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Entrepreneurial Effectuation: A Review and Suggestions for Future Research

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Effectuation represents a paradigmatic shift in the way that we understand entrepreneurship. Since its introduction, however, few researchers have attempted to empirically test effectuation. Our purpose is to encourage effectuation research. To do so, we review the effectuation literature and make suggestions for how to design and conduct empirically rigorous effectuation studies consistent with the developmental state of the research stream.

The main body of entrepreneurship research is based on the rational decision-making models employed by neoclassical economics. For example, Drucker (1998) claims that most opportunities are discovered through a purposeful search process. Consistent with this approach, competitive advantage for emerging firms is conceptualized to be largely determined by competencies related to finding and exploiting opportunities and the resources controlled by the firm (e.g., Chandler & Jansen, 1992; Cooper, Gimeno-Gascon, & Woo, 1994). With the assumptions of neoclassical economics underpinning this predominant theoretical base, most entrepreneurship researchers have assumed that individuals engage in rational goal-driven behaviors when pursuing entrepreneurial opportunities (e.g., Bird, 1989). Thus, the predominant entrepreneurial decision model taught in many business schools is a goal-driven, deliberate model of decision making referred to by Sarasvathy (2001) as a causation model.

Sarasvathy (2001), in contrast, argued that individuals also employ effectuation processes when pursuing entrepreneurial opportunities. When using effectuation processes, entrepreneurs start with a generalized aspiration and then attempt to satisfy that aspiration using the resources they have at their immediate disposal (i.e., who they are, what they know, and who they know). The overall objective is not clearly envisioned at the beginning, and those using effectuation processes remain flexible, take advantage of environmental contingencies as they arise, and learn as they go. Effectuation is relevant to the areas of entrepreneurship research and teaching because it questions the universal

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applicability of causation-based models of entrepreneurship (Stevenson & Gumpert, 1985) to the entrepreneurial process (Morris, Kuratko, & Covin, 2008). Thus, effectuation (Sarasvathy) represents a paradigmatic shift in the way that we understand entrepreneurship. Since the introduction of effectuation (Sarasvathy), however, only a few researchers have attempted to empirically model and test effectuation. This lack of research is surprising because effectuation suggests how individuals might act in situations in which the assumptions of causal strategy are not met and because effectuation research has the potential of making a significant contribution to the entrepreneurship literature. The importance of effectuation therefore raises the question—why has effectuation research not grown more quickly?

From our review of the effectuation literature, we conclude that some of the reasons effectuation research has not grown more quickly relate to the following: the fact that effectuation represents a challenge to conventional, entrenched entrepreneurial strategy wisdom; the complexity associated with developing consistent, observable behavioral variables from a cognition-based theory; and the difficulty related to developing and validating effectuation (and causation) measures. In spite of these challenges, we believe that effectuation holds much promise for the entrepreneurship literature, and we offer suggestions for how researchers can address these challenges.

Our purpose is to encourage effectuation research. To do so, we adapt classification systems used by previous review articles to analyze the existing research (Chandler & Lyon, 2001; McGrath, 1982; Scandura & Williams, 2000). We then review the emerging stream of effectuation literature in light of the framework provided by Edmondson and McManus (2007), which states that the methodologies employed should be contingent on the state of development of the field of research. In reviewing the effectuation literature, we analyze the methodological fit, or the consistency among elements of a research project—research questions, prior research, study design, and theoretical contribution—relative to the developmental state of the effectuation research stream. This analysis allows us to identify the state of progress in the research and to suggest specific next steps that will move the stream forward. Study design appropriate to the field's state of development is important because it influences the degree to which an article's results may be viewed as valid, reliable, and generalizable (Cook & Campbell, 1979) and the impact an article will have on the field (Bergh, Perry, & Hanke, 2006).

We begin by describing effectuation theory and reviewing the effectuation literature. We then identify research design challenges that are particularly problematic for effectuation research. We argue that each of these challenges can be mitigated if researchers are aware of them and design studies that take the challenges into account. Finally, we offer suggestions for how future researchers can address the challenges.

An Effectuation Primer

Sarasvathy (2001) stated that “effectuation processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means” (p. 245). She contrasts effectuation processes to causation processes, which she stated “take a particular effect as given and focus on selecting between means to create that effect” (p. 245). In the context of attempting to start new businesses, Sarasvathy argued that effectual logic is emphasized in the earlier stages of venture creation with a transition to more causal strategies as the new firm and market emerge out of uncertainty into a more predictable situation. Moreover, she noted that effectual logic is likely to be more effective in settings characterized by greater levels of uncertainty.

Although Sarasvathy (2001) stated that there are behaviors that are typical of effectuation and causation, effectuation and causation fundamentally refer to cognitive processes. Sarasvathy (1998) used think-aloud protocols in which she asked experimental subjects to continually talk aloud and describe what they are thinking as they were faced with problems and decisions. The experts' underlying logic was extracted from their thinking aloud about the actual problem presented to them. Based on relationships that she found between her subjects' thinking aloud and the behavior that they took in reaction to the problems they faced (i.e., their observed decisions), Sarasvathy developed five behavioral principles that relate to effectuation and causation. The behaviors linked to these principles, or sub-constructs, she proposed, could be observed and therefore could be tested using methods designed to capture behavior to differentiate causation and effectuation. The five sub-constructs include: (1) beginning with a given goal or a set of given means; (2) focusing on expected returns or affordable loss; (3) emphasizing competitive analysis or strategic alliances and precommitments; (4) exploiting preexisting knowledge or leveraging environmental contingencies; and (5) trying to predict a risky future or seeking to control an unpredictable future. When an individual uses causal logic, he or she will begin with a given goal, focus on expected returns, emphasize competitive analyses, exploit preexisting knowledge, and try to predict an uncertain future. When an individual uses effectual logic, he or she will begin with a given set of means, focus on affordable loss, emphasize strategic alliances, exploit contingencies, and seek to control an unpredictable future. Since Sarasvathy introduced effectuation, a few researchers have attempted to empirically measure and test effectuation and causation. We review those studies and the conceptual effectuation literature in the next section.

Effectuation Literature Review

To identify the effectuation literature, we searched for mentions of “effectuation” in article titles and abstracts and we read each of the articles that have cited Sarasvathy (2001). After discarding articles that referred tangentially to effectuation, we developed a list of 29 articles in which effectuation was a main topic. Sixteen of these articles were conceptual (they did not present data), and 13 were empirical. Among the empirical articles, seven were experimental studies, and six were field studies (five field studies that used primary data and one field study that used secondary data—a meta-analysis). We reviewed both conceptual and empirical articles because although conceptual articles do not employ research methods, they contribute to the developmental state of a research program and can influence research methods used in later studies (Edmondson & McManus, 2007).

The first articles referring to effectuation were published in 1998 (Sarasvathy, Simon, & Lave, 1998) and 2001 (Sarasvathy, 2001). Why is it taking so long for effectuation research to take off? Although it seemed to us that a decade is a long time to start moving research from a nascent to an intermediate phase, we also believe that given the nature of the field, that should be expected. To gain a sense of how long paradigm shifts take in the field of management theory, we conducted a brief analysis of three paradigm shifts related to the introductions of upper echelons theory, the resource-based view of the firm, and the punctuated equilibrium model of organizational change. We found that according to the Social Science Citation Index, from the publication of the article that coined the term “upper echelons” (Hambrick & Mason, 1984) to the first year in which there were more than 10 articles in which “upper echelons” appeared in the article’s title or list of keywords, 23 years passed. We found that 13 years passed between the publication of the

article that coined the term “resource-based view” (Wernerfelt, 1984) and the first year in which there were more than 10 resource-based view articles; and we found that 19 years passed between the publication of the article that coined the term “punctuated equilibrium” (Gersick, 1988) and the first year in which there were more than 10 punctuated equilibrium articles. This suggests that effectuation research is still in its infancy.

Pfeffer (1993) pointed out that paradigm shifts are slower in fields where there is less consensus of opinion regarding accepted paradigms, theories, and models. For example, the research cycle is slower in the social sciences than in the physical sciences. In addition, Salancik, Staw, and Pondy (1980) pointed out that fields in which there is more consensus are more efficient in their communication of new ideas and new findings. Although the main body of entrepreneurship research is based on the causal logic of neoclassical economics, there are still few theories and concepts in the entrepreneurship literature that have near universal acceptance. Therefore, following Pfeffer’s logic, new ideas such as effectuation that represent significant paradigm shifts will be relatively slow to emerge in a field such as entrepreneurship where there is still little consensus. The theory, concepts, and constructs must be sufficiently understood before they can be measured and tested. An analysis of the publication dates of effectuation articles (shown later in Tables 1–4) indicates that effectuation research seems to be following the expected pattern. Initially, theoretical articles described the concepts and potential constructs. More recently, researchers (e.g., Chandler, DeTienne, McKelvie, & Mumford, *in press*; Wiltbank, Read, Dew, & Sarasvathy, 2009) are developing measures and testing relationships with other variables. In this way, the effectuation research is moving toward an intermediate level of research.

To show that progression, we used the classification schemes that have been used in prior review articles (McGrath, 1982; Scandura & Williams, 2000) to analyze the effectuation literature. First, we classified each article’s research strategy according to Scandura and Williams’ modified version of McGrath’s typology of research strategies. The research strategy types include formal theory/literature review, sample survey, laboratory experiment, experimental simulation, field study—primary data, field study—secondary data, field experiment, judgment task, and computer simulation. Because of the small number of effectuation articles, we consolidated the articles into four broader research strategy categories: conceptual articles, experimental studies, field studies—primary data and field studies—secondary data. We classified articles’ research strategies first because the type of research strategy employed influences the type of methods used. For the conceptual articles, we captured (or imputed) the main research question and we characterized the main theoretical contribution. We also categorized the main research question and theoretical contribution for the experimental and field studies. Additionally, for the empirical articles, we collected information about the data source and sample, the types of analyses used, the results, and the extent to which the article fully considered effectuation (i.e., how many of the five effectuation sub-constructs were examined). For the field studies, we also collected information about whether the data were primary or secondary, the study’s time frame, level of analysis, the construct validation and reliability procedures used, and dependent variables. Using the contingency framework proposed by Edmondson and McManus (2007) and the classification scheme proposed by Scandura and Williams, we then evaluated the existing effectuation literature.

Research programs vary in their level of maturity. According to Edmondson and McManus (2007), the state of a research program may be classified as nascent, intermediate, or mature. Nascent research programs are characterized by open-ended research questions, qualitative methods (for empirical studies), and calls by authors to expand on the suggestive theory thus far developed. Intermediate research programs are characterized by research questions that propose relationships between new and established

constructs, a mix of qualitative and quantitative methods, and the development of a provisional theory. Mature research programs are characterized by focused questions about existing constructs, mostly quantitative methods, and studies that largely support the theory being examined. Using this framework, we identify the current state of research with respect to research questions, type of data collected, methods used for collecting data, constructs and measures, the goal of the data analysis, the data analysis methods, and the theoretical contribution. Then, using the framework proposed by Edmondson and McManus, we suggest next steps in each of these categories that will move the effectuation research agenda forward.

Conceptual Effectuation Literature

Several articles have presented effectuation as a new paradigm and have addressed the core definitional research questions of effectuation (see Table 1 for a summary of the conceptual effectuation literature). These research questions include how are firms created (Sarasvathy, 2001), what is effectuation (Dew & Sarasvathy, 2002), how do entrepreneurial opportunities come into being (Sarasvathy, Dew, Velamuri, & Venkataraman, 2003), how do firms decide what to do when faced with an uncertain situation (Wiltbank et al., 2006), how do firms that are not yet established behave (Dew, Read, Sarasvathy, & Wiltbank, 2008), and how do entrepreneurs successfully create new firms and markets (Dew et al.). Other articles have posited relationships between effectuation and other constructs including the tendency to over-trust (Goel & Karri, 2006; Karri & Goel, 2008; Sarasvathy & Dew, 2008a), creative imagination (Chiles, Bluedorn, & Gupta, 2007; Chiles, Gupta, & Bluedorn, 2008; Sarasvathy & Dew, 2008b), and entrepreneurial expertise and new venture performance (Read & Sarasvathy, 2005). Similarly, Dew, Sarasvathy, Read, and Wiltbank (2009) theoretically connected one of the effectuation sub-constructs, focusing on affordable loss, with the managerial decision-making literature.

The contributions of many of the conceptual effectuation articles have been to present and define the concept of effectuation, to contrast it to causation, and to describe when, how, and why effectuation may be used. Consistent with the research questions addressed, some of the conceptual articles have also developed testable propositions between effectuation and other concepts. The proposed relationships have linked effectuation and the tendency to over-trust (Goel & Karri, 2006; Karri & Goel, 2008; Sarasvathy & Dew, 2008a), effectuation and entrepreneurial expertise (Read & Sarasvathy, 2005), and effectuation and new venture performance (Read & Sarasvathy). Dew, Sarasvathy, et al. (2009) also developed testable propositions that related the affordable loss construct to the decision to start a new venture, real options reasoning, payment coupling, mental accounting, and escalation of commitment.

Empirical Effectuation Literature

Many of the early empirical effectuation articles have been experimental studies that focus on identifying how entrepreneurs and non-entrepreneurs process risks and returns (Dew, Read, Sarasvathy, & Wiltbank, 2009; Read, Dew, Sarasvathy, Song, & Wiltbank, 2009; Sarasvathy, 1998; Sarasvathy & Dew, 2005; Sarasvathy et al., 1998) (see Table 2 for a summary of the experimental effectuation literature). Although there are some differences in their samples and research questions, each of the experimental studies have employed similar types of procedures and analytical techniques. Specifically, in each experiment, subjects thought aloud as they encountered scenarios and solved problems

Table 1

Summary of the Conceptual Effectuation Literature

Article	Research question	Theoretical contribution	Research state
Sarasvathy (2001)	How are firms created?	Effectuation is presented and contrasted to causation	Nascent
Dew and Sarasvathy (2002)	What is effectuation?	Effectuation is distinguished from causation. A list of “nine things that effectuation is not” is offered and how effectuation integrates with other management theories is discussed.	Nascent
Sarasvathy, Dew, Velamuri, and Venkataraman (2003)	How do entrepreneurial opportunities come into being?	There are three explanations of how entrepreneurial opportunities come into being. They are “ <i>recognized</i> through deductive processes.” They are “ <i>discovered</i> through inductive processes,” and they are “ <i>created</i> through abductive processes.” According to the creative explanation, entrepreneurs manage the uncertainty that is associated with an opportunity through the use of effectuation principles.	Nascent
Read and Sarasvathy (2005)	Is there a relationship between entrepreneurial expertise and the use of effectual logics? Also, is there a relationship between the use of effectual logics and new venture performance?	Five testable propositions are offered that relate entrepreneurial expertise, the use of effectual action, and new venture performance.	Nascent
Goel and Karri (2006)	Why do entrepreneurs over-trust?	It is proposed that the use of effectual logic by entrepreneurs, coupled with entrepreneurial personality characteristics make entrepreneurs susceptible to over-trust.	Nascent
Wiltbank, Dew, Read, and Sarasvathy (2006)	How do firms decide what to do when faced with an uncertain situation?	Effectuation is discussed as a transformative approach to strategic decision making and deciding what to do next when faced with an uncertain situation. In contrast to most previous effectuation literature, this article discusses effectuation as appropriate not only for new ventures but for established firms as well.	Nascent
Chiles, Bluedorn, and Gupta (2007)	Do creative destruction and entrepreneurial discovery fully explain how entrepreneurs create opportunities?	A component of Lachmannian entrepreneurship differs from creative destruction and entrepreneurial discovery. The authors state that creative imagination is “congenial” with effectuation.	Nascent
Chiles, Gupta, and Bluedorn (2008)	What are the similarities and differences between Lachmannian entrepreneurship and effectuation?	The authors respond to criticisms by Sarasvathy and Dew about their differing interpretations of effectuation. They attempt to clarify the possible distinctions and common ground that exist between Lachmannian entrepreneurship and effectuation.	Nascent
Dew, Read, Sarasvathy, and Wiltbank (2008)	How do firms that are not yet established behave?	It is proposed that new ventures engage in more effectual behavior than established firms.	Nascent
Dew, Sarasvathy, Read, and Wiltbank (2008)	How do entrepreneurs successfully create new firms and markets?	The authors suggest that existing firms can avoid the “innovator’s dilemma” and continue to be entrepreneurial.	Nascent
Karri and Goel (2008)	Is trust irrelevant or necessary for effectuators?	In response to Sarasvathy and Dew, the authors argue that all human action requires trust and that effectuators “over-trust deliberately, and then make the risk of trusting irrelevant by following effectual logic.”	Intermediate concepts
Sarasvathy (2008)	Given who I am, what I know, and whom I know, what kinds of entrepreneurial activities could I pursue and what kind of enterprises could I create?	A book that clearly and sequentially describes the development of the concept of effectuation.	Nascent

Table 1

Continued

Article	Research question	Theoretical contribution	Research state
Sarasvathy and Dew (2008a)	Does using effectual logic necessitate trust?	In response to Goel and Karri, the authors argue that “effectual logic neither predicts nor assumes trust.”	Intermediate concepts
Sarasvathy and Dew (2008b)	Response to Chiles, Gupta, and Bluedorn	The authors respond to the comments and criticisms of Chiles, Gupta, and Bluedorn. They argue that effectuation and Lachmannian entrepreneurship differ with regard to the “problems of knowledge, resources, and institutions.”	Nascent
Sarasvathy, Dew, Read, and Wiltbank (2008)	How do effectuators design organizations and environments?	Organizational design is important because effectuators using transformational approaches not only design organizations but concurrently end up designing the environments we live in.	Nascent
Dew, Sarasvathy, Read, Wiltbank (2009)	How do individuals decide what they can afford to lose and what they are willing to lose to plunge into entrepreneurship?	Using the entrepreneur’s new venture plunge decision, this article combines insights from behavioral economics to develop a detailed analysis of the affordable loss heuristic. The article also discusses the implications of affordable loss for the economics of strategic entrepreneurship.	Nascent

related to risks, returns, and/or how to start a new venture; and the authors used verbal protocol analysis to analyze the spoken thoughts of their subjects. Sarasvathy examined how entrepreneurs and non-entrepreneurs differ in how they process and react to risks and returns. Sarasvathy et al. examined how entrepreneurs and non-entrepreneurs perceive risk and return. Sarasvathy and Dew examined how entrepreneurs predict uncertain future preferences. Dew, Read, et al. (2008) examined whether entrepreneurs frame decisions using effectual thinking more often than novices do, and Read, Dew, et al. (2009) examined whether entrepreneurs frame marketing decisions using effectual thinking more often than novices do. Taken together, the experiments contribute to the effectuation literature by demonstrating that entrepreneurs and non-entrepreneurs generally perceive risk and reward differently, they vary in their use of effectual and causal logic when confronted with scenarios involving risk and reward, and they differ in how they attempt to predict or control uncertainty.

In addition to the experimental studies, five field studies that examine effectuation have been conducted (see Table 3 for a summary of the field study effectuation literature). The first three studies were qualitative case studies (Harmeling, Oberman, Venkataraman, & Stevenson, 2004; Harting, 2004; Sarasvathy & Kotha, 2001), and the last two were quantitative studies (Chandler et al., in press; Wiltbank, Read, Dew, & Sarasvathy, 2009). The case studies are similar in that each examines effectuation within a single case, each uses content analysis to develop qualitative measures, and each considers the full range of effectuation sub-constructs. The quantitative studies are quite different.

In a quantitative study, Chandler et al. (in press) examined whether the sub-constructs’ underlying causation and effectuation are distinct. In doing so, they initially modeled causation and effectuation as reflective constructs (Coltman, Devinney, Midgley, & Venaik, 2008; MacKenzie, Podsakoff, & Jarvis, 2005) and developed scales that measured each construct. They found that the items proposed to reflect causation

Summary of the Experimental Effectuation Literature

Article	Research question	Data source and sample	Types of analysis	Results summary	Theoretical contribution	Research state
Sarasvathy (1998)	How do entrepreneurs and non-entrepreneurs differ in how they process and react to risks and returns?	The decisions and verbal protocols of four entrepreneurs who had founded large companies (\$5–30 million in sales), and four bankers with over 5 years of work experience in large banks as they solved five problems related to risk and return + the decisions and verbal protocols of 30 expert entrepreneurs as they solved 10 problems related to starting a new venture	Verbal protocol analysis; analysis of means variance	The entrepreneurs accepted risk as a given and framed their problem spaces with personal values and assumed greater personal responsibility for outcomes. Bankers focused on target outcomes—attempting to control risk within structured problem spaces and avoiding situations where they risk higher levels of personal responsibility. The entrepreneurs engaged in more effectuation-related behavior and less causation-related behavior.	Effectuation is presented and contrasted to causation	Nascent
Sarasvathy et al. (1998)	How do entrepreneurs and non-entrepreneurs perceive risk and return?	Similar to the first sample in Sarasvathy (1998)	Verbal protocol analysis; analysis of means variance	Similar to Sarasvathy (1998)	Entrepreneurs and non-entrepreneurs perceive risk and return differently	Nascent
Sarasvathy and Dew (2005)	How do entrepreneurs predict uncertain future preferences?	The decisions and verbal protocols of 27 entrepreneurs who had founded companies ranging in size from \$200 million to \$6.5 billion in sales as they solved 10 problems related to starting a new venture + historical data and interviews with entrepreneurs who participated in the creation of the radio frequency identity industry	Verbal protocol analysis; event history analysis	The entrepreneurs seemed to use entrepreneurial logics when predicting uncertain future demand. The prediction processes they described indicated that they used a logic of identity (who are you) as opposed to a logic of preferences, a logic of action (what you know) as opposed to a logic of belief, and a logic of commitment (whom you know) as opposed to a logic of transaction.	A “technology of foolishness” is offered that indicates how entrepreneurs predict uncertain future preferences	Nascent
Dew, Read, et al. (2008)	Do expert entrepreneurs frame decisions using effectual thinking more often than novices do?	The decisions and verbal protocols of 27 expert entrepreneurs + 37 MBA students as they solved two problems related to starting a new venture	Verbal protocol analysis; analysis of means variance	The expert entrepreneurs used analogical reasoning, were more likely to think holistically about business, weighed predictive information less, were more means-driven, were less concerned with expected return, and were more interested in developing partnerships than MBA students.	Expert entrepreneurs use effectual logics more and causal logics less when making decisions	Intermediate
Read, Dew, et al. (2009)	Do expert entrepreneurs frame marketing decisions using effectual thinking more often than novices do?	The decisions and verbal protocols of 27 expert entrepreneurs + 37 MBA students with little entrepreneurial expertise as they approach marketing problems.	Verbal protocol analysis; analysis of means variance	Expert entrepreneurs were less likely to believe market data, used analogical reasoning, focused on affordable loss, were more likely to think holistically about the business, thought about unmentioned markets, used skim pricing, more likely to make initial sales themselves.	Expert entrepreneurs use effectual logics more and causal logics less when making marketing decisions.	Intermediate

Table 3

Summary of the Field Study Effectuation Literature

Article	Sarasvathy and Kotha (2001)	Harting (2004)	Harmeling et al. (2004)	Chandler et al. (in-press)	Willbank et al. (2009)
Research question	Do entrepreneurs use effectual processes when faced with Knightian uncertainty?	Do established organizations engage in effectuation when pursuing entrepreneurial opportunities?	How do new ventures in adverse conditions (e.g., in a high level of uncertainty) come into existence?		
Data source and sample	The text of press releases, media accounts, books, and financial analysts' reports of RealNetworks and the audio and video streaming industry + transcripts derived from interviews with individuals familiar with RealNetworks	Transcripts derived from interviews with the founders of CarMax and Circuit City executives and the text of press releases related to the founding of CarMax	Transcripts derived from interviews with the founder of the Graduate Program for Entrepreneurship at the University of Osijek in Croatia and the text of a case study written about the development of the program		
Level of analysis	Decision-event	Semantic chunk	Semantic chunk		
Time frame	Retrospectively longitudinal	Retrospectively longitudinal	Retrospectively longitudinal		
Construct validation procedures	None mentioned	None mentioned	None mentioned		
Reliability procedures	None mentioned	None mentioned	None mentioned		
Dependent variable	Whether the RealNetworks entrepreneurs used effectual principles	The number of times that causal reasoning was used versus effectual reasoning	The number of times that causal reasoning was used versus effectual reasoning	n/a	Investment success
Types of analysis	Content analysis	Content analysis	Content analysis		Ordinary least squares regression
					Exploratory factor analysis (parallel analysis and a screen plot analysis) + Exploratory and confirmatory factor analysis

Table 3

Continued

Article	Sarasvathy and Kotha (2001)	Harting (2004)	Harmeling et al. (2004)	Chandler et al. (in-press)	Wiltbank et al. (2009)
Results summary	The RealNetworks entrepreneurs used the effectual principles of being means-driven rather than goals-driven, focusing on affordable loss rather than expected return, and using partnerships rather than formal analyses.	Effectual principles accounted for over 60% of the semantic chunks during the first phase of CarMax's development (the concept generation phase) as well as almost 60% overall. The use of effectual reasoning tapered off in later phases.	The founders of the program mentioned effectual reasoning more in the initial stage and causal reasoning more in later stages. Goal flexibility and the incidence of contingency exploitation decreased over time.	Two models fit the data equally well—a first-order model with causation, flexibility, experimentation, affordable loss, and precommitments as independent constructs and a second-order model with causation and effectuation as a latent variable (represented by flexibility, experimentation, and affordable loss) with precommitments shared between the two constructs (causation and effectuation).	Angel investors who emphasized control strategies experienced fewer investment failures without experiencing fewer investment homeruns than those who emphasized prediction strategies.
Theoretical contribution	Entrepreneurs, when faced with Knightian uncertainty, use and act more on effectual logics than on effectual logics.	In cases of corporate entrepreneurship, individuals may use more effectual reasoning in the earlier phases of a new venture's development, and more causal reasoning in later phases.	Entrepreneurs may use effectual logics more in the initial stage of a new venture when uncertainty and goal ambiguity are high.	A survey instrument to measure causation and effectuation is developed, and it is shown that causation and effectuation can be measured somewhat distinctly.	In cases of uncertainty, investors are better served to emphasize control strategies as opposed to prediction strategies.
Effectuation sub-construct(s) considered	Control, means, partnership, affordable loss, leverage contingency	Control, means, partnership, affordable loss, leverage contingency	Control, means, partnership, affordable loss, leverage contingency	Control, partnership, affordable loss, leverage contingency	Control
Research state	Nascent	Nascent	Nascent	Intermediate	Intermediate

processes correlated significantly with one another. The items proposed to reflect effectuation processes, on the other hand, were not significantly correlated with each other but instead, formed a multidimensional construct composed of four sub-constructs: affordable loss, experimentation, flexibility, and precommitments. They found that precommitments also loaded on causation processes. They then proposed that effectuation might be better viewed as a formative construct.

In a second quantitative study, Wiltbank et al. (2009) considered only one effectuation sub-construct—control. In particular, they examined the degree to which investors emphasized prediction or control in their responses to a scenario-based set of questions and whether the investor's prediction versus control emphasis related to their past investment success. They found that in cases of uncertainty, investors who emphasized control were generally more successful than investors who emphasized prediction. Because the authors examined only one sub-construct proposed to reflect effectuation, the study did not consider the whole of effectuation.

The last empirical effectuation study is a meta-analysis that tested whether there is a positive relationship between effectuation and new venture performance (Read, Song, & Smit, 2009). To develop a sample, the authors identified variables in 48 new venture studies that reflected the five sub-constructs of effectuation. These studies were published between 1985 and 2007 in the *Journal of Business Venturing*. The authors found that the meta-analytic relationships between venture performance and the following: (1) means—what I know that is relevant to starting a new venture; (2) means—what I know that is irrelevant to starting a new venture; (3) means—who I am that is relevant to starting a new venture; (4) means—who I am that is irrelevant to starting a new venture; (5) means—who I know; (6) partnership; and (7) leverage contingency were positive and significant. The meta-analytic relationship between venture performance and affordable loss, however, was negative and not significant. Therefore, not all hypotheses were supported. It is worthwhile noting that probably none of the studies included in the meta-analysis conceptualized their variables in terms of effectuation. In creating the meta-analytic study, therefore, Read, Song, et al. (2009) reconceptualized the variables as effectuation variables.

Implications of the State of Effectuation Research for Future Studies

Given these descriptions and considering the literature thus far, the study of effectuation can be currently classified as nascent/intermediate. This has implications that will help guide appropriate research questions, the type of data collected, methods used for collecting data, constructs and measures, the goal of the data analysis, the data analysis methods, and the theoretical contributions of future studies.

Suggestions for Future Research

Appropriate Research Questions. The existing literature asks research questions that are predominantly open-ended inquiries about effectuation as a phenomenon of interest. According to Edmondson and McManus (2007), these questions indicate that effectuation research may be classified as nascent. The existing studies' research questions are summarized in Tables 1–3, and they tend to focus on topics such as how are firms founded? How do entrepreneurial opportunities come into being? How do emerging firms deal with uncertainty? How do entrepreneurs create new firms and markets? A few research

questions, however, provide evidence of a move toward an intermediate state: How is effectuation related to trust? Does expertise impact effectual behaviors? In an intermediate state, research questions focus on proposed relationships between new and established constructs (Edmondson & McManus). Thus, the next suggested state of development should explore relationships between effectuation and established constructs. In addition to the relationships that have been proposed between effectuation and trust and effectuation and expertise, researchers should consider whether effectuation is conceptually related to other theories. Once conceptual relationships have been established, researchers could then develop propositions about these relationships and test their propositions. A wave of research establishing relationships between effectuation and established entrepreneurship and management theories will need to first be conducted before studies can be developed with focused questions and/or hypotheses. Some of these studies could examine the relationships between effectuation and bricolage (Baker & Nelson, 2005), improvisation (Miner, Bassoff, & Moorman, 2001), *ad hoc* decision making (Denrell, Fang, & Winter, 2003), and temporary organizations (Bigley & Roberts, 2001).

Types of Data to Collect. Referring back to Tables 1–3, much of the research that has been conducted thus far has used relatively open-ended data that need to be interpreted for meaning. At the nascent level, Edmondson and McManus (2007) stated that problems can arise when researchers conduct studies that use quantitative data and analysis methods. Such studies, conducted when there is little understanding from previous literature of the constructs being examined, are vulnerable to finding spurious results. As the research transitions into an intermediate state, Edmondson and McManus suggested that both qualitative and quantitative data be collected. They caution that problems can arise when researchers collectively use only qualitative or quantitative methods. Using only qualitative or quantitative methods to examine an intermediate research program can lead to less convincing results.

The prescription to use both qualitative and quantitative methods aligns with the proposed research questions. For example, if researchers choose to investigate the relationship between effectuation and hiring practices, it would be necessary to develop measures of effectuation and apply measures or typologies of hiring practices. Organizations applying effectuation processes may be more likely to hire contingent employees, and accepted definitions of contingent employees have existed for some time (e.g., Polivka & Nardone, 1989). A combination of converging qualitative and quantitative results therefore would provide more convincing evidence for the proposed relationships.

A related issue regarding the types of data to collect revolves around sample selection and sample size. Because many published empirical studies of effectuation appear to involve fewer than 90 participants, there is an inherent implication that effect sizes are large and can be detected in relatively small samples (Cohen, 1988). Because the research is in a nascent state, most of the research has focused on answering open-ended questions, and relationships between variables have not been examined. Thus, the existing literature does not provide clear information to allow us to estimate the likely effect sizes of effectuation and other constructs such as uncertainty, financing alternatives and practices, organizational learning, employment growth, and hiring practices. As research transitions to an intermediate state, sample sizes will need to increase.

In terms of samples, although we generally recommend collecting primary data from entrepreneurs, we suggest that insights may also be gleaned about the effectuation process by using samples of entrepreneurship students to see if the dimensions of effectuation can be taught or by using samples of strategic partners to examine relationships between entrepreneurs using effectuation processes and their strategic partners. It might also be

possible to reconstruct indicators of causation and effectuation from existing data sets such as the Panel Study of Entrepreneurship Dynamics.

Methods Used for Collecting Data. The preceding section suggests a need for both qualitative and quantitative data. As such, it is appropriate to continue collecting data through interviews and observations. However, it is also appropriate to move toward collecting data through questionnaires and relevant archival sources. The mix of quantitative and qualitative methods discussed earlier is appropriate.

In addition to our prescription for quantitative and qualitative data, Edmondson and McManus (2007) stated that at the intermediate level of development, it is appropriate to obtain information from field research sites relevant to the phenomena of interest. When selecting field research sites, it is important to consider the representativeness of those sites. Three of the published effectuation experiments we reviewed examined the degree to which experienced entrepreneurs and non-entrepreneurs (bankers, managers, and master of business administration [MBA] students) used effectual and causal logics (Dew, Read, et al., 2009; Read, Song, et al., 2009; Sarasvathy et al., 1998). These studies were designed as experiments and as such, generalizability threats were understandably not well-controlled. As effectuation research reaches an intermediate state of development, it will become more important to sample subjects who are more representative of the individuals who are in the process of starting businesses, developing not-for-profit organizations, or engaging in other activities where effectuation might apply. According to large-scale studies of entrepreneurship in the United States, many of the demographic characteristics of individuals who start businesses are representative of the non-entrepreneur population (Shane, 2008). That is, entrepreneurs look similar to the population from which they arise. Therefore, to move the research to an intermediate phase, it will be necessary to sample a wider variety of individuals.

At the same time, it is important to note that the concept of effectuation arose out of the study of expert entrepreneurs, who are, by definition, not representative of the population of entrepreneurs as a whole. Because effectual entrepreneurship may be synonymous with expert entrepreneurship, the average or typical entrepreneur may not predominantly use effectuation. Thus, conducting research that compares expert entrepreneurs versus non-entrepreneurs or novice entrepreneurs is warranted. Comparisons in the field with well-designed survey and cross-sectional data may yield interesting insights. Such research could examine whether experience, the level of resources available, and the developmental stage of a venture are related in different ways to different subdimensions of effectuation. Multilevel and contingent models may also help us better understand how and when the different subdimensions of effectuation are most applicable.

For researchers who wish to continue to examine effectuation among expert, experienced entrepreneurs, we recommend consulting the expertise methods literature for guidance. A variety of experimental (Proctor & Vu, 2006), retrospective interview (Sosniak, 2006), time use logging (Deakin, Cote, & Harvey, 2006), and historiometric (Simonton, 2006) methods may be helpful. For example, for researchers who wish to examine whether effectuation skills are better mastered when they are learned and practiced separately before they are integrated (i.e., part-whole training) or when they are learned and practiced as a whole (i.e., whole-task training), laboratory experimental techniques similar to those used by Frederikson and White (1989) may be useful. Examining the acquisition of expert skills in settings in which subjects were faced with several simultaneous stimuli, tasks, and requests for response, Frederikson and White found that expertise resulted more quickly from part-whole training than from whole-task training. Similarly, might entrepreneurs gain effectuation expertise more quickly by first learning

and practicing the skills associated with the effectuation sub-constructs before attempting to put together all of the effectuation skills in forming a new venture?

For researchers who wish to examine what leads to the use of effectual logics and behavior, the use of retrospective interviews with expert entrepreneurs and non-entrepreneurs may be warranted. Guidance for how to design such research is available by examining the results of the Development of Talent Project (Bloom, 1982; Sosniak, 2006). This project sought to understand what factors contributed to the development of expertise among 120 expert concert pianists, sculptors, swimmers, tennis players, mathematicians, and physicists. The principal investigator originally surmised that the experts “would be initially identified as possessing special gifts or qualities and then provided with special instruction and encouragement” (Bloom, p. 520). The study results suggested, however, that this pattern was not consistent among the experts. Instead, the researchers found that the experts were “encouraged and supported in considerable learning before they were identified as special and then accorded even more encouragement and support” (Sosniak, p. 289). Similarly, might the use of effectual logics that has been found among expert entrepreneurs have resulted more from environments that encouraged them to engage in affordable loss experiments and develop alliances? Such environments might have included growing up in an entrepreneurial family and/or being trained in financial bootstrapping techniques or other effectual approaches through courses or workshops in entrepreneurship education programs.

We encourage researchers who are interested in understanding the difference between how expert and novice entrepreneurs spend their time when starting a new venture to consult the time use logging methods literature (Deakin et al., 2006). Stylized activity lists and logs, two techniques that collect data about how subjects spend their time, can be adapted to allow researchers to learn how much time expert and novice entrepreneurs spend engaged in effectual behaviors, the frequency with which they engage in effectual behaviors, and when they engage in these behaviors. These data might allow researchers to learn whether expert and novice entrepreneurs engage in effectual behaviors differently over time.

Lastly, in terms of methodological advice for researchers who wish to examine expert entrepreneurs, we encourage researchers to consult the historiometric methods literature (Simonton, 2006) if they wish to examine whether the use of effectuation among expert entrepreneurs has changed over time. Historiometric methods allow researchers to examine and analyze the acquisition and performance of notable, historical experts using quantitative analytical techniques. Historiometric methods therefore could allow a researcher to examine the use of effectuation logics and behavior among Benjamin Franklin, Thomas Edison, Henry Ford, and Bill Gates. Note that a historiometric examination of effectual logic would require data collected from sources that provide insight into individuals’ logics (e.g., personal diaries, letters). Data for a historiometric examination of effectual behavior, on the other hand, might be drawn from newspaper reports and biographies (e.g., objective reports of an entrepreneur’s behaviors). Such data might be valuable for understanding whether successful entrepreneurs who lived prior to the industrial revolution, the rise of large multinational corporations, or the advent of the internet used effectual logics and behavior as much as expert entrepreneurs do today.

Unit of Analysis. Another issue related to data collection is the choice of the appropriate unit of analysis. In entrepreneurship research, the unit of analysis has traditionally been either the entrepreneur or the emerging firm. A deeper understanding of effectuation processes may incorporate both of these traditional approaches. For example, an effectuation-based model of entrepreneurship is nonlinear and includes an entrepreneur

realizing that he or she has a generalized aspiration, assessing the resources that he or she has within his or her control, experimenting with affordable alternatives, receiving feedback, and committing resources only after successful trials (Sarasvathy, 2001). Therefore, a business launch may never occur, or several business launches may occur that result from the entrepreneur's generalized aspiration. As such, to understand the effectuation phenomenon, it would be necessary to study entrepreneurs rather than firms over a period of time long enough for effectuation behaviors to manifest themselves. Alternatively, at the firm level, it might be possible to analyze business model change. For example, different versions of business plans could be analyzed over time and changes in relevant variables could be mapped in both causal and effectual terms. Finally, because interactions with stakeholders form an important part of effectual logic, it might be possible to analyze stakeholder interactions or relationships. For example, researchers could track each stakeholder that joined a venture and classify interactions into predominantly causal and effectual. All three approaches require the observation and analysis of cognitive processes and behaviors over time.

Gathering data on individuals over time requires either retrospective recall or real-time data gathering. Because process and field study data collection methods often capture data retrospectively, the data (especially unobservable data such as the thought processes that an individual uses) are subject to recall biases (Eisenhower, Mathiowetz, & Morganstein, 2004). When examining the degree to which entrepreneurs use effectual versus causal logics, researchers should attempt to mitigate subjects' recall biases. To do so in field studies, researchers could use longitudinal research designs that include frequent data collections to capture subjects' logics and behaviors. A subject's inability to accurately remember what he or she was thinking is likely to occur as more time passes. Therefore, studies based on recall should focus on recent events and be supplemented by longitudinal designs. In addition, combining retrospective interview data with observable behavioral and action variables, such as actual strategies implemented, and triangulating both with historical materials and information from multiple stakeholders—as was performed in Sarasvathy and Kotha (2001), Harting (2004), and Harmeling et al. (2004)—will help mitigate the risk of recall bias (Eisenhower et al.).

An additional methodology that might well be adapted to the study of effectuation is the experience sampling methodology (Alliger & Williams, 1993; Hormuth, 1986; Uy, Foo, & Aguinis, 2010). The experience sampling methodology requires participants to report their thoughts, feelings, and behaviors at multiple times across situations as they happen in the natural environment. Thus, it allows researchers to capture person–situation interactions as well as between- and within-person processes. It helps researchers improve the degree to which findings can be generalized to naturally occurring environments, and it minimizes retrospective biases.

Constructs and Measures. As research on effectuation transitions to the intermediate state, measures must be developed. Some studies have begun to establish measures of effectuation. Wiltbank et al. (2009) and Chandler, DeTienne, and Mumford (2007) offered survey instruments that capture some aspects of causation and effectuation. However, as is true with most measurement scales in the social sciences, these constructs were developed and validated as reflective rather than formative constructs (MacKenzie et al., 2005). In reflective models, the latent construct exists independent of the measures, and the measures are merely reflections of the underlying construct. Bollen and Lennox (1991) noted that the traditional reflective models used in most social science research may not make sense for all constructs. Whether a construct should be validated as a formative or reflective construct should depend on theoretical considerations—namely, do the

construct indicators attempt to reflect the underlying construct or do the indicators collectively form the construct (Diamantopoulos & Siguaw, 2006).

In the case of effectuation, the underlying subdimensions combine to form the effectuation construct and thus, formative models and evaluation would be more appropriate. In formative models, the measures jointly influence the composite latent construct, and meaning comes from the measures of the construct in the sense that the complete meaning of the composite construct is derived from its measures. Effectuation is a composite of several different cognitive processes and behaviors: (1) beginning with a set of given means; (2) decision making based on affordable loss; (3) emphasizing strategic alliances and precommitments; (4) exploiting environmental contingencies through flexibility and experimentation; and (5) seeking to control an unpredictable future. It might be argued therefore that effectuation as a construct does not exist independently of those measures and there is no reason to suppose that each of the five sub-components of effectuation should be highly correlated with each other. Hence, effectuation would be more accurately measured and validated using formative models (Coltman et al., 2008)—a detailed description of how to appropriately validate formative measures is beyond the bounds of this research. However, a body of research is emerging that describes appropriate procedures for validating formative constructs (e.g., Coltman et al.; Diamantopoulos & Siguaw, 2006; MacKenzie et al., 2005). Note that Chandler et al. (in press) used methodologies consistent with the formative nature of the effectuation construct. Using these methodologies, they found that effectuation can be better understood as a formative construct rather than as a reflective construct, and they provided a validated effectuation measure consisting of four sub-constructs—experimentation, affordable loss, flexibility, and precommitments. They concluded, however, that additional measures should be developed. These new measures could incorporate other elements of effectuation that are shown to be central to effectuation (e.g., beginning with a given set of means). Future researchers could use different sample types and data collection methods, and they could include effectuation outcome variables as a means of validating effectuation as a formative construct (cf. MacKenzie et al.). Therefore, we suggest that researchers should consider the formative nature of the construct, and use appropriate methods to validate their measures. In addition, we suggest two specific formative measurement models that might be used for effectuation.

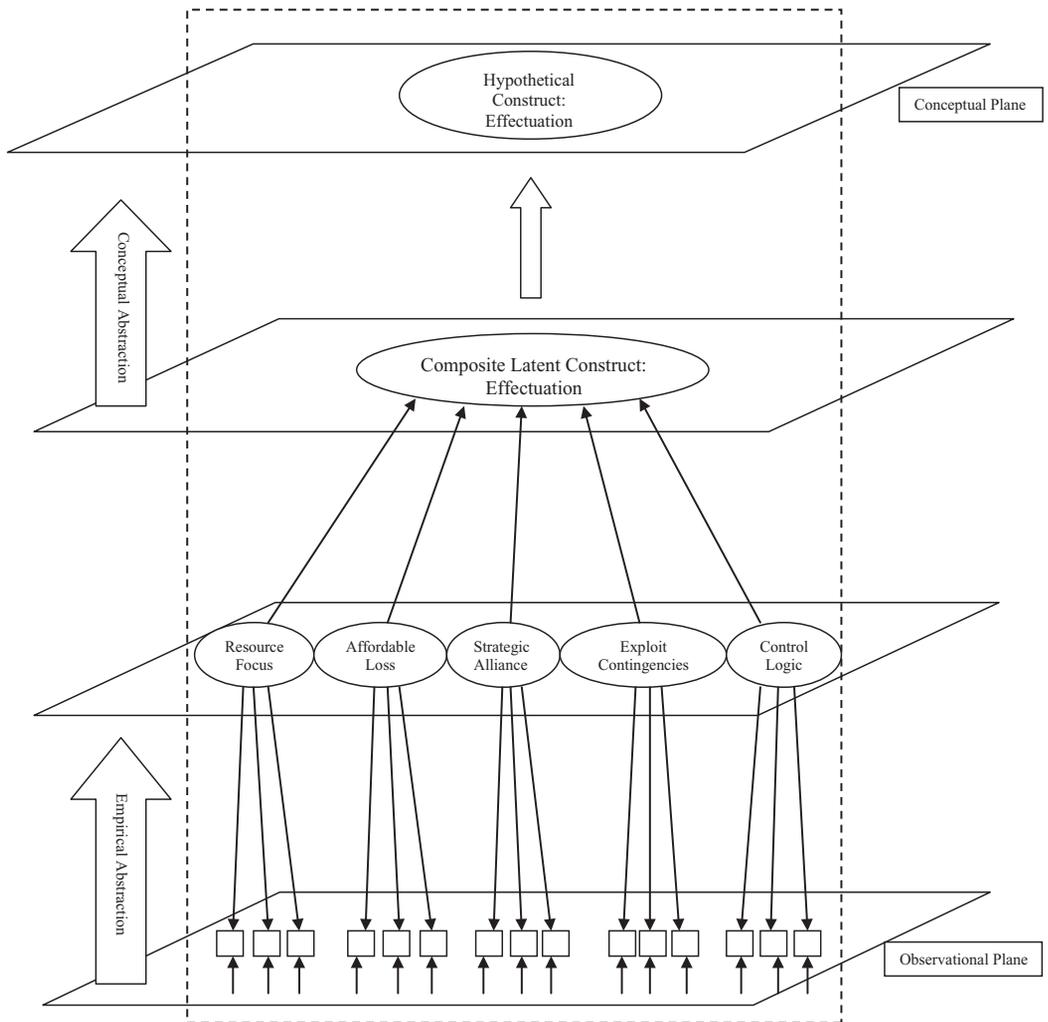
MacKenzie et al. (2005) suggested that when a composite construct is the focus of research, investigators may want to use a mixed indicator measurement model such as the one diagrammed in Figure 1. Thus, if effectuation is a central construct in a research model, the subdimensions of effectuation can be measured as reflective constructs using multiple indicators of each subdimension. For example, multiple items could be developed that reflect decision making based on affordable loss, focusing on existing means and each of the other subdimensions. Each of the individual subdimensions, however, then must be aggregated to form a composite latent construct. Hence, a mixed measurement model might be developed with the subdimensions measured and validated reflectively but with each subdimension or facet aggregated and validated formatively.

In contrast to the mixed indicator model, if effectuation is less central to a study or is part of a complex system of relationships, researchers may choose to use the measurement model diagrammed in Figure 2. In this model, single items measure each subdimension and are aggregated as a composite formative measure (cf. MacKenzie et al., 2005).

In addition to developing instruments that measure cognitive effectuation and causation processes, we suggest that future researchers develop instruments that measure effectuation- and causation-related behaviors. To do so, researchers should examine how entrepreneurs begin with a given goal and/or set of means, how they focus on affordable

Figure 1

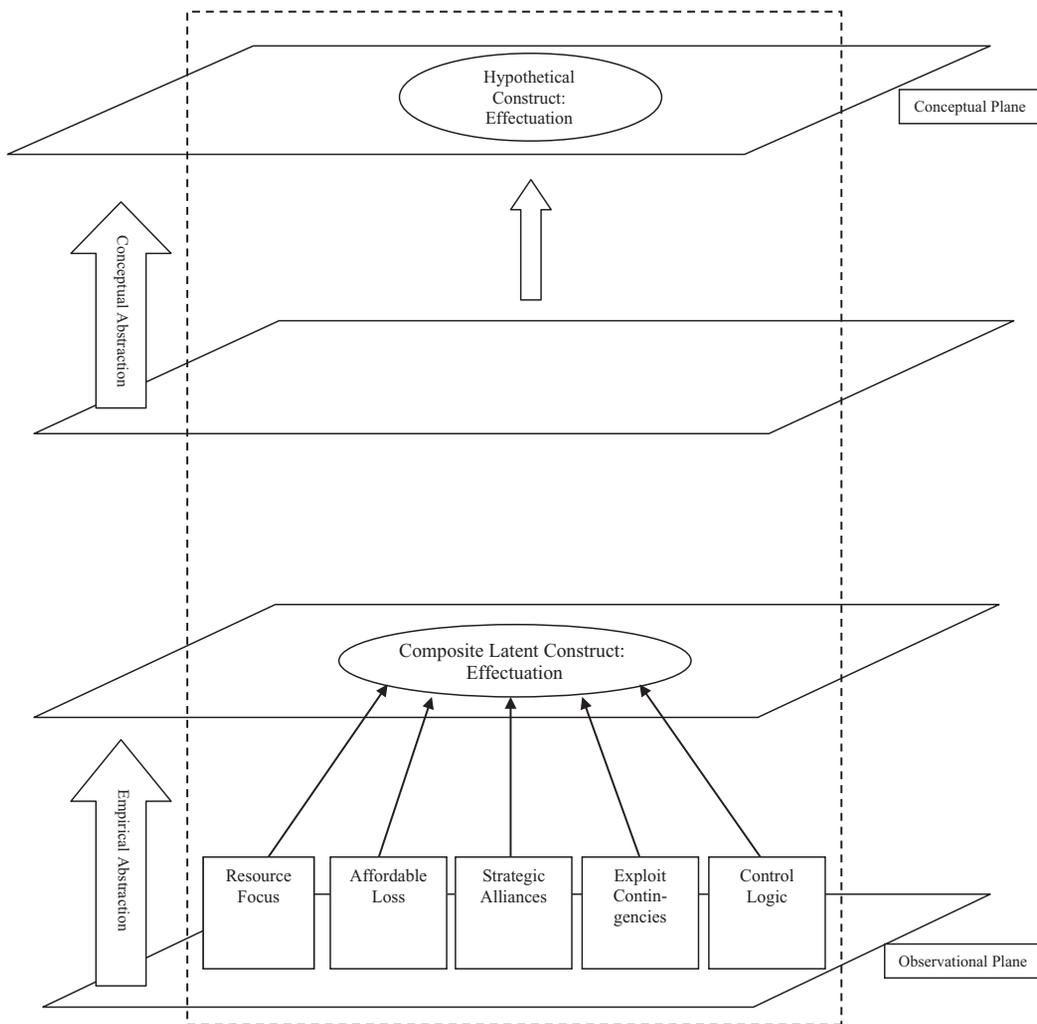
Mixed Indicator Measurement Model for Effectuation



loss and/or expected returns, how they emphasize strategic alliances and/or competitive analyses, how they exploit contingencies and/or preexisting knowledge, and how they try to control an unpredictable future and/or predict an uncertain one. For example, in terms of effectuation- and causation-related behaviors, researchers could develop items similar to the following Likert scale items used by Chandler et al. (in press) to measure experimentation—“We experimented with different products and/or business models” and “We tried a number of different approaches until we found a business model that worked.” In terms of cognitive processes, researchers could develop measures similar to the following Likert scale items used by Wiltbank et al. (2009)—“As you assemble information

Figure 2

Composite Indicator Measurement Model for the Effectuation Construct



on this business you would . . . imagine possible outcomes based on your prior experience . . . [and] imagine ways your venture will change aspects of the situation they are forecasting.”

Differentiating effectuation from other related constructs is an additional measurement issue. Dew, Read, et al. (2009) showed that in an exercise involving the evaluation of an entrepreneurial situation, 27 expert entrepreneurs used effectual logics more and used causal logics less than 37 MBA students. The researchers showed that the entrepreneurs also used analogical reasoning and holistic and conceptual thinking more than the

MBA students, and they valued predictive information (i.e., market research) less than the students. Because these latter cognitive processes categorize the entrepreneurs and non-entrepreneurs as well as the use of effectual and causal logics, we wonder if analogical reasoning, holistic and conceptual thinking, and the valuing of predictive information may be related to or conceptually indiscriminant from the use of effectual versus causal logics. For example, the degree to which an individual values predictive information seems to directly relate to the distinction that Sarasvathy (2001) drew between individuals seeking to control an unpredictable future or trying to predict an uncertain one. We therefore suggest that future researchers should carefully distinguish between effectuation and causation processes and other cognitive processes and develop instruments that measure these processes separately.

In developing instruments that measure effectuation processes, it may be tempting to view effectuation and causation as constructs on opposite ends of a continuum (similar to introversion and extraversion). We do not view effectuation and causation as opposing constructs. Rather, we view them as orthogonal (similar to satisfaction and dissatisfaction). Examining the sub-constructs of effectuation and causation also does not indicate that the sub-constructs are opposite ends of a continuum. The opposite of “beginning with a set of given means” is not “beginning with a given goal.” The opposite of “focusing on affordable loss” is not “focusing on expected returns.” The opposite of “emphasizing strategic alliances” is not “emphasizing competitive analysis.” The opposite of “leveraging contingencies” is not “exploiting preexisting knowledge” and the opposite of “seeking to control an unpredictable future” is not “trying to predict a risky future.” Therefore, we advise future researchers to develop effectuation measures that are not contrasted as polar opposites of causation measures, and we advise researchers who use these measures to also account for causation separately.

Goal of Data Analysis. According to Edmondson and McManus (2007), when research is in a nascent state of development, the goal of data analysis should be to identify patterns in the data. As a research program transitions to an intermediate state, analysis moves toward preliminary testing of new propositions and new or related constructs. In the section entitled “appropriate research questions,” we listed a number of research questions that could be asked. Therefore, the goal of data analysis at the intermediate state would be to provide preliminary evidence of relationships between effectuation and uncertainty, financing alternatives and practices, individual and organizational learning, employment growth and hiring practices, business planning, strategy development, and industry-related factors, along with other theoretically appropriate relationships.

In terms of developing meaningful studies that pursue evidence of relationships between effectuation and other constructs, we caution researchers to first consider the insight that may be gained from their study. Because effectuation is a large construct, similar to human development (cf. Coltman et al.’s [2008], example of the human development index), researchers should consider what insight might be gained from a study that finds that effectuation is or is not related to, for example, an individual’s level of optimism—e.g., a construct that has been related to several other constructs and to which the addition of effectuation may not significantly improve the amount of variance explained. As effectuation research moves into an intermediate state, we suggest that researchers develop studies in which effectuation, or effectuation’s sub-constructs, may be expected to explain a significant level of variance in another construct.

Data Analysis Methods. A study's data analysis methods should conform to its data analysis goals. Hence, when research is in a nascent state, thematic content analysis is conducted to provide evidence of constructs. As described by our literature review, several studies have used thematic content analysis. In the intermediate state, it is appropriate to transition from content analysis to exploratory statistical analysis and preliminary tests (Edmondson & McManus, 2007). In our review of effectuation articles, those we classified as intermediate studies used verbal protocol analysis, *t*-tests, analysis of variance (Dew, Read, et al., 2009), exploratory factor analysis (Chandler et al., in press), and ordinary least squares regression (Wiltbank et al., 2009). Such methods and techniques appear to be appropriate for this state of development.

As effectuation research moves into an intermediate state, it is also increasingly important to implement rigorous methods to separate real from spurious results (Chandler & Lyon, 2001). This includes the use of appropriate control variables to strengthen the claim that a study's independent variables are the cause of the observed effect in the dependent variable. A control variable is a variable that is included in an analysis to allow researchers to tap into the relationship between independent and dependent variables without interference. If relevant influences are not controlled, true effects may go unobserved and spurious effects may occur. If the introduction of appropriate control variables does not change the original relationship between the cause and effect variables, then claims of non-spuriousness are strengthened (Trochim, 2001).

For example, the existing nonexperimental empirical effectuation literature has not measured or controlled for environmental uncertainty. Instead, Wiltbank et al. (2009) used control variables that seem to capture individuals' general risk propensities. Although researchers have claimed that entrepreneurs generally possess higher risk propensities than non-entrepreneurs (Stewart & Roth, 2001) and therefore, an individual's risk propensity may be related to the degree to which an individual uses effectuation versus causation, we do not believe that an individual's risk propensity is an adequate proxy for situational uncertainty. Because the use of effectual and causal logics is a choice that an individual may make dependent on the amount of uncertainty that he or she perceives, we suggest that researchers who examine the effects of effectuation and causation should attempt to measure uncertainty and control for it. This leads to another related data analysis issue—the issue of endogeneity.

In research models, a variable is endogenous if it is a function of other variables in the model. For example, a change in environmental circumstances that changes the level of uncertainty is an exogenous change if the level of uncertainty is not correlated with the error term. Perceptions of uncertainty, however, may be endogenous and may lead to endogenous changes in causation and effectuation and outcomes. The application of effectuation behaviors may also inject uncertainty into the process, another endogenous change. If perceived uncertainty is endogenous and entrepreneurs self-select into effectual or causal modes of operation, then one should also provide instrumental measures of effectuation. For a reference on how to control for endogeneity in empirical models, see Hamilton and Nickerson (2003).

An additional issue related to endogeneity is the choice of independent and dependent variables studied in effectuation studies. With the exception of two studies (Read, Song, et al., 2009; Wiltbank et al., 2009), most empirical effectuation studies have examined effectuation as a dependent variable. Researchers have studied when, how, and why individuals use effectual reasoning. Conversely, future researchers could begin to examine the consequences of using effectual reasoning. For example, researchers could study whether students who are exposed to effectuation concepts in the classroom are more

likely to attempt to start new ventures than students who are not exposed to effectuation, and whether their venture success rates differ.

Theoretical Contribution. As effectuation research enters an intermediate state, appropriate theoretical contributions will center on the development and testing of suggestive models. Using a previously mentioned example, researchers could examine whether entrepreneurs pursuing opportunities through effectuation processes use alliances and precommitments and/or make decisions based on affordable loss. Thus, one might suggestively theorize that when employing effectuation, entrepreneurs would be more likely to outsource production and/or hire contingent employees rather than building a hierarchical organization with full-time employees. The intermediate state theoretical contribution would be the clear definition of “alliances and precommitments,” and empirical evidence that these relationships hold in the proposed direction.

Conclusion

Effectuation has captured the imagination of researchers because it identifies and questions basic assumptions of how individuals think and behave when starting businesses, and it offers an alternative explanation to causation that many believe has face validity. Effectuation seems to be particularly appropriate to entrepreneurship because it may better describe how, “in the absence of current markets for future goods and services, these goods and services manage to come into existence” (Venkataraman, 1997, p. 120). That is, it appears to better describe the actual thoughts and behaviors that some entrepreneurs experience when starting a venture. As such, we believe that the effectuation-related model of entrepreneurship is an important theoretical model that needs to be tested by researchers.

We have followed the model proposed by Edmondson and McManus (2007) to show that effectuation research is transitioning to an intermediate state. Using this model, we make a significant contribution by suggesting appropriate research questions, describing the types of data that should be collected, identifying appropriate methods for collecting data, providing clear guidelines for the development of relevant constructs and measures, presenting data analysis methods that fit the state of development of the research, offering suggestions for appropriate data analysis methods, and discussing theoretical contributions that are realistic in this state of development. Note, however, that our recommendations and Edmondson and McManus’ framework focus on evaluating a research stream from a positivist perspective wherein there is a focus on falsifiability. From this perspective, the progress of a research stream is viewed as occurring through hypothesis testing. Thus, our bias for hypothesis testing as a means of advancing a field of study should be acknowledged when considering our recommendations for future effectuation research studies. Nevertheless, Edmondson and McManus’s framework is appropriate for developing a field of study from a positivist perspective, and we have used the framework to focus on challenges currently relevant to effectuation research.

Many of the recommendations we make would be appropriate for other areas of research that are transitioning from a nascent to an intermediate state. However, we have specifically tailored our recommendations to apply to effectuation research. We believe that if researchers consider and follow these recommendations they will make important contributions to entrepreneurship literature and help determine the value of effectuation to the field.

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