectivism

This study heeds the call by Gartner et al. (1992) to "borrow boldly" from related theories by offering Lachmann's individual-based subjectivism framework as a potential foundation for entrepreneurial process selection. In Lachmann's views, the entrepreneurial economy is continuously remade through combinations and recombination's of available means by entrepreneurs who, in seeking to put into effect their processes, are forced to adjust because the processes prove to be mutually incompatible (Mathews, 2010). Profits and losses from the implementation of the entrepreneurial processes drive the economy and the mutual incompatibility of these processes. While Lachmann's original work examines the capital structures of the economy through a combination and recombination of resources, this study incorporates the framework into entrepreneurs who interchange between causation and effectuation processes as uncertainty fluctuates within a given context.

Entrepreneurial process selection, whether rooted in planning/prediction (causation) or non-predictive methods (effectuation), is fundamentally subjective (Mathews, 2010). A Lachmannian perspective on these strategic calculations invites us to view entrepreneurial process selection regarding the subjective interpretation of past experiences by entrepreneurs and their subjective imagination of future possibilities based on their unique decision-making capabilities (Chiles et al., 2008). The entrepreneurial environment is heterogeneous in that it results from the conflicting and mutually effacing process selection strategies of different entrepreneurs (Mathews, 2010). Accordingly, incommensurable entrepreneurial process selection schemas of competing entrepreneurs create value. While the Lachmannian view has fallen into disesteem at times (Sarasvathy, 2007; Salerno, 2002; Kirzner, 1979), his radical, individual-based subjectivism only makes sense in a setting of disequilibrium (Mathews, 2010). Specifically, this study by Mathews posits that entrepreneurial processes are rarely static; instead, they are executed in environments that are consistently fluctuating between different degrees of technical and market uncertainty.

Lachmann's views are appropriate for this study because entrepreneurs rarely operate in linear environments; they mostly operate with varying degrees of technical and market uncertainty. The ancillary benefits of Lachmann's subjectivist views include affording flexibility to entrepreneurs to act using available means and incorporating predictive, planning, and non-predictive processes to estimate and mitigate uncertainty. Entrepreneurs who can bear this uncertainty and adapt processes to mitigate uncertainty increase their likelihood of having a profitable venture (Knight, 1921). The aim of incorporating Lachmann's view of individual-based subjectivism is to posit that

successful combinations and recombination's of entrepreneurial processes drive venture profit growth (Mathews, 2010).

This study incorporates Knightian uncertainty and Lachmannian individual-based subjectivism to address two concerns: 1) avoiding ontological oscillation with other entrepreneurial process theories and 2) centering on the theoretical underpinnings (process-selection decisions) of the entrepreneur. The complexity of individual-based subjectivism and ever-changing degrees of Knightian uncertainty in entrepreneurial ventures casts serious doubts on the notion that effectual and causal processes are non-overlapping. It is also not clear whether this process of integration is suitable for the ventures that engage in it. On integrating non-deliberate and deliberate strategies, Mintzberg (1994) found that deliberate strategies sacrifice learning, whereas emergent strategies lack control (Mintzberg, 1994). Similar to Mintzberg's findings, causation sacrifices the entrepreneurs' flexibility, whereas effectuation lacks the planning and predictive structure that has been proven to mitigate risk and uncertainty in entrepreneurial ventures. This study hypothesizes that successful entrepreneurs will never be entirely causal or entirely effectual; the optimal solution requires a both/and approach rather than an either/or approach.

Causation

Causal processes can likely be traced back to the beginnings of organizational research, but many would suggest that these process manifestations in entrepreneurship research are derivatives from the planning school of thought and the specific works of Stigler et al. (1952), Ansoff (1965), Mintzberg (1994), and Steiner (1969). Causal logic has been used in this study (on strategic planning and predictive strategies) to help

simplify the complexities of planning for and operating a profitable entrepreneurial

venture. This study initially yielded a considerable mix of results that helped determine

whether ventures benefited from the strategic planning process. While small firms did not

agree on what degree of planning to conduct, every respondent in Unni's (1981) study

stated that good strategies significantly increase the likelihood of success in business (p.

56). Good strategies, Unni clarified, allow entrepreneurs to make strategic decisions that

are adaptable to complex situations where the available information is unreliable

(Busenitz & Barney, 1997).

Several studies have discussed the simplified strategies described by Unni (1981).

This study aligns with the work of Smolka et al. (2016) who found that causal

entrepreneurs integrate planning and prediction processes into the creation of processes

aimed at the development of entrepreneurial ventures. To clarify how entrepreneurs,

integrate planning and prediction processes into creating a venture, I draw from and build

upon Bhave's (1994) conceptual model to analyze essential business activities necessary

for the venture to remain viable. Bhave's conceptual model simplifies the complexities

associated with the creation of causation process required by initial revenue. In contrast

with previous studies on causation and effectuation, I posit that the intentional alignment

of causal logic with Bhave's venture creation model could clarify when entrepreneurs use

specific planning or prediction processes.

Entrepreneurs identify and exploit opportunities through a series of actions that

stem from external or internal opportunity recognition (Bhave, 1994). External

opportunity recognition occurs when a venture was created before the development of the

opportunity or the business concept. By contrast, internal opportunity recognition occurs

when the opportunity is developed before the business formation (Liao & Welsch, 2008). When either external or internal opportunity recognition occurred, the entrepreneur decided whether he or she possessed the capabilities to exploit a narrow window of opportunity in the market space (Tversky & Kahneman, 1974). The entrepreneur's ability to find an opportunity to exploit this window in the market space would focus on establishing a strong brand and distribution niche (Hofer, 1973). Drawing from Chandler, DeTienne, McKelvie, and Mumford (2011), the causally oriented entrepreneur would develop a strategy to take advantage of available resources and capabilities to create and develop a viable product or service that best positions the venture to establish a strong brand and distribution niche.

To establish a strong distribution niche, causal entrepreneurs conduct meaningful competitive analyses to select cost-effective markets toward which to target their products and services. To create and deliver a viable product or service, the entrepreneur should develop a production technology that includes the procurement, configuration, and launch of tools that transform raw goods into finished products (Bhave, 1994). One of the challenges faced in procuring and developing production technology is to determine how to finance the process (Bhave, 1994). For most entrepreneurial ventures, financial constraints often prevent the self-financing of production technologies and subsequently inhibit the achievement of the desired performance outcomes (Van Auken & Neeley, 1996). Financial constraints require entrepreneurs to use creative financing efforts in the venture creation process.

Causal logic employs planning tools, such as business plans, to detail how entrepreneurs best utilize highly complex business functions to mitigate uncertainty.

Even 15 years after Sarasvathy's (2001) seminal article on effectuation, the role of business planning in entrepreneurship remains central in both practice and theory. Business planning is still widely viewed as the gold standard for various practical approaches (Honig & Karlsson, 2004). For example, in their meta-analysis covering 51 effect sizes, Brinckmann, Grichnik, and Kapsa (2010) examined the relationship between business plans and venture performances, and they found that, on average, business plans enhanced firm performance.

The business plan allows entrepreneurs to leverage their limited cognitive ability and accomplish several business activities simultaneously (Haynie & Shepard, 2009). Entrepreneurs addressing how to finance the development of production technology in a business plan would project the raw material requirements first; subsequently, they would predict how much product those materials would create. Entrepreneurs who use causation processes would start by examining the current economic environment and the existing products in the marketplace by using a screening process with the selection being centered on the predicted return on investment (Chandler, DeTienne, McKelvie, & Mumford, 2011). In causation, a common approach is to gather information from retailers and wholesale companies to gauge the demand for products in a market space. After creating rough projections for product demand, entrepreneurs can purchase production technology and raw materials within their financial means to finalize any organizational change and hopefully generate initial revenue.

The initial generation of revenue creates a concrete link between the business concepts created in the strategic plans and the initial market opportunity recognized by the entrepreneur (Bhave, 1994). Business planning and predictive strategies result from

the entrepreneurs' limited cognitive abilities to complete the complex process of establishing a viable venture. Entrepreneurs use the planning and predictive processes to maximize their limited cognitive capacity by organizing available means to achieve the goal of creating a viable venture. Bhave's conceptual model simplifies this process for entrepreneurs because it gradually introduces opportunity recognition and subsequent planning considerations that are necessary for initial revenue generation. The logical flow of Bhave's causally oriented model makes it clear how entrepreneurs can easily follow these processes.

Deliberate activities, such as business planning, create the venture by relying on the experiences and motives of entrepreneurs. This is in line with traditional entrepreneurial thought processes (Politis, 2005). Causation-oriented entrepreneurs use their experiences to explore opportunities to create a departure point for the planning or execution of venture activities (Wiltbank, Dew, Read, & Sarasvathy, 2006). In summary, causal logic affords entrepreneurs the ability to use planning/prediction considerations to mitigate uncertainty and maximize their limited cognitive abilities.

Effectuation

Effectual logic focuses on the abilities of entrepreneurs to leverage their resources to create the desired effects (Sarasvathy, 2001). Effectuators start with what is available to them (e.g., time, prior knowledge, human capital) and attempt to achieve their desired effect with those means. The premise of effectuation allows entrepreneurs to take their available means and create a variety of effects that aim to mitigate uncertainty (Sarasvathy, 2001). The thinking framework of effectuation minimizes the need for traditional planning and prediction techniques because individual thoughts drive the

entrepreneurs' use of means to achieve the desired effects (Sarasvathy, 2011). The effectual entrepreneur can quickly analyze means available and then immediately move forward; this approach mitigates the uncertainty and losses that would result if the venture failed. This flexibility allows entrepreneurs to see an opportunity and exploit it using their available means without having to engage in significant business planning. Effectuation, in contrast to causation, exploits the methods of non-predictive control measures to reduce the need for prediction (Wiltbank et al., 2011).

Non-predictive control provides entrepreneurs the ability to use their available means to control future business activities while pursuing the desired effects. Similar to causation, effectuation employs a framework approach to guide the entrepreneurs' use of effectual processes. Effectuation is framed around five principles: using available means, ascertaining affordable losses, leveraging contingencies, forming partnerships, and focusing on control rather than on prediction. These five principles provide a framework that entrepreneurs can tailor to meet their needs. This framework is centered on individual entrepreneurs' knowledge and the relationships they possess (Sarasvathy, 2005). To provide theoretical clarity, this study pairs Sarasvathy's effectual logic construct with Lachmann's individual-based subjectivism to avoid ontological oscillation (Burrell & Morgan, 1979). Lachmann's views of economic action rely on the individual to execute decisions in an environment of doubt and uncertainty based upon the entrepreneurs' mental alertness and the ability to adapt to an ever-changing business environment (Lachmann, 1943).

The cognitive abilities of effectual entrepreneurs are critical to the success of effectuation processes. In contrast to causation, although effectuation's thinking

framework is flexible, it relies heavily on the entrepreneur's cognitive abilities to discern uncertainty in entrepreneurial ventures. While there is no absolute or objective set of entrepreneurial processes that every entrepreneur can apply with success, effectual logic provides the venture owner the unconstrained freedom to pursue or redirect business development if he or she possesses the means to do so. Freedom in the thinking framework of effectuation was designed to maximize the entrepreneurs' abilities to leverage non-predictive processes to mitigate high degrees of uncertainty. As the key actor in effectuation, the entrepreneur mitigates high degrees of uncertainty by using processes that control the future application of available means.

As mentioned above, the degree of uncertainty embodied in effectuation is high; therefore, entrepreneurs should have a keen understanding of how to balance risks. Uncertainty, as Knight (1921) hypothesized, allows entrepreneurs to earn a positive profit even when there is perfect competition, long-run equilibrium, and product exhaustion. According to Knight, the entrepreneurs' success as risk-takers depends upon their ability to mitigate and transform uncertainty. Entrepreneurs who use effectuation processes rely on the elements of control; they risk only what they can lose if they do not jeopardize the entire venture and form partnerships that work in tandem to mitigate uncertainty (Dew, Sarasvathy, Read, & Wiltbank, 2009).

It is critical for entrepreneurs to work with their available resources to support the profitable growth of a firm, which largely determines the firm's response to a changing world (Penrose, 1959). In this study, I further expand the definition of the thinking framework associated with effectuation to provide a clear picture of how each process incorporates non-predictive control to mitigate uncertainty and maximize the

entrepreneurs' available means. The next section will discuss the importance of entrepreneurs maximizing their available means, risking only what they can "affordably lose," leveraging unexpected occurrences into advantages and forming strategic partnerships with self-selected stakeholders. In summary, effectual logic provides entrepreneurs the opportunity to employ non-predictive tools that focus on controlling the future, all the while mitigating high degrees of uncertainty typically associated with entrepreneurial ventures.

Available Means

The available means principle of effectuation states that entrepreneurs start with what is immediately available to them, such as time, finances, and prior knowledge (Sarasvathy, 2008). In contrast to causation, which focuses on selecting among optimal effects, effectuation determines the degree of availability of various means. Instead of analyzing effects, effectual entrepreneurs focus on the means that they can leverage to create the desired effects. Effectuation-oriented entrepreneurs start with one set of means and subsequently determine which effects (i.e., ventures) to create (Sarasvathy, 2001).

Effectual entrepreneurs must analyze and adapt to their environments quickly; this requires a high degree of adaptive cognition (Flavell, 1979). Adaptive cognition is a higher-order process that helps organize what entrepreneurs recognize about tasks, situations, and environments in the face of a dynamic business environment (Haynie & Shepard, 2009). Similar to the resources mentioned above, entrepreneurs possess limited cognitive means and must determine how to leverage them to create the desired effects. Entrepreneurs leveraging their available means in highly uncertain environments require

quick decision-making abilities, which are generated by adaptive cognition (Haynie & Shepard, 2009).

Sarasvathy's U-Haul example suggests that entrepreneurs working within available means and through adaptive cognition could create a financially viable venture with limited resources. In this example, the venture owner took limited financial resources ($5,000) and infrastructure (one automobile garage) and leveraged them to create a nationwide do-it-yourself moving company (Sarasvathy, 2001). It demonstrates that although adaptive cognition requires significant entrepreneurial skills to transform the limited means quickly, it is related to venture performance positively in highly uncertain environments (Rozin, 1976).

Affordable Loss

In contrast to risk mitigation strategies that causal processes use, such as business canvases, business planning, and predictive forecasting, affordable loss introduces two aspects: (a) estimating an entrepreneur's downside and (b) determining what can be lost without risking the termination of the venture (Sarasvathy, 2007). The affordable loss principle mitigates uncertainty by controlling the downside scenarios and reaching markets with a minimum expenditure of resources (Sarasvathy, 2001; Wiltbank et al., 2011, March 1982). Prior economic literature supports Sarasvathy's affordable loss reasoning because entrepreneurs traditionally examine the obstacles they can expect to encounter (Lachmann, 1943). An important benefit of applying the affordable loss principle is the ease with which entrepreneurs can determine their available resources, ideas, and find a path forward (Sarasvathy, Kumar, York, & Bhagavatula, 2014).

The affordable loss principle isolates, in a very hasty way, what the entrepreneur is willing to risk and uses the available resources in the best possible way. Entrepreneurs use affordable loss as an evaluation criterion for comparison with the expected returns in causation (Wiltbank et al., 2006). This evaluation criterion ensures that failure in effectual logic does not result in severe financial or personal consequences for the entrepreneur, but rather, it acts as a learning experience that could be leveraged successfully in the future (Read, Song, & Smit 2009).

Leveraging Contingencies

A high degree of uncertainty in the selection of an entrepreneurial process often creates unexpected opportunities for entrepreneurs to improve their ventures. Effectual entrepreneurs' welcome surprises as clues to the future of their ventures (Sarasvathy, 2001). Effectual logic embraces failure, and through adaptive cognition, entrepreneurs adapt to ever-changing environmental conditions within their available means and decision-making capacities (Sarasvathy, 2001; Hofer & Sandberg, 1987; Flavell, 1979; Knight 1921). Entrepreneurs who work using the available means and mitigate losses using the affordable loss principle position themselves well to leverage available contingencies. As an illustration, Milton Hershey's two failures, which left him penniless, eventually led him to create the Hershey chocolate brand; this is an example of leveraging contingencies.

Milton Hershey's ability to learn from both his previous failures and leverage his extensive experience resulted in his eventual success. As Hershey experienced failure, he acquired new production skill sets, which resulted in his ability to leverage expertise when the opportunity presented itself. For entrepreneurs, resilience in the face of

changing business landscapes, competitive forces, and the limitations of available means

is imperative for both venture survival and the capacity to leverage newly discovered

contingencies (Ciavarella et al., 2004).

Forming Partnerships

The formation of partnerships early in the venture-creation process provides

entrepreneurs the ability to reduce the limitation of capabilities and the dispersion of

uncertainty (Hatfield & Pearce, 1994). Vested stakeholders also increase the available

physical and cognitive means to create the desired effects. Metacognitive knowledge and

experience are important cognitive means that increase with the addition of pre-

committed stakeholders; this further incorporates the uncertainty-reduction mechanisms

(Haynie & Shepard, 2009). Metacognition posits that venture owners know when and

how to utilize strategies for learning, problem-solving, and forming partnerships (Haynie

& Shepard, 2009). In contrast to entrepreneurs using causal logic (which predicts trends

and conducts analysis on competitors), "effectuators" actively seek partnerships through

pre-commitments across industries to reduce competitor effects and co-create new market

spaces to counter uncertainty (Sarasvathy, 2001). Forming partnerships and using control

(as opposed to prediction) logic allows entrepreneurs to proactively direct the venture

toward minimal means or losses in the face of setbacks.

The nature of partnerships provides entrepreneurs the freedom to obtain

committed stakeholders who can assist in the successful launching of their ventures.

Sarasvathy's (2001) "Curry in a Hurry" thought experiment provides an example

involving an entrepreneur sourcing friends to purchase Indian food and starting a lunch

delivery service, and the product was well received. In this example, an entrepreneur

gains the freedom to pursue committed stakeholders and partnerships to establish a viable

venture (Sarasvathy, 2001). In the thinking framework of effectuation, forming

partnerships is a free-flowing process that incorporates the other principles of effectual

logic, such as using available means, ascertaining affordable losses, leveraging

contingencies, and focusing on control rather than on prediction. To integrate the

complexities of causal and effectual logic, it is necessary to find a bridge that would leave

each construct theoretically intact and avoid ontological oscillation. The theoretical

component selected to bridge the causal and effectual constructs is a real-options

perspective; specifically, it is a stepping-stone option.

Stepping-Stone Options

The value of waiting to make an investment increases with the level of

uncertainty of the future returns, and the greater the level of uncertainty, the more

pronounced is the departure from the ideals of Marshall's equilibrium investment theory

(Dixit, 1992). The application of Dixit's real-options concept to corporate strategic

investments involves the possibility that each entrepreneurial initiative represents

individual "real-option" investment decisions. As such, the firm's entire entrepreneurial

R&D investment strategy can be subsequently viewed as a portfolio of real options

(McGrath, 1999). Entrepreneurs rarely possess a portfolio of real options to manage and

subsequently possess several paths forward, each of which represents the firm's imputed

real-options portfolio. After the entrepreneur makes the initial investment (called the

premium), he or she selects a time horizon (i.e., the expiry) before making a significant

investment (i.e., the strike price) when the option could offer potential future revenue

streams (or the payoffs). Each time an option is exercised (i.e., one of the larger

investments is made), the entrepreneur's portfolio changes as several previous paths are effectively abandoned, and a new horizon of possibilities presents itself (i.e., a new real-options portfolio).

Three categories of real-options strategies exist and are used based on two types of uncertainty found in entrepreneurial ventures: market uncertainty and technical uncertainty (MacMillan & McGrath, 2002). Positioning options are best when the technical uncertainty is high, and the market uncertainty is low. Entrepreneurs would use scouting options when market uncertainty is high but technical uncertainty is low. The focus of the current study is stepping-stone options, which entrepreneurs use when both the technical and market uncertainty are high. Real-options allow entrepreneurs to build both market insight and technical competence systematically to move an entrepreneurial venture forward without exposure to potentially catastrophic downside risks (MacMillan & McGrath, 2002).

Real options provide a practical blueprint for entrepreneurs to forecast; forecasting using real options is unlike the magician-type forecasting that was critiqued by Mintzberg (1994). This blueprint provides entrepreneurs a forecasting method that incorporates the establishment of all key underlying assumptions and subsequent tests and validations of those assumptions (McGrath & MacMillan, 1995, 1999, 2009). Entrepreneurs who use this discovery-driven blueprint align entrepreneurial process selection by developing numerous milestones that guarantee the testing of all assumptions and the validation of expenditures directly tied to the successful completion of each milestone (McGrath & MacMillan, 1999). This concept relates to affordable loss

and represents a core concept of MacMillan and McGrath's (2002) real-options stepping-stone strategy.

This study adopts the approach that continuously validating key assumptions by applying stepping-stone options can help entrepreneurs strategically shift between causal and effectual processes (or, at times, help engage in both simultaneously). High levels of uncertainty in entrepreneurial ventures (with uncertainty directly creating the value of the real-options investment) represent the conditions under which causal processes of real-options strategies (such as stepping-stone strategies) provide an avenue for enhancing the beneficial aspects of effectual processes.

Hypothesis Development

Causation (Planning)

Researchers and entrepreneurs have a vested interest in discovering processes that will drive performance and create measures to account for, mitigate, and adapt to ever-evolving economic complexities. To facilitate the further exploration of causal processes, it is necessary to examine the theoretical underpinnings of predictive and planning constructs. Building upon Bhave's (1994) structure of entrepreneurial venture creation, this study incorporates additional background on predictive and planning activities to clarify their respective roles in causal processes.

Organizational formation is a dynamic process in which activities, such as obtaining resources, developing new products, seeking funding, and hiring employees, occur at various times and in various orders (Katz & Gartner, 1988). Organizational formation is important in entrepreneurial ventures because it enables entrepreneurs to establish a sequence in which they perform tasks and make decisions. Using structured

interviews, previous studies have found that the definitions of business concept and creation, the setup of production technology, and the exchange of products kept this iterative, non-linear, feedback-driven process organized (Bhave, 1994). Bhave's views are different from Sarasvathy's views that causal processes are more useful in static, linear, and independent environments.

Entrepreneurs possess a limited cognitive ability and cannot possibly engage in all processes simultaneously. Individual entrepreneurial decision-making ability is limited by the entrepreneurs' cognitive ability to adequately define the problems they face (Simon, 1991). Regardless of whether they use causal and effectual processes, entrepreneurs must make calculated decisions in each phase of the venture gestation period within the limited time and using limited resources (Bhave, 1994; Katz & Gartner, 1988; Liao & Welsch, 2008). Being causal does not imply that the entrepreneurs are methodical; instead, it indicates that the individual employed predictive and planning measures during the gestation period.

The validation study by Chandler et al. (2011) involved the administration of causal and effectual process surveys to MBA students and entrepreneurs. They developed their causal process questions from a review of Sarasvathy's (2001) descriptive constructs in her seminal article. The development of causal and effectual constructs being relatively new to the literature, Chandler et al. adopted a multi-stage approach to ensure face and content validity. The subject matter of causal items included analyzing long-run opportunities, determining strategies to best take advantage of resources/capabilities, using meaningful competitive analyses designed for planned business strategies, and planning production/marketing events (Chandler et al., 2011).

Central to these items is the use of planning (i.e., analyzing long-run opportunities) and predictive (i.e., meaningful competitive analysis) mediums.

The application of planning and predictive media is especially important in an entrepreneurial process, which is considered discontinuous, dynamic, and holistic, and it involves multiple antecedent variables in which outcomes are extremely sensitive to these initial inputs (Hofer & Bygrave, 1991). Predictive and planning media (e.g., business plans, marketing strategies, sales penetration projections) allow entrepreneurs to work on multiple projects simultaneously. With uncertainty being the cornerstone of entrepreneurial action, planning within the entrepreneurs' means (i.e., financial, cognitive, and area of expertise) provides a means to explore the best opportunity and select the best course of action based on available resources (McMullen & Shepard, 2006). Research shows that generating strategic alternatives and selecting the most suitable outcomes comprises the strategies most beneficial to the success of a firm (Wheelwright, 1971). This strategy of generating alternatives and subsequently selecting the most suitable outcomes based on the entrepreneur's available means allows the entrepreneurs to construct a vision that brings together the various scattered pieces of a venture (McMullen, Plummer, & Acs, 2007).

It would be an understatement to call the process selection complex because diverse options are available for entrepreneurial ventures. The processes discussed by Chandler et al. (2011) are not exhaustive, and entrepreneurs do not have to complete them in any specific order. During the entrepreneurial process, one activity tends to trigger the completion another based on the gestation pattern of the venture (Liao & Welsch, 2008). It is no longer appropriate to classify the planning and predictive

processes in developing an entrepreneurial venture as linear and static because economic

complexities dictate the need for adaptable and fluid causal processes. Although

ambiguity and uncertainty remain throughout a company's lifecycle, they are most

present in entrepreneurial ventures where the entrepreneur has limited knowledge,

resources, and experience (Liao & Welsch, 2008).

The preceding discussion leads to the following hypothesis:

H1*: In all contexts (i.e., high uncertainty and low uncertainty), the degree to*

which entrepreneurs implement planning-related causation processes will positively

influence venture profit growth.

Causation (Prediction)

Interestingly, the causation and effectuation literature to date has only scantly

discussed the role of prediction in the entrepreneurs' use of causal processes.

Entrepreneurial venture success relies on accurate representation and accounting for

numerous prediction-based antecedent variables such as competitor positioning, available

resources, and customer needs (Hofer & Bygrave, 1991). The entrepreneurial process

selection is further complicated because these antecedent variables are evolving and

unique to the industry that the entrepreneurs choose to enter (Hofer & Bygrave, 1991).

For entrepreneurs to determine these antecedent variables successfully and accurately,

this study draws from and builds upon the work mode of Aram and Cowen's (1990)

strategic process development issue/situation analysis. As entrepreneurs move forward in

causation process selection and subsequent strategic planning, they must evaluate the

solutions they generate in a systematic manner (Aram & Cowen, 1990). It is possible to

infer that entrepreneurs who employ causation engage in planning and prediction to reduce uncertainty.

The systematic evaluation of solutions by entrepreneurs involves meaningful competitive analyses and the selection of strategies that make optimal use of available resources (Chandler et al., 2011). Meaningful competitive analysis provides entrepreneurs the ability to analyze each unique antecedent variable discovered in the planning process, and it creates reasonable predictions about what will occur, given the available means in the industry (Hofer & Bygrave, 1991). An analysis that is based on the entrepreneurs' available means and is sensitive to the industry specifics will be positively correlated with firm performance (Baum, Locke, & Kirkpatrick, 1998). This positive correlation with firm performance is not solely based on competitive analysis but rather on the integration of prediction techniques into the entrepreneurial planning process. Entrepreneurs often use these prediction techniques during organizational formation activities, such as determining the need for additional funding and the demand for products and raw materials (Katz & Gartner, 1988).

Entrepreneurs who integrate prediction techniques into the causation process selection enable their enterprises to adapt to the changes in their competitive environments (Aram & Cowen, 1990). The successful integration of planning and prediction processes in causation creates a strategic environment in which entrepreneurs can capitalize on the five-percent difference (Aram & Cowen, 1990). The five-percent difference refers to the situation when entrepreneurs, during strategic planning, create processes adaptable to industry uncertainty and cause a value-creating action (Aram & Cowen, 1990). Specifically, Aram and Cowen's (1990) strategic, process-development

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model integrates prediction as a component of creating the five-percent difference in an enterprise's strategy creation (p. 66). Entrepreneurs who achieve the five-percent difference through the application of an issue/situation analysis work mode ensure that the strategic solutions generated are adaptable to dynamic and uncertain environments (Aram & Cowen, 1990).

Causation is unique to "effectual" literature because it is posited to be more useful in static, linear, and independent environments (Sarasvathy, 2001). In contrast, pre-effectual literature defines the entrepreneurial process as initiated by an act of human volition through which a discontinuous change of state occurs that is dynamic yet holistic (Hofer & Bygrave 1991). Bhave (1994) also shared the interpretation of the entrepreneurial process presented by Hofer and Bygrave who found that while a generalized taxonomy of entrepreneurial venture creation is possible, the process is iterative, non-linear, and evolving based on the needs of the business. They present causation as a tool by which the individual entrepreneur adapts to specific prediction modalities based on their practical needs.

In the examination of causation, Chandler et al.'s (2011) validation of causal and effectual processes hypothesized and tested two prediction processes. By examining the resources and capabilities and conducting meaningful competitive analyses as part of the causation construct, Chandler et al. (2011) found that both have face and content validity. These findings indicate that entrepreneurs who incorporate both planning and prediction into causal process selection may be able to mitigate uncertainty and increase performance (Aram & Cowen, 1990). There is sparse literature on the role of prediction in the selection of a causation process. This study builds upon the previous strategic

planning research that states that prediction is an integral part of good entrepreneurial

firm strategy creation.

The preceding discussion leads to the following hypothesis:

H2: *In all contexts (i.e., high uncertainty and low uncertainty), the degree to*

which entrepreneurs implement prediction-related causation processes will positively

influence venture profit growth.

Effectuation

In contrast to causation, effectuation focuses on the elements of control,

affordable loss, and experimentation (Sarasvathy, 2001). Effectual logic significantly

deviates from the planning and prediction function of causation by proposing that

entrepreneurs control situations through the knowledge they possess and subsequently

reduce the requirement to predict the future (Goel & Karri, 2006). The core claim of

effectuation is that entrepreneurs can create a variety of effects when they attempt to

influence the factors that they can control. Many entrepreneurs may not be able to do

anything beyond merely networking with the people they know directly and indirectly

(Sarasvathy & Dew, 2005). Effectual logic focuses on the means immediately available

to the entrepreneur and the knowledge of what he or she is willing to lose; both these

factors are readily adaptable to changing economic conditions.

Effectual logic combines the principles of ascertaining affordable losses,

experimentation, and flexible non-predictive planning to mitigate and, at times, to

eliminate uncertainty by focusing on control rather than on planning or prediction

(Sarasvathy, 2001). In effectuation, actors influence their environment through their

available means and iterate based on responses from their environment. To respond to

environmental factors, the entrepreneur not only needs to adapt cognitively but also needs to proactively exploit strategic alliances and partnerships (Sarasvathy, 2001). Strategic alliances and partnerships are important in effectuation because they frame the future by co-creation through intentional agents who are stitched together (Chandler et al., 2011).

Co-creation by intentional agents reincorporates individual-based subjectivism because the entrepreneur selects relationships through an organic process that draws on previous experiences and preferences. The entrepreneur is a unique individual with a distinct perspective on how to use the available means at his or her disposal. Similarly, what the entrepreneur can afford to lose varies from one entrepreneurial venture owner to the next. This study deviates from recent literature by integrating individual-based subjectivism into effectual logic. The entrepreneur who implements processes and creates an organizational structure to pursue an opportunity must operate at a high-order cognition level to be successful. Meanwhile, the integration of individual-based subjectivism has received support from effectual scholars who have observed expert entrepreneurs frequently using resources within their control in conjunction with commitments from self-selected stakeholders. Such actions enable the fabrication of new artifacts such as entrepreneurial ventures (Sarasvathy & Dew, 2013).

The role of effectual logic in maximizing underutilized resources is at the forefront of the affordable loss principle, which molds, shapes, transforms, and reconstitutes the current realities and limited resources into new opportunities (Sarasvathy, 2006). The U-Haul example in Sarasvathy's (2001) seminal piece suggested the potential of maximizing underutilized resources and initiating the formation of new industries. Not only did the U-Haul create a new industry (Do-It-Yourself Moving

Services), but it also used extremely limited resources that the entrepreneur could reasonably afford to lose. The principle of effectuation relying on individual willful creation puts the entrepreneur front and center in the opportunity recognition and uncertainty mitigation processes (Read et al., 2009).

Effectual logic mitigates uncertainty in two ways. First, it is the affordable loss principle and leverages surprises in the venture creation process to control the newly emerging situation (Sarasvathy & Dew, 2013). Entrepreneurs using effectual logic share risks and allow stakeholders to act as co-creation agents by investing in opportunities and having multiple parties sharing in the risk (Sarasvathy & Dew, 2013). The shared risk model in an effectual partnership embraces contingencies throughout the venture creation process by evolving means, goals, and stakeholders (Sarasvathy & Dew, 2013). The focus on evolving means, goals, and stakeholders permits effectually oriented entrepreneurs to adapt quickly to a rapidly changing entrepreneurial landscape. Without denigrating the other positive values related to the use of causal processes, the logic developed by Sarasvathy (2001) and others (March 1982; Weick, 1979) leads to the following hypotheses:

H3: *In high uncertainty contexts, the use of effectual processes will be positively related to venture profit growth.*

Stepping-Stone Options

In environments of high uncertainty, regardless of causal orientation or effectual process orientation, stepping-stone strategies assist entrepreneurs in shifting strategically between effectual and causal processes; at times, the strategy even enables them to perform both processes simultaneously. Defining the failure thresholds of entrepreneurs

provides a subjective process of assessing alternatives that stages investments to where

expenditures end under poor conditions and investments continue if the venture performs

well (McGrath, 1999); this is known as "exercising the option." Entrepreneurs using

either causal or effectual processes benefit from employing stepping-stone options

because although it focuses on the individual venture owner, yet it is a flexible and

sequenced process. The deployment of real options allows entrepreneurs to respond

effectively to highly unpredictable situations through a pattern of real options that use

multiple smaller investments in contrast to one large investment (MacMillan & McGrath,

2002). Real-options analysis provides entrepreneurs an intervening tool to stage

investments and mitigate uncertainty (Amoroso, Moncada-Paternò-Castello, & Vezzani,

2016).

Stepping-stone options allow entrepreneurs who execute the causation or

effectuation processes to incorporate learning in both market and technical dimensions,

which will likely involve an unsuccessful venture on the first attempt (MacMillan &

McGrath, 2002). This aspect of real options openly incorporates the acceptance of high

market (economic) uncertainty, similar to the effectual logic construct. The real-options

approach provides the entrepreneur a fluid resource allocation decision process, which is

fundamental both theoretically and practically in causal and effectual processes. Keeping

investments to a minimum and reassessing the entrepreneurial venture frequently allows

an entrepreneur to retain the benefits of the potential failure and to contain costs

(McGrath, 1999). Regardless of whether entrepreneurs want to focus on maximizing

investment returns (a causally oriented mindset) or selecting options that create future

opportunities over current returns (an effectually oriented mindset), they can integrate the

logic of stepping-stone options into either of the mindsets (MacMillan & McGrath, 2002; McGrath, 1999; Sarasvathy, 2001). The preferences of entrepreneurs for exploiting preexisting knowledge or contingencies that arise over time allow them to leverage stepping-stone options as an evolving competency base that progressively takes newly learned skills into new markets (MacMillan & McGrath, 2002; Sarasvathy, 2001; Chandler et al., 2011).

Stepping-stone options have an evolving competency base and allow venture owners to enter at a relatively low cost and risk. Entrepreneurs who take these small exploratory forays into a new industry only with their available means minimize uncertainty. Developing new competency bases and using stepping-stone options to limit risks and the required initial investments benefit both causal and effectual venture owners. In a discontinuous yet holistic and dynamic process, applying stepping-stone options provide the entrepreneur with a tool to make deliberate resource allocation decisions and pursue carefully selected and increasingly challenging opportunities (MacMillan & McGrath, 2002).

Stepping-stone options posit that a highly uncertain project's real value (i.e., entrepreneurial ventures) is in the future. This allows entrepreneurs to integrate stepping-stone options into the model because it deals with failure in a manner that allows them to avoid damaging future opportunities (McGrath, 1999). With this information, I propose the following two hypotheses:

H4a: *In high-uncertainty contexts, the use of stepping-stone strategies will positively moderate the relationship between the use of causation (prediction) and the venture profit growth.*

H4b: *In high-uncertainty contexts, the use of stepping-stone strategies will positively moderate the relationship between the use of causation (planning) and the venture profit growth.*

Stepping-Stone Options (Effectuation)

Real options, specifically stepping-stone options, provide entrepreneurs a unique approach to examining and pursuing small exploratory forays into emerging markets (McGrath, 1999). Unlike when entrepreneurs use causation processes, effectuation and real options embrace quick decision-making capabilities and minimize the expenditures from available means (McGrath, 1999). As the previous described, stepping-stone options benefit both causal and effectual entrepreneurs. This study hypothesizes that effectual entrepreneurs will benefit by using stepping-stone options; therefore, this process warrants a closer examination. The premise of effectuation depends on the entrepreneurs' ability to change their course of their ventures quickly (Sarasvathy, 2001). Using stepping-stone options makes it easier for entrepreneurs to take quick steps in other directions while mitigating uncertainty. Entrepreneurs who employ stepping-stone strategies are also likely to preserve available means because the expenditure of resources is limited to the cost of the option (McGrath, 1999).

Stepping-stone options preserve the means available to entrepreneurs by keeping their investments to an absolute minimum; they require frequent reassessment of processes and allow the entrepreneurs to redirect their ventures (MacMillan & McGrath, 2002). The frequent reassessment of processes provides entrepreneurs with an inexpensive and quick method for structuring their decisions (MacMillan & McGrath, 2002). The key issue in the application of stepping-stone options in effectuation is

mitigating uncertainty while preserving access to attractive opportunities (McGrath, 1999). Effectual entrepreneurs leverage stepping-stone options to maximize their available means, mitigate high degrees of uncertainty, and preserve future opportunities to change the direction of their venture if the business environment were to change. Based on this understanding, I propose the following hypothesis:

H5: *In high-uncertainty contexts, the use of stepping-stone strategies will positively moderate the relationship between the use of effectuation processes and venture profit growth.*

Conclusion

The literature presented in this chapter indicates that although causation and effectuation processes have unique components, they converge in the reflected elements of human volition and are enacted in practice in a non-linear, iterative, and evolving economic landscape. The focus of causation on achieving means through the available effects contrasts with the focus of effectuation on creating effects using means. However, it is possible to have both inverse and direct relationships between the two constructs. Examining constructs in only one industry or a set of sub-populations (Chandler et al., 2011) is a widespread practice in literature. Therefore, in this study, I consider venture owners from five different industries in the United States to obtain a more diverse sample of entrepreneurs. The theoretical underpinnings of effectuation in this study align with Sarasvathy's (2001) empirical work; it also incorporates Lachmannian individual-based subjectivism.

The reasoning for incorporating Lachmannian individual-based subjectivism is that it enables the entrepreneur to interpret experience subjectively and imagine future

possibilities (Chiles et al., 2008). The ability to interpret an experience (i.e., a decision maker's knowledge of possible means) or to imagine possible future opportunities (i.e., a decision maker's ability to discover and use contingencies) is central to the logic of both causation and effectuation processes (Chandler et al., 2011; Read et al., 2009; Sarasvathy, 2001). To reintegrate individual human volition in both causation and effectuation processes, this study proposes that the entrepreneur is ubiquitous within each construct. Despite the salience of entrepreneurial process research and the arguments presented by some scholars for examining causation and effectuation as separate constructs (Chandler et al., 2011; Read et al., 2009; Sarasvathy, 2001), there is mounting evidence that both constructs should be examined as interchangeable in entrepreneurial venture creation.

This study has been motivated by the findings of Harms and Schiele (2012) that causation and effectuation processes need not be diametrically opposed and that entrepreneurs can use both processes. Their contribution to the literature on causal and effectual processes revealed a clear opportunity not only to examine the constructs independently but also to recognize the degree to which they are interrelated. Mintzberg (1994) reasoned that strategies are neither 100% deliberate nor 100% emergent; instead, they are combinations thereof; this leads to an optimal solution and provides further reasoning for examining causation and effectuation processes in a similar vein. Acknowledging that causation and effectuation processes can co-occur offers further evidence that it is necessary to perform a detailed examination of the effects of both types of processes on venture profit growth (Sarasvathy, 2008). Finally, the explanation by Aram and Cowen (1990) of the immediate vulnerability of entrepreneurial ventures to

changes in their environment provides an opportunity to incorporate multiple processes into the ventures to mitigate these risks.

Despite their inherent differences, causation and effectuation processes are both integral parts of human reasoning that can occur simultaneously and in different contexts of decisions and actions (Sarasvathy, 2001). Given that causal and effectual processes are rooted in human volition, it is logical to consider that a common thread connects them despite their apparent differences. Although highly uncertain contexts may favor an effectual approach, causal approaches also likely mitigate uncertainty. It was necessary to develop a model that adequately incorporates multiple entrepreneurial processes because the proposed theoretical model allows for uni- and multi-dimensional analyses of each construct not only to assess the utility of the construct in highly uncertain contexts but also to examine the interchangeable use of causal and effectual logic.

Despite the degree to which theoretical and practical research on causation and effectuation are still developing, the study of effectuation over the past 16 years has created solid constructs by which to measure both causal and effectual process orientations in business ventures. This research will contribute to the understanding of entrepreneurial process selection in two key areas. First, it will demonstrate that causation and effectuation processes are interchangeable in high-uncertainty environments. Second, it will demonstrate that sequencing of processes in stepping-stone options will positively affect venture performance.
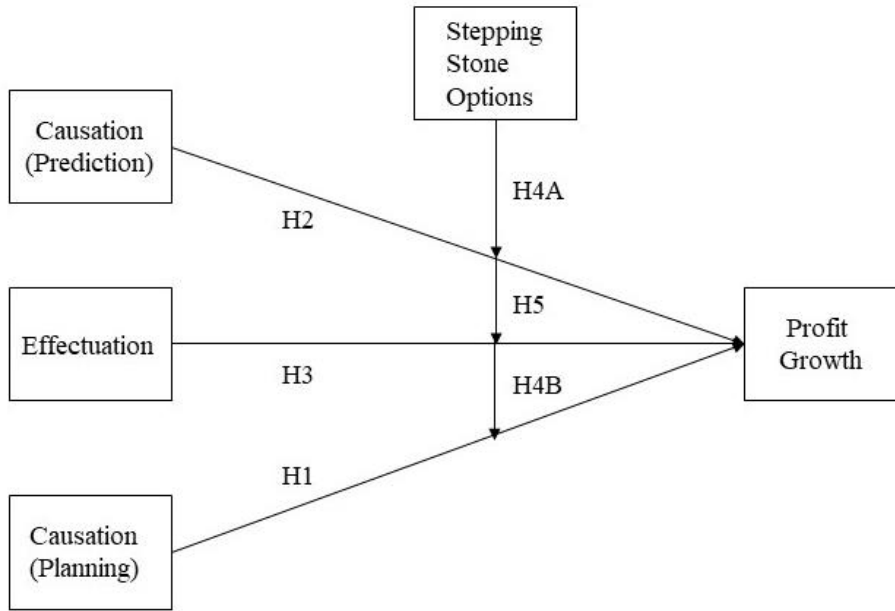
Figure 2. Proposed theoretical model.

CHAPTER III

METHOD

Participants and Procedures

This study is designed to link the theoretical concepts described in Chapter II

empirically using instrumentation that measures causation process orientation,

effectuation process orientation, and the moderating effect of stepping-stone options. I

have drawn from literature (Chandler et al., 2009; MacMillan & McGrath, 2002;

Werhahn et al., 2015; Wiltbank et al., 2009) to develop causation, effectuation, and

stepping-stone measures. Following the guidelines set forth by Burns and Michelle

(2015) for survey-based research, I will collect, code, and analyze responses from venture

owners in multiple industries. To study young firms, I focus on ventures with no more

than 100 employees.

To address the face and content validity issues, I took items from previous peer-

reviewed research that was aligned with the goal of this study to create an instrument that

was theoretically grounded yet deployable by venture owners when required. In addition

to collecting self-report survey responses from the primary founders of established

ventures regarding their use of causation and effectuation processes, this study will also

collect the amount of equity investment received by their ventures during the first five

years and the firm's financial performance over that same period.

To supplement the analysis concerning profit growth, I developed and integrated into the survey specific exploratory questions that focus on the venture's emphasis on economic goals, the profits made versus the expectations, and the annual average gross revenues. The instrument was constructed in Qualtrics to ensure quality control, data security, and the uniformity of distribution to all potential respondents. Using Qualtrics, I reached out to 1,000 primary venture owners across five industries and received 211 usable responses for a response rate of 21.1%. Each respondent was screened to ensure that the individual was the actual primary venture owner to ensure sampling accuracy and compatibility with the study's objective.

The Qualtrics survey included one question regarding the business owner's perceived level of technical uncertainty in his or her respective industry with possible uncertainty responses being no, low, moderate, and high. Using a similar question, I asked each business owner to assess the level of market uncertainty characterizing the industry. For this study, businesses represented in the dataset will be divided into two distinct groups: those operating under low uncertainty and those operating under high uncertainty. The low-uncertainty group included only those businesses reported by respondents to be characterized by no- to low-technical and market uncertainty. The high-uncertainty group would include only those operating in industries characterized by moderate to high technical and market uncertainty.

Measures

Causation (Planning) and Effectuation Processes. Causation and effectuation process orientations were measured with the construct proposed by Chandler et al. (2011). I used a 17-item survey that asked respondents to indicate their level of

agreement on a five-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) to indicate their use of various strategic processes in the development or operation of their venture. The responded were instructed as follows: "Please answer each question as it relates to your venture."

Effectual Orientation. Unlike causation or effectuation process utilization, effectual orientation was measured by using the construct proposed by Werhahn et al. (2015). This was a 10-item survey in which respondents were asked to indicate their level of agreement on a seven-point Likert scale (1 = Strongly Disagree, 7 = Strongly Agree) containing a series of effectuation orientation statements about their use of effectual logic in the development or operation of their ventures. The instructions provided to the respondents stated, "Please answer each question as it relates to your venture."

Causation (Prediction) and Effectuation. This study measured causation and effectuation along the prediction and control dimensions suggested by Wiltbank et al. (2009); adapted versions of that study's prediction and control constructs were used. To measure prediction and control, Wiltbank et al. (2009) developed a 16-item survey asking respondents to consider their level of agreement on a seven-point scale (1 = Disagree, 4 = Indifferent, 7 = Strongly Agree) with a series of possible actions within the context of a hypothetical entrepreneurial business scenario. For this study, rather than providing a hypothetical scenario for the respondents to consider, venture owners were instructed as follows: "Please answer each question as it relates to your venture."

Moderating Measures

Stepping-Stone Options. MacMillan and McGrath (2002) provided the theoretical background and measures or stepping-stone options in this study. Their

instrument contains ten items focused on considering the options in R&D about business

investments by using a seven-point Likert scale (1 = Certain, 7 = Highly Uncertain). The

instructions given to the respondents stated, "Please answer each question as it relates to

your venture."

Dependent Variable

Profit Growth. The dependent variable selected was profit growth, which was a

measure of the financial performance, which was extremely important for entrepreneurial

ventures and for those entrepreneurs who invested in such ventures. Specifically,

previous research shows that year-over-year annual profit growth fluctuates significantly

because of individual entrepreneurial traits such as process selection and execution

(Baum et al., 1998). Year-over-year profit growth during the past five years (or for

businesses less than five years old from inception) was measured on a six-point scale

coded as follows: 0 = under 5%; 1 = 5%–9%; 2 = 10%–19%; 3 = 20%–34%; 4 = 35%–

50%; and 5 = more than 50%.

Control Variables

Industry. In addition to accounting for technical and market uncertainty as

explained above, I also treated industry as a suitable control variable. Technical

uncertainty is defined as the degree of change and adaptation that a venture would

experience with its core technology offerings with "1" being certain and "7" being highly

uncertain. Market uncertainty is defined as the degree of change and adaptations the

venture would experience within its core product category or industry with "1" denoting

certainty of the core product category and industry competition and "7" denoting high

uncertainty. The coded industries are retail, healthcare, technology, and services (e.g.,

restaurants and cleaning services).

Number of employees. To control venture size, I focused on firms with fewer

than 100 employees and distinguished between those firms with 1 to 50 employees

(coded as "1") or 51 to 100 employees (coded as "2"). The analysis will not include

responses that indicate a larger number of employees. Controlling for venture size allows

small venture owners to be the focus of this study similar to previous studies (Chandler et

al., 2011); the control also helps to capture firms in various stages of the gestation

process.

Measure Validation

Before conducting hierarchical and multiple moderated regression analysis, it was

necessary to establish item reliability, composite reliability (CR), and convergent and

discriminant validity for each construct. Therefore, in this study, I first examined

Cronbach's Alpha for each construct based upon standardized items. After establishing

acceptable reliability for each construct, this study conducts a confirmatory factor

analysis (CFA) to test the theoretical linkage previously discussed. The CFA will be used

to confirm convergent and discriminant validity and ensure that the most statistically

appropriate model is used for hierarchal and multiple moderated regression analysis.

Cronbach's Alpha analysis ensures homogeneity of the items comprising the scale

whereas CFA validates my proposed measures of causation, effectuation, and stepping-

stone options.

The causation (planning) construct was created with seven questions from the

Chandler et al. (2011) instrument that measured the entrepreneur's penchant for using

planning processes. For the causation (planning) construct, Cronbach's Alpha based upon standardized items was .883, which exceeded the .80 cut off proposed by Cronbach (1951). The causation (prediction) construct was created with six questions from the Dew et al. (2009) instrument, which measured the entrepreneur's preference for using the prediction processes. For the causation (prediction) construct, Cronbach's Alpha based upon the standardized items was .807, which exceeded the .80 cut off proposed by Cronbach. The effectuation construct was created with ten questions from the Werhahn et al. (2015) instrument, which measured the entrepreneur's preference for the use of effectual processes. For the effectuation construct, Cronbach's Alpha based on the standardized items was .847, which exceeded the .80 cut off proposed by Cronbach. The stepping-stone options construct was created with ten questions from MacMillan and McGrath (2002), which measured the business owner's preference for considering options in R&D in relation to their business investments. For stepping-stone options construct, the Cronbach's Alpha based on standardized items was .932, which exceeded the .80 cut off proposed by Cronbach.

The item reliability analysis provided Cronbach's Alpha for each construct (causation (planning), effectuation, and stepping-stone options) and gave reasonable validation to move forward with CFA. The two-factor solution for effectuation was a matter of concern; however, control (one of the three factors in the construct of Werhahn et al. (2015)) was isolated as an independent factor, and partnerships and contingencies were loaded onto another factor. In this research, I aim to create a more robust model of causation and effectuation processes that incorporate a selection medium for entrepreneurs to interchange between logics.

The constructs excluded from this analysis include 11 items from the Chandler et al. (2011) effectuation construct, 8 items from the Dew et al. (2009) construct that measured effectuation (specifically the element of control versus prediction), and 6 items from the Dew et al. (2009) construct that measured causation (prediction). I decided to exclude these constructs after running several iterations of item reliability analysis as well as CFA that demonstrated inconsistent convergent and discriminant validity. While this changes the original theoretical model proposed above, it was important to include these constructs initially to best determine a more robust measure of causation and effectuation processes. Even if these items did not meet the inclusion criteria after statistical analysis, the resulting model still measures causation, effectuation, and stepping-stone options in a robust and theoretically appropriate manner.

Confirmatory Factor Analysis

The exploratory factor analysis confirmed the presence of reasonable constructs to move forward with and conduct the CFA. Before discussing the results of the CFA below, it was necessary to establish two conditions. The first condition was to determine the appropriate sample size (n > 200). The second condition was to ensure that the construct utilized was theoretically grounded and to verify that the construct for analysis was appropriate. The response rate and the well-completed questionnaires of this study were (n=211), which satisfied the first requirement of appropriate sample size. The second condition was also satisfied well in this study.

This study uses guidelines set forth for statistical fit and interpretation by Kline (2013). CFA is a theory-driven relationship among observed and unobserved variables; in this study, these included 4 unobserved variables being measured by 25 observed

variables (Kline, 2013). Before examining the fit indices, it is necessary to determine CR, convergent validity, and discriminant validity. To create the best-fitting model possible, a systematic process proposed by Kenny (1979) was employed to examine each indicator of causation (planning), causation (prediction), effectuation, and stepping-stone options. I evaluated each construct by first examining the standardized factor loadings of each question and how it related to CR; I also extracted the average variance.

For causation (planning), seven questions were initially included for the CFA. After applying the .70 criteria as proposed by Kenny (1979), all seven questions were retained for the CFA. For effectuation, ten questions were initially included for the CFA. After applying the .70 criteria as proposed by Kenny (1979), four out of ten questions were retained for the CFA. For stepping-stone options, ten questions were initially included in the CFA. After applying the .70 criteria as proposed by Kenny (1979), five out of ten questions were retained for the CFA. I used this process to refine each construct to ensure CR, convergent validity, and discriminant validity for the 25 items that were included in this study. Table 1 provides a summary of the composite reliability and convergent validity of each construct as stated by Hu and Bentler (1999).

Table 1

Summary of Composite Reliability and Convergent Validity for Causation and Effectuation Processes (N = 211)

	Composite Reliability and AVE	
Construct	CR	AVE
Causation (Planning)	0.89	0.53
Effectuation	0.75	0.60
Stepping Stone Options	0.80	0.58

Note: *CR stands for Composite Reliability (suggested minimum is .70) and AVE stands for Average Variance Extracted (suggested minimum is .50)*

Composite reliabilities of each construct showed reasonable internal consistency because each measure was over the .70 cut-off criteria (Kline, 2013). Convergent validity of causation (planning), effectuation, and stepping-stone options demonstrated that the indicators within each construct "converge" or share a high proportion of variance in common (Kline, 2013). To check discriminant validity, this study used the guidelines proposed by Kline (2013). Table 2 summarizes the results, which indicate that "the measured variables "have more in common with the construct they are associated with than they do with the other constructs" (Kline, 2013).

Table 2

Summary of Factor Inter-Correlations for Causation and Effectuation Processes

Variable	Causation	Effectuation	Stepping Stones
Causation (Planning)	1.000	0.727	0.633
Effectuation	0.727	1.000	0.594
Stepping Stone Options	0.633	0.594	1.000

The resulting convergent and discriminant validity reasonably confirm that the indicators and constructs warrant investigating the overall model fit. In accordance with the guidelines set forth by Kenny (2015), the fit indices assessed in this study include the following: Chi-Square of Model Fit, Root Mean Square Error of Approximation (RMSEA), Null Hypothesis P-Value, Alternative Hypothesis P-Value, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Standardized Root Mean Square Residual (SRMR). Each of these statistical fit indices is widely used in entrepreneurship research, and they provide a reasonable set of criteria by which to assess the fit of a model.

The chi-square of the proposed model was statistically significant (P = 0.00); however, this statistic requires further examination. The present model had 180 degrees of freedom and a value of 361.619 for a ratio of 2.00 (Hu & Bentler, 1999). The ratio of

the chi-square statistic to the degrees of freedom provides the first goodness of fit metric in which ratios less than or equal to 2 indicated a good fit (Wheaton et al., 1977). The next measure examined was RMSEA, which was assessed using the following criteria: 0.01, 0.05, and 0.08 indicated excellent, good, and mediocre fit, respectively (Hu & Bentler, 1999). The RMSEA of the proposed study was 0.069, which indicates a reasonable fit (Hu & Bentler). The next two fit indices examined were the CFI and the TLI. The acceptable fit as defined by Hu and Bentler (1999) is >.90 for both indices. In this study, the CFI was 0.917, and the TLI was 0.899, which indicate a reasonable fit. The final index examined was the SRMR in which the acceptable fit $P < 0.08$. In this study, the SRMR was 0.069, which indicates good fit because it is less than 0.08 (Hu & Bentler, 1999). To summarize, the examination of each fit index in Table 3 indicates that the overall model demonstrates reasonable fit in comparison with the acceptable levels.

Table 3

Summary of Confirmatory Factor Analysis Fit Indices for Causation and Effectuation Processes (N = 211)

	Actual Results/Acceptable Fit Criteria	
Fit Index	Actual Results	Acceptable Fit
Chi-Square of Model Fit	0.00	<0.05
RMSEA	0.074	<0.08
Lower End 90 CI	0.061	<0.05
Upper End 90 CI	0.088	<0.10
CFI	0.917	>0.90
TLI	0.899	>0.90
SRMR	0.069	<0.08

Note: *Fit indices were determined utilizing the software Mplus. CI stands for Confidence interval. Lower End represents the close-fitting hypothesis and Upper End represents the poor fitting hypothesis*

After conducting the CFA, all seven indicators of causation (planning) were retained. Four out of ten indicators were retained for effectuation, and four out of ten

indicators were retained for stepping-stone options. These retentions result in a regression model with 3 constructs (causation (planning), effectuation, and stepping-stone options) and 15 indicators that met the item reliability analysis criteria of .70 (Kline, 2013). The item reliability, CR, and convergent and discriminant validity of the resulting model provides the opportunity to explore not only the effects of causation and effectuation independently but also the integration effects of both types of processes. The overall model fit shows a reasonable fit and instead of rejecting the close-fit hypothesis, the poor-fit hypothesis noted by the Upper Limit 90% confidence interval, is not rejected indicating "close" fit (Kline, 2013). Confirming composite, convergent, and discriminant reliabilities enabled me to analyze the hypothesized model and determine the integration effects of causation and effectuation on venture profit growth.

Analysis of Hypothesized Model

Most studies on causation and effectuation processes consider the two constructs as unrelated rather than intertwined. In this study, I theoretically and empirically examine the integration of the causation and effectuation processes instead of treating them as mutually exclusive. To alleviate potential endogeneity problems related to annual average gross revenues and year-over-year profits, differentiating constructs will be built to analyze each item adequately. To perform this analysis, moderated multiple regression (Aguinis, 2004; Jaccard & Turrisi, 2003; Jose, 2013) will be used because it is the most appropriate statistical treatment of multiple independent variables with a moderator. Prior to proceeding with hierarchical and multiple moderated regression analysis, the indicators of causation (prediction), causation (planning), effectuation, and stepping-stone options were combined and mean centered according to the guidelines set forth by Aguinis

(2004). After the constructs were created, the moderating variables were calculated as the product of any two mean-centered variables. This process ensured that the mean of each construct was set to 1.000, and it decreased the correlation between the multiplicative terms (Aguinis, 2004).

For Hypothesis 1, causation (planning) will be isolated as the independent variable and profit growth as the dependent variable. For Hypothesis 3, effectuation will be isolated as the independent variable and profit growth as the dependent variable. Hypothesis 4B proposes that stepping-stone options positively moderate the relationship between the use of the causation (planning) processes and the profit growth in highly uncertain contexts. Hypothesis 5 proposes that stepping-stone options positively moderate the relationship between the use of effectuation processes and profit growth in highly uncertain contexts.

CHAPTER IV

RESULTS

Table 4 presents the descriptive statistics and the inter-correlations of the variables used in this study.

Table 4

Descriptive Statistics and Inter-Correlations

Variable	Mean	*SD*	1	2	3	4	5	6	7	8
1. Causation (Planning)	0.000	1.000	1.000							
2. Effectuation	0.000	1.000	0.623**	1.000						
3. Stepping Stone Options	0.000	1.000	0.150*	0.159*	1.000					
4. Retail	0.140	0.345	-0.016	0.020	-0.103	1.000				
5. Healthcare	0.110	0.464	0.014	-0.050	-0.051	-0.098	1.000			
6. Technology	0.260	0.840	-0.068	0.010	0.017	-0.122	-0.075	1.000		
7.Services	3.390	2.342	0.063	0.024	0.151*	-0.579	-0.356	-0.433	1.000	
8.Profit Growth	3.000	1.342	-0.146	-0.011	-0.075	-0.010	-0.076	0.000	0.015	1.000

Note. n = 211; * $p < 0.05$; ** $p < 0.01$.

Multicollinearity Test

Variance inflation factor (VIF) scores help understand the severity of multicollinearity between the variables in a model. A VIF of 5 or higher is considered to be the indicator of moderate to high multicollinearity between the variables in the model (Lorch & Myers, 1990). Multicollinearity tests were conducted on each variable because this was the first study to

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integrate Chandler, Werhahn, and Dew's causation and effectuation measures into one survey instrument. After analyzing the VIFs in the SPSS software, all scores were found to be below 5 with the highest VIF score being 2.776 for causation (planning).

Testing the Hypothesized Model

The six hypotheses of this study were tested by means of four models using multiple statistical methods. Hierarchical multiple regression was used to test Models 1 and 2 (i.e., Hypotheses 1, 2, and 3 in all market and technical uncertainty contexts). A multiple moderated regression analysis was used to test Model 3 (i.e., Hypotheses 4A and 4B) and Model 4 (i.e., Hypothesis 5). Hierarchical and moderated multiple regression analyses enabled me to test the primary relationships while including control variables (industry, technical, and market uncertainty) in the models. In all tests, the control variables were input in the first block of the regression procedure and the independent variables in the second. In Models 3 and 4, stepping-stone options were placed in block three, and all other moderating variables were placed in block four.

Table 5 presents the results from the survey with n = 211, which gauges both low and high levels of technical and market uncertainty; Table 6 presents the results from the survey with n = 106 for high technical and market uncertainty respondents. The variables selected are the result of first averaging each set of indicators listed in Appendix B to create the constructs for causation (planning) that had seven indicators, effectuation that had four indicators, and stepping-stone options that also had four indicators. The indicators selected for each construct were input into the "Compute Variable" function in SPSS, which subsequently resulted in one score per respondent, per construct for causation (planning), effectuation, and stepping-stone options. Furthermore, each

construct was then mean centered before being input into the SPSS hierarchical and multiple moderated regression analysis. The moderated variables (labeled as Causation (Planning)*SS and Effectuation*SS) in Tables 5 and 6 are by-products of mean-centered variables. The Compute Variable procedure and the mean-centered procedures were carried out in SPSS as proposed by Aguinis (2004).

Hypothesis 1 predicted the degree to which the entrepreneurs' implementation of causation (planning) processes would positively influence venture profit growth. Specifically, this hypothesis posits that an entrepreneur's implementation of causation (planning) would mitigate technical/market uncertainty and subsequently impact venture profit growth. To test this hypothesis, I used the hierarchical multiple regression procedures. The first block of the regression procedure contained the control variables, and the second block of the regression procedure contained the entrepreneur's score on the tendency to utilize causation (planning) processes. From Model 2 of Table 5, it can be seen that the relationship between the entrepreneur's penchant to use causation (planning) to impact venture profit growth positively ($\beta = -.30$, $p < .01$) is both negative and significant. Therefore, the findings offer no support for Hypothesis 1.

Hypothesis 2 predicted the degree to which the entrepreneurs' implementation of causation (prediction) processes would positively influence venture profit growth. Specifically, this hypothesis posits that an entrepreneur's implementation of causation (prediction) would mitigate technical and market uncertainty and subsequently impact venture profit growth. After completing the process of validating the theoretical measures proposed, causation (prediction) was dropped from the regression model; therefore, Hypothesis 2 was not tested or proved.

Table 5
Summary of Hierarchical Regression Analysis for Causation and Effectuation Processes Effect on Venture Performance (N = 211)

Variable	Model 1			Model 2			Model 3			Model 4		
	B	SE B	P-Value	B	SE B	P-Value	B	SE B	P-Value	B	SE B	P-Value
Entrepreneurial Processes												
Causation (Planning)				-0.301	-0.225	.01**	-0.295	-0.220	.01**	-0.318	-0.237	.009**
Effectuation				0.173	0.129	.14	0.182	0.135	.12	0.190	0.142	.114
Stepping Stones							-0.083	-0.062	.38	-0.055	-0.041	.59
Effectuation*SS										-0.235	-0.192	.09
Causation (Planning)*SS										0.200	0.169	.13
Industry Controls												
Healthcare	-0.431	-0.149	.14	-0.395	-0.137	.18	-0.377	-0.130	.20	-0.379	-0.131	.20
Retail	-0.479	-0.123	.35	-0.479	-0.123	.34	-0.449	-0.116	.38	-0.486	-0.125	.34
Services	-0.086	-0.150	.35	-0.080	-0.140	.38	-0.068	-0.119	.46	-0.073	-0.127	.43
Technology	-0.148	-0.093	.42	-0.166	-0.104	.36	-0.146	-0.092	.42	-0.154	-0.096	.40
R^2		-0.009			0.013			0.012			0.016	
F		.540			1.450			1.351			1.375	

Note: Causation (Planning), Effectuation and Stepping Stone Options (Referred to as Stepping Stones) were centered at their means. SS stands for Stepping Stone Options in moderated variables. The moderated variables as products of mean centered variables.

$*p < .05. **p < .01.$

Hypothesis 3 predicted the degree to which entrepreneurs implement effectuation processes in environments of high technical and market uncertainty, which would positively influence venture profit growth. Specifically, this hypothesis posits that the entrepreneur's implementation of effectuation processes would mitigate high technical/market uncertainty and subsequently impact venture profit growth. To test this hypothesis, I used the hierarchical multiple regression procedure. The first block of the regression procedure contained the control variables, and the second block of the regression procedure contained the entrepreneur's score on the tendency to use the effectuation processes. From Model 2 of Table 6, the relationship between the entrepreneur's preference for the effectuation processes positively impacts venture profit growth in environments of high technical and market uncertainty ($\beta = .32$, $p > .06$) is statistically significant. Therefore, the findings offer support for Hypothesis 3.

Hypothesis 4A predicted the degree to which stepping-stone options positively moderate the relationship between the use of causation (prediction) and venture profit growth in environments of high technical and market uncertainty. Specifically, this

hypothesis posits that an entrepreneur's implementation of stepping-stone options would moderate the relationship between the use of causation (prediction) and venture profit growth. After completing the process of validating the proposed theoretical measures, causation (prediction) was dropped from the regression. Therefore, hypothesis 4A was not tested or proved.

Hypothesis 4B predicted the degree to which stepping-stone options positively moderate the relationship between the use of causation (planning) and venture profit growth in environments of high technical and market uncertainty. Specifically, this hypothesis posits that an entrepreneur's implementation of stepping-stone options would moderate the relationship between the use of causation (planning) and venture profit growth in environments of high technical and market uncertainty. To test this hypothesis, I used the multiple moderated regression analysis procedure proposed by Aguinis (2004). The first block of the regression procedure contained the control variables. The second block of the regression procedure contained the entrepreneur's score on the tendency to use causation (prediction) processes. The third block contained stepping-stone options variable, and the fourth block contained the entrepreneur's score on the tendency for using stepping-stone options to positively moderate the relationship between the use of causation (planning) and venture profit growth. From Model 2 of Table 6, we can see that stepping-stone options' positive moderation of the relationship between the use of causation (planning) and venture profit growth in environments of high technical and market uncertainty ($\beta = .17$, $p > .36$) is not statistically significant. Therefore, the findings do not support Hypothesis 4B.

Hypothesis 5 predicted the degree to which stepping-stone options positively moderate the relationship between the use of the effectuation processes and the venture profit growth in environments of high technical and market uncertainty. Specifically, this hypothesis posits that an entrepreneur's implementation of stepping-stone options would moderate the relationship between the use of effectuation and venture profit growth in environments of high technical and market uncertainty. To test this hypothesis, I used the multiple moderated regression analysis procedure proposed by Aguinis (2004). The first block of the regression procedure contained the control variables; the second block of the regression procedure contained the entrepreneur's score on the tendency to use the causation and effectuation processes. The third block contained stepping-stone option variable, and the fourth block contained the entrepreneur's score on the tendency for stepping-stone options to positively moderate the relationship between the use of effectuation and the venture profit growth. From Model 2 of Table 6, we can see that stepping-stone options' positive moderation of the relationship between the use of effectuation and the venture profit growth in environments of high technical and market uncertainty (β = -.187, p > .41) is not statistically significant. Therefore, the findings do not Hypothesis 5.

Table 6
Summary of Hierarchical Regression Analysis for Causation and Effectuation Processes Effect on Venture Performance (N = 105)

Variable	Model 1			Model 2			Model 3			Model 4		
	B	SE B	P-Value	B	SE B	P-Value	B	SE B	P-Value	B	SE B	P-Value
Entrepreneurial Processes												
Causation (Planning)				-0.374	-0.273	.03*	-0.349	-0.255	.04*	-0.390	-0.285	.03*
Effectuation				0.285	0.209	.09	0.284	0.209	.09	0.324	0.238	.06
Stepping Stones							-0.193	-0.145	.15	-0.154	-0.116	.33
Effectuation*SS										-0.187	-0.129	.41
Causation (Planning)*SS										0.176	-0.129	.36
Industry Controls												
Healthcare	-0.200	-0.093	.57	-0.216	-0.100	.53	-0.153	-0.071	.66	-0.155	-0.072	.67
Retail	-0.277	-0.072	.68	-0.410	-0.106	.54	-0.250	-0.065	.71	-0.259	-0.067	.71
Services	-0.034	-0.065	.78	-0.040	-0.077	.73	-0.005	-0.010	.96	-0.011	-0.021	.92
Technology	-0.041	-0.032	.85	-0.118	-0.092	.60	-0.065	-0.050	.77	-0.054	-0.042	.81
R^2		-0.035			-0.005			0.006			-0.005	
F		.120			.914			1.090			.940	

Note: Causation (Planning), Effectuation and Stepping Stone Options (Referred to as Stepping Stones) were centered at their means. SS stands for Stepping Stone Options in moderated variables. The moderated variables as products of mean centered variables.

*$p < .05$. **$p < .01$.

Post-Hoc Analysis

For the complexities of these data, I conducted two post-hoc analyses because multiple constructs were utilized to gather robust data on the causation and effectuation processes. In addition, the hierarchal and multiple moderated regression analysis had negative adjusted R-Squared values. To examine the negative adjusted R-Squared values in this study, it was necessary to reduce the effects of range restriction by the guidelines set forth by Aguinis (Aguinis, 1995). To reduce the possible phenomenon of range restriction in these data, two additional regression analyses were run excluding the industry control variables. This analysis was necessary to determine potential causes of the negative adjusted R-Squared and to examine any possibility of range restriction within the multiple moderated regression analysis (Aguinis, 1995). Each hierarchal and multiple moderated regression analysis for all and high uncertainty observations are summarized in table's 7 and 8 below.

Table 7
Summary of Hierarchical Regression Analysis for Causation and Effectuation Processes Effect on Venture Performance (N = 211)

Variable	Model 1			Model 2			Model 3		
	B	SE B	P-Value	B	SE B	P-Value	B	SE B	P-Value
Entrepreneurial Processes									
Causation	-0.305	-0.227	.01**	-0.298	-0.222	.01**	-0.320	-0.238	.008**
Effectuation	0.175	0.131	.13	0.184	0.137	.11	0.193	0.144	.10
Stepping Stones				-0.085	-0.063	.36	-0.059	-0.044	.55
Effectuation*SS							-0.232	-0.190	.10
Causation*SS							0.202	0.170	.13
R^2		0.022			0.022			0.026	
F		3.403*			2.543*			2.110	

Note: Causation (Planning), Effectuation and Stepping Stone Options (Referred to as Stepping Stones) were centered at their means.

SS stands for Stepping Stone Options in moderated variables. The moderated variables as products of mean centered variables.

$*p < .05$. $**p < .01$.

The post-hoc regression analysis for (n=211) demonstrates significance at the 0.05 level (F=3.403, p=.035) in model 1, yet has a low adjusted R-Squared (R^2=0.022). While the F and P-Value's indicate the possibility that causation and effectuation processes could affect venture profit growth, the low adjusted R-Squared demonstrates to proceed with caution on drawing any conclusions on this relationship (Sturman, 1999). Similar to the analysis completed in table 5, the variable interaction between profit growth and the independent variables (causation, effectuation and stepping stone options) is not significant at the 0.05 level except causation (planning) negative impact on profit growth. Overall, the post-hoc regression on (n=211) observations remedy the negative adjusted R-Squared values after removing industry but does not significantly alter the overall findings of causation and effectuation's effect on venture profit growth.

Table 8
Summary of Hierarchical Regression Analysis for Causation and Effectuation Processes Effect on Venture Performance (N = 105)

	Model 1			Model 2			Model 3		
Variable	B	SE B	P-Value	B	SE B	P-Value	B	SE B	P-Value
Entrepreneurial Processes									
Causation	-0.352	-0.258	.03*	-0.330	-0.241	.04*	-0.382	-0.279	.02*
Effectuation	0.268	0.196	.10	0.266	0.195	.10	0.314	0.230	.06
Stepping Stones				-0.190	-0.143	.14	-0.140	-0.106	.36
Effectuation*SS							-0.215	-0.148	.33
Causation*SS							0.180	0.131	.33
R^2		0.027			0.038			0.030	
F		2.438			2.370			1.635	

Note: Causation (Planning), Effectuation and Stepping Stone Options (Referred to as Stepping Stones) were centered at their means. SS stands for Stepping Stone Options in moderated variables. The moderated variables as products of mean centered variables.

$*p < .05.$ $**p < .01.$

The post-hoc regression analysis for (n=105) demonstrates no statistical significance at the 0.05 level in models 1, 2 or 3. The negative relationship between causation (planning) and venture profit growth is similar to the original analysis and did not change when the post-hoc was completed. Effectuation is positively related to venture profit growth at the 0.10 level in model 3, however; this relationship is assessed with extreme caution since the overall model is not statistically significant at the 0.05 nor the 0.10 level. In addition, the low adjusted R-Squared demonstrates to proceed with caution on drawing any conclusions on this relationship (Sturman, 1999). Overall, the post-hoc regression on (n=105) observations remedy the negative adjusted R-Squared values after removing industry but does not significantly alter the overall findings of causation and effectuation's effect on venture profit growth.

Upon examining the results of the post-hoc regression analysis, it was necessary also to conduct a post-hoc exploratory factor analysis using principal axis factoring (PAF) and varimax rotation (Darlington & Culley, 2004). Heeding the warnings of Hayton, Allen, and Scarpello (2004), this present study used the Kaiser-Meyer-Olkin

Measure of Sampling Adequacy (KMO) and Kaiser Criterion (K1) to verify that the

factors were identified correctly.

Upon examining the Kaiser-Meyer-Olkin scores, I found that the constructs had

proper sampling adequacy and were acceptable for analysis because all constructs scored

above 0.70 (Kaiser, 1970). The eigenvalues of causation (planning), effectuation, and

stepping-stone options demonstrated that no other factor had loadings greater than 1.000,

which indicated that the indicators selected during the CFA had properly loaded onto the

corresponding construct. The post-hoc exploratory factor analysis confirms that the

hypothesized model constructs were identified correctly and was appropriate for the

hierarchical and multiple moderated regression analysis testing of the hypothesized

models.

Table 9

Kaiser-Meyer-Olkin and Eigenvalues from Exploratory Factor Analysis

Variable	Kaiser-Meyer-Olkin MSA	Eigenvalue (K1 Criteria)	*2*	*3*
1. Causation (Planning)	0.909	4.303		
2. Effectuation	0.733	2.338		
3. Stepping Stone Options	0.827	2.900		

Conclusion

In this study, I examined the integration of the causation and effectuation

processes from both the theoretical and statistical viewpoints. From a theoretical

standpoint, the integration of causation and effectuation could be possible as both logics

are integral parts of entrepreneurial reasoning (Sarasvathy, 2008; Chandler et al., 2011; &

Smolka et al., 2016). Even though the overall model was not significant, significance was

found between the negative impact of causation planning on venture profit growth.

Considerable reexamination of causation and effectuation is recommended because the

reliability analysis and CFA of this study demonstrated that many indicators were well below the .70 threshold (Kline, 2013). For example, effectuation had ten items from the Werhahn et al. (2015) instrument; however, after completing the CFA, only four indicators met the inclusion criteria based upon the .70 standardized factor-loading criteria (Kline, 2013).

Stepping-stone options, like effectuation, had ten items from the MacMillan and McGrath (2002) instrument. After completing the CFA, only four indicators met the inclusion criteria based upon the .70 standardized factor-loading criteria (Kline, 2013). For causation (prediction), the entire construct was dropped after analyzing the standardized factor loadings and cross-loading with causation (planning). While this deviated from the originally proposed theoretical model, it was necessary to create a testable model with CR and convergent and discriminant validity. The only construct that retained all original indicators was causation (planning) because it had seven items from the Chandler et al. (2011) instrument, and after completing the CFA, every indicator met the inclusion criteria based upon the .70 standardized factor loading criteria (Kline, 2013). Future work on the integration of causation and effectuation processes should focus on developing more robust indicators that more adequately assess and measure the degree to which entrepreneurs use these entrepreneurial processes.

CHAPTER V

DISCUSSION AND CONCLUSION

It is not about ideas. It is about making ideas happen.

—Scott Belsky

Entrepreneurs' implementation of entrepreneurial processes transform ideas and available means into profitable ventures. This study proposed that an entrepreneur's interchange between causation and effectuation processes would mitigate technical and market uncertainty; and ultimately, lead to profit growth. The mechanism behind this effect was proposed to be the use of stepping-stone options as a process selection medium to change between causation and effectuation. Furthermore, in contrast to previous effectuation studies (Chandler et al., 2011, Werhahn et al., 2015; Dew et al., 2009), this study proposed that causation would be effective in environments of high technical and market uncertainty. The combination and recombination of causation and effectuation moderated by using stepping-stone options were proposed to be a more robust model of entrepreneurial processes. There are very few empirical studies relating to the integration of causation and effectuation; therefore, this study sets out to deliberately test causation's effectiveness in environments of low and high technical and market uncertainty (Sarasvathy, 2001, 2008; Werhahn et al., 2015).

Overall, this study found no evidence of the hypothesized models being significant at the 0.05 level. In addition, after examining the adjusted R-Squared values in both the initial and post-hoc analysis, this study found no reasonable support that causation and effectuation integrate to impact venture profit growth positively. Furthermore, the negative relationship between causation (planning) and venture profit growth should be viewed with caution as the overall variance of each variable could have been affected by range restriction (Aguinis, 1995). Range restriction in these data could have been caused by the survey instrument leading the entrepreneur to select higher scores for a particular set of causation or effectuation indicators (Aguinis, 1995). It is possible that range restriction also could have effected effectuation and the moderating effect of stepping stone options on venture profit growth (Aguinis, 1995). Finally, it should be noted that these data point to the continued need to develop more robust measures of causation and effectuation as well as a construct for entrepreneurs to use to interchange between the two sets of processes.

For this study, evidence was found that causation (planning) could have a negative impact on venture profit growth in all uncertainty context (n=211). To explore this negative relationship between causation (planning) and venture profit growth further, I drew on the notion that entrepreneurs systematically evaluate solutions through meaningful competitive analysis (Chandler et al., 2011). This systematic evaluation of solutions affords experienced entrepreneurs the ability to analyze each unique antecedent variable. However, the evaluation process is complicated and time-consuming; which reduces flexibility in responding to rapid changes in the entrepreneurial environment (Hofer & Bygrave, 1991). Furthermore, the decreased flexibility of entrepreneurs could

result in adverse outcomes when causation (planning) is implemented. The negative relationship between causation (planning) and profit growth indicates that the level of technical and market uncertainty could be a contributing factor when entrepreneurs decide between causal processes.

Next, this study explored the relationship between entrepreneurs using effectual processes and the subsequent impact on venture profit growth. Specifically, this study proposed that effectuation processes would positively impact venture profit growth in environments of high technical and market uncertainty. It was found that, as the level of technical and market uncertainty increased, effectuation could impact venture profit growth positively. It is stated with caution that effectuation could impact venture profit growth positively as it was at the 0.10 significant level. In addition, the adjusted R-Square values for overall model significance are very low and demonstrates possible range restriction given the constraints of these data (Aguinis, 1995). It is of note that, in contrast to the formative constructs composed of five independent subdimensions proposed in previous research (Chandler et al., 2011), this study measured effectuation across one subdimension (control vs. prediction). The CFA eliminated many of the indicators that assessed the other subdimensions (e.g., available means, affordable loss, forming partnerships and contingencies) for lack of item reliability (Kline, 2013).

In contrast to the Chandler et al. (2011) study, which used item reliability thresholds of .50 (Hair et al., 1998), this study used the reliability guidelines for indicators of .70 (Kline, 2013). This resulted in several indicators being dropped during the CFA process. While this altered the testing of the hypothesized model considerably, it

allowed for the measure of effectuation to demonstrate item reliability and convergent and discriminant validity.

The moderating effect of stepping-stone options, which served as an entrepreneurial process selection medium in this study, was also proposed and tested. This study found no evidence that stepping-stone strategies positively moderate the relationship between the use of causation and venture profit growth in environments of high technical and market uncertainty. Furthermore, I did not find any evidence that stepping-stone strategies positively moderate the relationship between the use of effectuation and venture profit growth. The incorporation of stepping-stone options was theoretically grounded, but ultimately causation and effectuation were not positively moderated by stepping-stone options in either low or high uncertainty contexts.

In this study, I explored the integration effects of causation and effectuation processes on venture profit growth. I did not find any evidence that entrepreneurs who interchange between causation and effectuation processes outperform entrepreneurs who do not. Previous studies have demonstrated that causation and effectuation are mutually reinforcing and contribute jointly to venture performance (Smolka et al., 2016). In this study, I demonstrated that the two constructs are positively correlated and therefore not independent. No evidence was found that this relationship impacts venture profit growth. Smolka et al. (2016)[1] stated that causation and effectuation "jointly" impact venture performance, however; this study differs with the findings of Smolka et al. Using theoretical and statistical analysis, I have demonstrated how entrepreneurs interchange

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[1] In the Smolka et al. (2016) study, the combined use of causation and the effectual principle of experimentation was positively associated with ventures. All other effectuation subdimensions (e.g., available means, affordable loss, leveraging contingencies, and partnerships) did not yield statistically significant results.

between each entrepreneurial process logic. In fact, the addition of stepping-stone options as an entrepreneurial process selection medium was proposed as a theoretical and practical tool, which entrepreneurs could use to interchange between the causation and effectuation processes. However, it was found that stepping-stone options do not positively moderate causation and effectuation processes, nor were they used interchangeably by entrepreneurs to mitigate technical and market uncertainty.

It is possible that there are other variables outside the parameters of this study that interact with causation and effectuation and create significant interactions. It is also possible that stepping-stone options work better for small exploratory investment decisions rather than for entrepreneurial process selection medium (MacMillan & McGrath, 2002). Finally, it could be the case that entrepreneurs with varying degrees of experience use causation and effectuation differently. The impact of entrepreneurial experience and refining of mutually reinforcing indicators of causal and effectual logic should be examined further in future research on the venture performance effects of causation and effectuation process implementation.

Contributions

Entrepreneurs experience varying levels of technical and market uncertainty during the lifecycle of an entrepreneurial venture. Understanding why entrepreneurs use specific processes that positively impact profit growth—or alternatively, negatively impact profit growth—is a critical area of research within entrepreneurship literature (Sarasvathy, 2008; Dew et al., 2009; Werhahn et al., 2015; Smolka et al., 2016). To further this understanding, there have been recent efforts to understand the impact of the potential integration effects of causation and effectuation processes (Smolka et al., 2016).

More specifically, the study proposes a positive relationship between the entrepreneurs' interchange between causation and effectuation processes and venture profit growth. I also proposed a mechanism (stepping-stone options) that could help entrepreneurs interchange between causation and effectuation processes more effectively.

In this study, I tested and found evidence for a negative relationship between entrepreneurs who implement causation (planning) and venture profit growth in environments of high technical and market uncertainty. This relationship was found not to be moderated by stepping-stone options; therefore, it provided no evidence for positively impacting venture profit growth. Therefore, this study adds to the findings of entrepreneurship scholars (Baron, 2006, 2009; Arend, Sarooghi, & Burkemper, 2015) to create more robust indicators and measures of causation and effectuation. In this study, I attempted to create more robust measures of causation and effectuation processes to respond to the findings of these previous studies; however, I was not successful in doing so. There were several effectual indicators, and causation (prediction) construct was eliminated because it did not meet the appropriate statistical significance criteria in the CFA; this probably points to the continued gaps in the ways that causation (prediction) and effectuation processes are measured and conceptualized.

This study also attempted to add an entrepreneurial process selection medium to causation and effectuation literature in the form of stepping-stone options. While stepping-stone options did not positively moderate the relationship between the use of causation and effectuation and venture profit growth, it was a theoretically appropriate step forward in possibly identifying an entrepreneurial process selection medium (Baron, 2009; Arend, Sarooghi, & Burkemper, 2015). The findings from this study do not

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confirm the application of stepping-stone options as an entrepreneurial process selection medium; however, I would encourage researchers to continue pursuing and identifying a cognitive resource for entrepreneurs to change between logics.

In this study, I endeavored to contribute to the entrepreneurship literature by highlighting the importance of examining causation and effectuation as mutually reinforcing constructs (Smolka et al., 2016). Researchers have suggested that causation and effectuation are mutually exclusive constructs (Sarasvathy, 2001, 2008; Wiltbank et al., 2009; Werhahn et al., 2015); however, in these data, causation and effectuation processes share more in common than stated by previous literature. However, this does not mean that causation and effectuation processes are identical; but rather, they are both integral parts of human reasoning used interchangeably as the degree of technical and market uncertainty fluctuates in the venture (Sarasvathy, 2008).

Future Research

This study suggests that future research might focus on two areas. First, the field would benefit from further refinement of causation and effectuation measures (Chandler et al., 2011; Werhahn et al., 2015; Dew et al., 2009). Although effectuation consists of several operationalized components, research might refine and expand the sub-dimensions (i.e., available means, affordable loss, leveraging contingencies, and forming partnerships). This study encourages researchers to carefully examine the dimensions of planning and prediction within the causation construct. This study used the planning construct from Chandler et al. (2011), and the prediction construct from Dew et al. (2009). However, the results reveal that the planning construct was highly correlated to

prediction. This high degree of similarity prevented the succinct operationalization of causation (planning) and causation (prediction).

Second, more work could disentangle the nomological web of antecedents and consequences of the integration of causation and effectuation (Smolka et al., 2016). In addition to creating more clarity on the conceptualization of integrating causation and effectuation, it is necessary to examine more antecedent variables. For instance, in addition to examining the role of individual-level characteristics, such as entrepreneurial orientation, future research could consider the concept of bisociation in greater detail. Bisociation could explain an entrepreneur's decision to change between causation and effectuation as their uncertainty either increases or decreases. Given that both causation and effectuation are integral parts of human reasoning, there are possible opportunities for future research to reflect on what the appropriate theoretical underpinnings are to define the constructs as being interchangeable.

Limitations

As with all empirical work, this study has its limitations. This study involved self-reported, cross-sectional data from venture owners; therefore, causality cannot be inferred. It is possible that combining several previously validated instruments to create a robust measure of causation, effectuation, and stepping-stone options distorted the relationship between causation and effectuation (Graham, 2003). Another limitation is related to the sample. The data for this study was collected from a lone source (Qualtrics) using a single collection method. It may be advisable to determine the specific venture age and incorporate questions about the venturing process to prevent any recall bias

(Smolka et al., 2016). Determining venture age could also be of assistance in examining

whether the surveyed entrepreneurs could be considered novices or experts to

define stepping-stone construct further. The ability to determine previous entrepreneurial

experience clearly and the number of ventures previously started and owned would have

distinguished experts from novice entrepreneurs. Future studies could include questions

about the number of ventures owned and the age of those ventures.

Finally, additional work could focus on the measurement constructs. Previous

research on the integration of causation and effectuation is limited (Smolka et al., 2016).

This study incorporated four measurement constructs (Chandler et al., 2011; Werhahn et

al., 2015; Dew et al., 2009; MacMillan & McGrath, 2002), which resulted in several

similar questions regarding causation (planning) and causation (prediction) processes. It

is possible that the respondents experienced confusion that may have resulted in

them noting similar levels of planning and prediction in their primary ventures.

Furthermore, the similarity of the questions between the constructs led to causation

(prediction) being dropped before testing the hypothesized model.

Practical Implications

This study has two practice-oriented implications. First, entrepreneurs operate in

highly uncertain conditions and with limited resources; therefore, processes that mitigate

entrepreneurial uncertainty and unnecessary financial investments could add practical

value to the enterprise. For example, entrepreneurs could implement control mechanisms

that focus on investing only what is necessary. To determine what is necessary,

entrepreneurs could examine current profit growth and either preserve capital for current

operations if levels are low or if the venture is highly profitable, leverage those resources

to expand. Entrepreneurs who control and leverage available means like capital at the appropriate time could realize year over year profit growth in highly uncertain environments.

Processes that have the potential to be interchangeable might reaffirm the position that entrepreneurs who use a variety of planning, prediction, and control measures would outperform those who maintain a single strategy. Second, this study illustrates that causation (planning) negatively impacts venture profit growth in both low and high technical/market uncertainty, suggesting that entrepreneurs who desire to use these processes should define boundary conditions before incorporating them into their entrepreneurial strategies. Defining boundary conditions could include entrepreneurs utilizing meaningful competitive analysis to sequence planning activities based upon the degree of technical and market uncertainty present in their ventures.

Conclusion

Entrepreneur process selection drives the success and sustainability of entrepreneurial ventures. Entrepreneurs must consistently mitigate technical and market uncertainty while remaining fiscally aware of every investment they make in their ventures. A key goal of this study is to help entrepreneurs retain the flexibility required to be successful while they still have the resources to select the best processes for the uncertainty levels that they experience at the time. This study is designed to contribute to entrepreneurship literature and practice by highlighting how the interchangeability of causation and effectuation stepping-stone options can positively impact entrepreneurial investments. This study is also designed to emphasize the importance of continuing the theoretical conversation interlinking causation and

effectuation as two integral components of human reasoning. This study contributes to

improving the economy by providing tangible process selection choices for entrepreneurs

and contributing to entrepreneurship literature.

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APPENDICES

The Effect of Causation and Effectuation Processes on Venture Profit Growth

The following survey instrument measures several facets of the causation and effectuation processes, effectual orientation, entrepreneurial alertness, prediction and control under uncertainty, and crafting R&D project portfolios. A set of instructions for each section of the survey will be found prior to the first question covering that particular topic. Please complete each question for response clarity and integrity of information. This survey should take you approximately 15 minutes to complete.

Q1 In what industry is your venture (or your main venture if you have more than one)? Coded as
1. Retail
2. Healthcare
3. Technology
4. Manufacturing/Engineering
5. Services (Restaurant, Cleaning Services, etc.)

Q2 In addition to yourself, how many employees work in the main venture that you are presently involved in (the one described above)?
    1-50 (1)
    51-100 (2)
    101-500 (3)
    501-1000 (4)
    1001+ (5)

Q3 How would you characterize your overall goals when you started your venture?
    Emphasis on economic goals (1)
    Emphasis on non-economic goals (2)

Q4 How do the profits of your present main business compare with your expectations?
    Above expectations (1)
    In line with expectations (2)
    Below expectations (3)

Q5 Over the past five years or since the founding of your present main business, how would you characterize the annual average gross revenues in comparison to any equity investment?
    Gross revenue is significantly more than equity investment (1)
    Gross revenue is moderately more than equity investment (2)
    Gross revenue is equal to the equity investment (3)
    Gross revenue is less than equity investment (4)
    Present main business is less than 1 year old or has not yet generated annual gross revenue (5)

Q6 Over the past five years or since the founding of your present main business, how would you characterize the growth of your profits year over year?
    Under 5% (1)
    5% to 9% (2)
    10% to 19% (3)
    20% to 34% (4)
    35% to 50% (5)
    More than 50% (6)

Q7 Over the past five years or since the founding of your present main business, how would you characterize the degree of market uncertainty (e.g., market demand, competitor entry, pricing) in your industry?
    High degree of uncertainty (1)
    Moderate degree of uncertainty (2)
    Low degree of uncertainty (3)
    No degree of uncertainty (4)
    Present main business is less than 1 year old or has an unknown degree of uncertainty (5)

Q8 Over the past five years or since the founding of your present main business, how would you characterize the degree of technical uncertainty (e.g., technologies, staffing, production capacity) in your industry?
    High degree of uncertainty (1)
    Moderate degree of uncertainty (2)
    Low degree of uncertainty (3)
    No degree of uncertainty (4)
    Present main business is less than 1 year old or has an unknown degree of uncertainty (5)

Q9 Please indicate your gender.
    Male (1)
    Female (2)
    Prefer Not to Answer (3)

Q10 Tell us about your educational background.
    General Business Management (1)

Entrepreneurship (2)
Finance (3)
Medical School graduate (MD, DO, etc.) (4)
Law School graduate (JD, etc.) (5)
Other (6)

Causation and effectuation processes: A validation study
Chandler, G., DeTienne, D., McKelvie, A., & Mumford, T. (2011)

The following 17 questions measure strategic processes. The questions use a five-point Likert scale with 1 = *Strongly Disagree* and 5 = *Strongly Agree.* Please take the opportunity to answer each question as it relates to your venture.

Q11 - We analyzed long-run opportunities and selected what we thought would provide the best returns.
Q12 - We developed a strategy to best take advantage of resources and capabilities.
Q13 - We designed and planned business strategies.
Q14 - We organized and implemented control processes to make sure we met objectives.
Q15 - We researched and selected target markets and did meaningful competitive analysis.
Q16 - We had a clear and consistent vision for where we wanted to end up.
Q17 - We designed and planned production and marketing efforts.
Q18 - We experimented with different products and/or business models.
Q19 - The product/service we now provide is substantially different from what we first imagined.
Q20 - We tried a number of different approaches until we found a business model that worked.
Q21 - We were careful not to commit more resources than we could afford to lose.
Q22 - We were careful not to risk more money than we were willing to lose with our initial idea.
Q23 - We were careful not to risk so much money that the company would be in real trouble financially if things didn't work out.
Q24 - We allowed the business to evolve as opportunities emerged.
Q25 - We were flexible and took advantage of opportunities as they arose.
Q26 - We avoided courses of action that restricted our flexibility and adaptability.
Q27 - We used pre-commitments from customers and suppliers as often as possible.

Validating effectual orientation as strategic direction in the corporate context
Werhahn, D., Mauer, R., Flatten, T., & Brettel, M. (2015)

The following 10 questions assess the strategic direction. The questions use a seven-point Likert scale with 1 = *Strongly Disagree* and 7 = *Strongly Agree*. Please answer each question as it relates to your venture.

Please indicate the extent to which you agree or disagree with the following statements.

As managers of this company, we consider it important that both we and our employees

Q29 aim to ensure that gains and risk in existing partnerships are shared fairly.
Q30 enter business relationships where the partners are willing to commit (e.g., invest time) from the onset.
Q31 regard surprises to be new opportunities.
Q32 exploit contingencies as effectively as possible.
Q33 use new information as a resource.
Q34 use setbacks as new opportunities.
Q35 attempt to influence trends.
Q36 attempt to shape the environment we operate in.
Q37 attempt to co-create future markets.
Q38 attempt to proactively design our environment with others.

Prediction and control under uncertainty: Outcomes in angel investing
Dew, N., Read, S., Sarasvathy, S., & Wiltbank, R. (2009)

The following 16 questions measure prediction and control under uncertainty. The questions use a seven-point Likert scale with 1 = *Strongly Disagree* and 7 = *Strongly Agree*. Please answer each question as it relates to your venture. Please note that the 16 questions have several sub-questions leading to each required response and are critical to observe before answering each question.

If you were to look at predictions for where potential markets are heading, you would do the following:

Q39 Use them to create forecasts of what your business might accomplish over time.
Q40 Discount them because they do not incorporate the impact of your innovation.

As you assemble information on this business, you would do the following:

Q41 Talk with people you know to enlist their support in making this a reality.
Q42 Study expert predictions of where the market is "heading."

As you develop a marketing approach for this product, you would do the following:

Q43 Research the competitors' approaches.
Q44 Imagine possible courses of action based on your prior experience.

When you think about market uncertainty for this idea, you move forward anyway because of the following reasons:

Q45 Your expertise allows you to influence that uncertainty.
Q46 Your actions can create a future you value.

As you manage product development, you are driven by the following factors:

Q47 Comparison of your progress against the development of competitors
Q48 Creation of new solutions on your own terms; competitors will have to keep up with you

If you were able to look at predictions for where potential markets are heading, you would do the following:

Q49 Use them to create forecasts of what your business might accomplish over time.
Q50 Discount them because they do not incorporate the impact of your innovation.

Considering predictions for where potential markets are heading, it is important to base strategy on the following factors:

Q51 Relevance of forecasts and analysis
Q52 Your capability given the means available to you

As you learn about the expectations other people have for this industry, you do the following:

Q53 Imagine the ways your venture will change aspects of the situation they are forecasting.
Q54 Form updated predictions of likely outcomes for the business.

Crafting R&D project portfolios
MacMillan, I., & McGrath, R. (2002)
Definition of Stepping Stone Options

The following 10 questions measure crafting R&D project portfolios. The questions use a seven-point Likert scale with 1 = *Certain* and 7 = *Highly Uncertain*. Please answer each question as it relates to your venture.

When you consider investment options in R&D, to what degree do you do with the following:

Q55 Identify several early possible applications of the technology.
Q56 Assemble small experimental probes deliberately designed to capture data about the market's reaction to the product.
Q57 Learn how to apply the capability of the technology.
Q58 Insist on design parsimony.
Q59 Develop clear metrics that, rather than measuring revenues and profits, initially measure learning processes.
Q60 Ensure that, rather than conventional measures of success, evidence of learning is used to assess progress.
Q61 At each stage, assess what has been learned, then design the next stage by selecting a more challenging technology requirement for a longer, more demanding market.

Q62 Put in place a rigorous intelligence system to capture, interpret, and make decisions based on these data.

Q63 Specify clearly which data you will use to discontinue development.

Q64 Possess a process for discontinuing the project.

The Effect of Causation and Effectuation Processes: Post–Confirmatory Factor Analysis Constructs

Causation and effectuation processes: A validation study
Chandler, G., DeTienne, D., McKelvie, A., & Mumford, T. (2011)

The following seven questions measure strategic processes. The questions use a five-point Likert scale with 1 = *Strongly Disagree* and 5 = *Strongly Agree.*

Please answer each question as it relates to your venture.

Causation (Planning)
Q11 We analyzed long-run opportunities and selected what we thought would provide the best returns.
Q12 We developed a strategy to best take advantage of resources and capabilities.
Q13 We designed and planned business strategies.
Q14 We organized and implemented control processes to make sure we met objectives.
Q15 We researched and selected target markets and did meaningful competitive analysis.
Q16 We had a clear and consistent vision for where we wanted to end up.
Q17 We designed and planned production and marketing efforts.

Validating effectual orientation as strategic direction in the corporate context
Werhahn, D., Mauer, R., Flatten, T., & Brettel, M. (2015)

The following four questions were used to assess the strategic direction. The questions use a seven-point Likert scale with 1 = *Strongly Disagree* and 7 = *Strongly Agree*.

Please answer each question as it relates to your venture.

Please indicate the extent to which you agree or disagree with the following statements.

As managers of this company, we consider it important that both we and our employees do the following:

Q34 Use setbacks as new opportunities.
Q36 Attempt to shape the environment we operate in.
Q37 Attempt to co-create future markets.
Q38 Attempt to proactively design our environment with others.

Crafting R&D project portfolios
MacMillan, I., & McGrath, R. (2002)
Definition of Stepping Stone Options

The following four questions measure crafting R&D project portfolios. The questions use a seven-point Likert scale with 1 = *Certain* and 7 = *Highly Uncertain*.

Please answer each question as it relates to your venture.

When you consider investment options in R&D, to what degree do you
Q57 learn how to apply the capability of the technology?
Q61 assess what has been learned at each stage, and then design the next stage by selecting a more challenging technology requirement for a longer, more demanding market?
Q62 put in place a rigorous intelligence system to capture, interpret, and make decisions based on these data?
Q63 specify clearly which data you will use to discontinue development?

APPENDIX C

Oklahoma State University IRB Approval

Oklahoma State University Institutional Review Board

Date: Wednesday, July 27, 2016

IRB Application No BU1644

Proposal Title: Causation and Effectuation Processes Effect on Investment Performance

Reviewed and Processed as: Exempt

Status Recommended by Reviewer(s): Approved   Protocol Expires: 7/26/2019

Principal
Investigator(s):

Matthew Kolakowski   Matthew Rutherford
4200 Scotland Street Apt 210
Stillwater, OK 74078   Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

☐ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Dawnett Watkins 219 Scott Hall (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,

Hugh Crethar, Chair
Institutional Review Board

VITA

MATTHEW JAMES KOLAKOWSKI

Candidate for the Degree of

Doctor of Philosophy

Thesis: INTERSECTION OF ENTREPRENEURIAL PROCESS: THE INTEGRATION OF CAUSATION AND EFFECTUATION PROCESSES ON VENTURE PERFORMANCE

Major Field: BUSINESS ADMINISTRATION

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Business Administration at Oklahoma State University, Stillwater, Oklahoma in December 2017.

Completed the requirements for the Master of Science/Arts in Business Administration at University of Mary Hardin Baylor, Belton, TX in 2014.

Completed the requirements for the Bachelor of Science in Healthcare Management at Trident University International, Cypress, CA, in 2011.

Work Experience:

February 2016 to Present: Practice Administrator, Erickson Living
               Represent the Eagles Trace clinic in its relationships with other healthcare organizations, government agencies, and third-party payers.
November 2014 to Present: President & CEO, TLK Human Capital Consulting
               Lead strategic Management consulting firm for healthcare organizations seeking to improve process implementation; developed, structured and implemented three entrepreneurial ventures mission statements, organizational strategic planning and short/long term growth plans within 6 months of opening the firm.
June 2002 to November 2014: Assistant Director of Medical Operations, U.S. Army
               Directed ambulatory, acute and family practice operations across 5 sites with over 75 FTE and patient satisfaction rates of 88%; directed health care profit and loss leadership that included direct responsibility for a $10 million-dollar medical supply budget.