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### **Effectuation: a decision logic for innovation in dynamic environments**

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#### **Abstract**

Innovation management approaches are evolving to enable organisations to respond to an increasingly changeable environment. Contemporary methods such as agile project management, design thinking and lean startup approaches offer ‘new ways of working’ that promote iteration over up-front planning to support innovation in dynamic times. A growing stream of research suggests that effectuation, a decision logic first observed in entrepreneurship, may provide a ‘new way of thinking’ to support these contemporary approaches for innovation management. Effectuation is also proposed to offer competitive advantages for organisational innovation by acting as a dynamic capability, improving organisational ambidexterity, and facilitating strategy emergence. Organisations may achieve benefits by developing managers’ awareness of effectuation and their abilities to apply it effectively; however, further research is needed to better understand the ways the relatively recent concept of effectuation can assist organisations manage contemporary innovation.

#### **Keywords**

Effectuation, Innovation, Dynamic capability, Emergent strategy, Project management, Decision making, Decision logic, Project portfolio management.

## Introduction

Managing innovation in the face of relentless change is further complicated by the diversity of types of change and the increasing pace of change. Traditional innovation management approaches are not designed for such highly dynamic environments and can inhibit innovation in such contexts. A succession of new approaches has been introduced to support innovation that is faster, more responsive, and adaptable. Agile project management, design thinking and lean startup methods are some of these contemporary approaches for managing innovation. While new ways of thinking are important for supporting these increasingly agile and responsive ways of working (Cicmil, Williams, Thomas, & Hodgson, 2006; Conforto, Salum, Amaral, Da Silva, & De Almeida, 2014), research is only just starting to identify types of thinking that will best support innovation (Sauer & Reich, 2009; Svejvig & Andersen, 2015). The ‘rational’ or ‘causative’ mindset that underpins traditional innovation approaches may not be relevant during times of rapid change.

This chapter overviews the latest research on a relatively new concept, ‘effectuation’, highlighting its potential as an alternate mindset to better support innovation management in dynamic and uncertain times. Effectuation is a decision logic identified by Saras Sarasvathy in studies of entrepreneurship (2001, 2008). Effectuation is positioned as a contrasting type of decision logic from ‘causation’, the rational type of thinking that underpins many innovation processes and decision frameworks. A primary differentiating principle of effectuation is the focus on using available resources to generate innovation ideas, rather than developing ideas and setting goals and only later considering resourcing to meet those goals. Other effectuation principles promote considering the level of loss that is ‘affordable’ when pursuing risky projects, emphasising partnerships and networks over competitive analyses, and encouraging the proactive identification of contingency options to enable adaptability to changing circumstances (Sarasvathy, 2001). In contrast, causation logic advocates thorough up-front planning to avoid failure and meet pre-defined goals.

A growing stream of literature on effectuation highlights its relevance in a range of disciplines. While effectuation has been studied most often in entrepreneurship and could be seen to be a quality of entrepreneurs, increasing evidence indicates that effectual logic plays a role in innovation management environments, including project management and new product and service development (see, for example, Berends, Jelinek, Reymen, & Stultiëns, 2014; Brettel, Mauer, Engelen, & Küpper, 2012; Nguyen, Killen, Kock, & Gemuenden, 2018; Read, Song, & Smit, 2009; Wiltbank, Read, Dew, & Sarasvathy, 2009; Wiltbank & Sarasvathy, 2010).

Managing innovation involves a degree of risk and uncertainty; the ability to create value from something new is never assured. However, there are differing degrees and types of innovation, and each requires innovation management approaches tailored to the context. Many organisational innovation efforts are devoted to relatively low-risk incremental innovations that employ tried-and-tested methods and offer a good chance of modest success. These incremental innovations are often successfully managed through ‘phase-gate’ processes that guide an innovation project through multiple phases from idea to launch and ensure that criteria are satisfied along the way.

However, to establish innovation leadership and obtain long-term competitive advantages, organisations need to develop innovations that involve high levels of change. These radical or

breakthrough innovations entail higher levels of risk and uncertainty than incremental innovation. The traditional approaches that provide benefits for incremental innovation in fairly stable innovation environments can actually hinder the development of radical innovations in more dynamic environments by slowing the innovation process and applying outdated criteria that block relevant and promising new ideas. The resulting ‘incrementalism’ prevents organisations from making the larger innovative leaps that are required for sustainable success.

Contemporary innovation approaches aim to address the downsides from traditional, causation-based innovation management methods; however, these approaches require organisations to think differently. Promoting awareness of alternative ways of thinking, such as effectuation, may assist organisations meet the challenge of innovation in dynamic and uncertain times; in fact, studies are starting to emerge that demonstrate how effectuation has played a role in organisational responses to the COVID-19 pandemic.

This chapter outlines the impact of Sarasvathy’s (2001) identification of ‘effectuation’ as an alternate decision logic on contemporary innovation management. An overview of the origins and definitions of effectuation is followed by a summary of the research relating effectuation to innovation management. Emphasis is placed on the findings about the role of effectuation in several prominent innovation management themes, including strategy and dynamic capabilities, ambidexterity, and agile methodologies. Implications for practice include promoting awareness of effectuation as an alternate decision logic, identifying contexts where effectuation logic may support innovation, and providing guidance on applying effectual thinking in contemporary innovation practices. The chapter concludes with recommendations for future research to strengthen the understanding and provide further insights on whether and how effectuation can enhance innovation outcomes.

### *What is effectuation?*

The origins of effectuation lie in the field of entrepreneurship. Effectuation is best described as a ‘decision logic’ – defined by a set of principles that were first observed in entrepreneurial decision making (Sarasvathy, 2001). Sarasvathy refers to effectuation as a “comprehensive alternate frame” (2008, p. 23) that is “the inverse of causation” (2008, p. 16). Causation is the decision logic underpinned by rational assumptions about cause and effect. Causation is characterised by goal-setting and up-front planning before identifying and deploying resources; many traditional innovation approaches designed to reduce risk and gain predictability are built upon the logic of causation. In contrast, approaches using effectuation logic “take a set of means as given and focus on selecting between possible effects that can be created with that set of means” (Sarasvathy, 2001, p. 245). An approach guided by effectuation draws inspiration from the resources currently available and accepts that risk is a part of creating something new. Instead of trying to eliminate risk, effectuation asks what level of risk is ‘affordable’ – recognising the potential loss up-front when deciding to pursue new endeavours.

Metaphors assist with understanding the difference between causation and effectuation. Sarasvathy uses a simple example of the process of cooking. Starting with a menu and recipes and then shopping for ingredients and obtaining any necessary equipment or skills is a causation-based approach. In contrast, when applying effectuation logic, the menu and recipes evolve from looking in the kitchen and seeing what ingredients are available and considering existing skills and equipment (Sarasvathy, 2001). This example demonstrates one of the five

principles of effectuation, the ‘available means’ principle, also referred to as ‘bird-in-hand’ (drawing up on the proverb *a bird in the hand is worth two in the bush* that emphasises the value of currently held resources).

Effectuation and causation have different benefits. While causation provides structured approaches to achieve identified goals, effectuation promotes creative ways of thinking and working that are more closely influenced by current resources and constraints. Multiple studies document evidence of a mixed use of the two logics (see, for example, Berends et al., 2014; Lingelbach, Sriram, Mersha, & Saffu, 2015; Nguyen et al., 2018; Reymen et al., 2015). Effectuation approaches are regarded as more effective than causation when the future is unpredictable (Sarasvathy, 2001) or for exploratory phases of the innovation process (Reymen et al., 2015). For these reasons, effectuation is attracting growing interest in disciplines such as innovation management that deal with a high level of uncertainty and exploration.

Sarasvathy’s seminal paper on effectuation (2001) documented findings from a study that compared the ways that decisions were made by entrepreneurs and bankers. Sarasvathy observed entrepreneurs using rational, causation-based logic, along with an alternate way of viewing the world that she labelled ‘effectuation’. Effectuation involves decision-making "starting with means and creating new effects" (Sarasvathy, 2008, p. 74).

Debates and proposed refinements abound in the literature, but the original principles presented by Sarasvathy still anchor the field. Characteristics of the decision maker – “who are they, what do they know, whom do they know” (Sarasvathy, 2001, p. 249) – and the available resources form the starting point for the effectuation principles Sarasvathy proposed in 2001. Effectuation contrasts with causation by promoting “(1) affordable loss, rather than expected returns; (2) strategic alliances, rather than competitive analyses; (3) exploitation of contingencies, rather than pre-existing knowledge; and (4) the control of an unpredictable future, rather than prediction of an uncertain one” (Sarasvathy, 2001, p. 259). Table 1 compiles the principles introduced by Sarasvathy (2001, 2008) and compares these with the corresponding causation approaches.

**Table 1: Effectuation principles compared with causation approaches  
(derived from Sarasvathy, 2001, 2008)**

Effectuation	Causation
<p><b>Available means principle</b> (also referred to as the bird-in-hand principle)</p> <ul style="list-style-type: none"> <li>- using the resources that are currently available as a starting point. Including the answers to: Who am I? What do I know? Whom do I know?</li> </ul>	<p>Goal-driven</p> <ul style="list-style-type: none"> <li>- setting goals and targets, and then identifying and securing the resources needed</li> </ul>
<p><b>Affordable loss principle</b></p> <ul style="list-style-type: none"> <li>- accepting a level of risk, and determining up front the level of ‘loss’ that is possible, proceeding if this level is acceptable, “determination of how much one is willing to lose and leveraging limited means in creative ways” (Sarasvathy, 2008, p. 81)</li> </ul>	<p>Expected returns</p> <ul style="list-style-type: none"> <li>- focusing on commercial analysis and the expected returns</li> <li>- up-front planning and analysis focused on achieving returns on investment</li> </ul>
<p><b>Adaptability principle</b> (also called the lemonade principle, or referred to as exploitation of contingencies)</p> <ul style="list-style-type: none"> <li>- responding to change, flexibility</li> <li>- viewing unexpected events as opportunities (when life gives you lemons, make lemonade)</li> </ul>	<p>Planning and control</p> <ul style="list-style-type: none"> <li>- attempting to predict the future, using up-front planning and monitoring that aims to control the situation and to avoid being surprised by unexpected change</li> </ul>
<p><b>Partnership principle</b> (also called the crazy quilt principle)</p> <ul style="list-style-type: none"> <li>- using networks and partnerships that commit to the endeavour and influence its direction</li> <li>- involving strategic alliances, pre-commitments to partnerships</li> </ul>	<p>Competitive analysis</p> <ul style="list-style-type: none"> <li>- undertaking detailed competitive analysis using casual models such as Porter’s principles of competition and strategic advantage (Porter, 1980)</li> </ul>
<p><b>Control of an unpredictable future</b> (also called the pilot-in-the-plane principle)</p> <ul style="list-style-type: none"> <li>- based on non-predictive control related to the above four principles, acknowledging the role of human agency in responding to opportunity, and developing networks and teams.</li> </ul>	<p>Prediction of an uncertain future</p> <ul style="list-style-type: none"> <li>- planning based on projections of future conditions</li> <li>- focusing on technological developments and other trends as drivers of opportunity</li> </ul>

**Twenty years of effectuation research: Extending beyond entrepreneurship**

It has been 20 years since the effectuation concept was first introduced in the field of entrepreneurship. Interest and further research on the theme grew slowly at first, with escalating interest in recent years. Rapid growth in fields beyond entrepreneurship position effectuation as a “general theory of decision-making in uncertain situations” (Sarasvathy, 2008, p. 227). However, the word ‘theory’ with respect to effectuation has been strongly contested, most prominently by Arend, Saroogi and Burkemper (2015), who argue that the elements of Experience, Explain, and Establish required for theory building have not been satisfied. In

response, some authors suggest that effectuation should be evaluated as a process theory using different criteria (Gupta, Chiles, & McMullen, 2016) and others contribute guidance for effectuation research to progress and support the evolution of the effectuation concept as a potential theory (Read, Sarasvathy, Dew, & Wiltbank, 2016; Reuber, Fischer, & Coviello, 2016).

Recent additions to the debate confirm that there is still no consensus on whether effectuation can be considered a theory and suggest that further studies are needed that focus on the theoretical aspects of effectuation (Dias, Lizuka, & Boas, 2019). The increasing number of publications in recent years is helping to build the understanding of effectuation and its theoretical application, providing evidence to support claims that effectuation is transitioning to the mature stage of theoretical development (Matalamäki, 2017). However, claims that effectuation represents a theory of entrepreneurship have been contested, as effectuation represents only one aspect of the entrepreneurship process (Kitching & Rouse, 2020).

The scholars in this debate agree that effectuation is still a relatively new concept, and that further studies are needed to strengthen the understanding and efficacy of effectuation as a valuable lens for research. Effectuation has been given many different labels – for example it has been called a theory, a framework, a set of behaviours and a type of logic. To avoid the controversy about whether effectuation can be considered a theory, this chapter uses the common description of effectuation as a decision-making logic.

As effectuation matures as a lens for research, the focus of the research is moving well beyond entrepreneurship. Innovation and new product development now represent the strongest areas for effectuation research (Matalamäki, 2017). Effectuation research has also moved from focusing on the individual entrepreneur and small startups to testing its applicability in larger organisational settings; most of the research related to effectuation is now situated in established organisations.

One sign of the maturation of a field of research is the emergence of review papers summarising the developments in the field. Read et al. (2009) conducted an early review of effectuation, noting the growing interest in the discipline, and encouraging further research in this area. Perry, Chandler and Markova's (2012) review observed a steady increase in publications, with 29 articles where effectuation was the primary focus. Most of the papers were conceptual at that stage, with only 13 empirical studies – and the context for research was still largely within entrepreneurship. Recent reviews that analysed 64 (Grégoire & Cherchem, 2020) and 81 empirical studies (McKelvie, Chandler, DeTienne, & Johansson, 2020) reveal that effectuation research is influencing fields outside entrepreneurship. This finding is emphasised in the special issue of the journal *Small Business Economics* on “Effectual exchange: from entrepreneurship to the disciplines and beyond” which identifies a research agenda to continue to “move effectuation from entrepreneurship to the disciplines and beyond into new futures” (Alsos, Clausen, Mauer, Read, & Sarasvathy, 2020, p. 605).

Effectuation has influenced research in a wide variety of disciplines to date, many of which align with future-oriented and contemporary innovation management themes. A growing stream of publications reveal how effectuation perspectives contribute to research on aspects such as foresight (Djuricic & Bootz, 2019), leadership (Miles & Morrison, 2020), disaster response (Nelson & Lima, 2020), the evolution of art (Olive-Tomas & Harmeling, 2020),

strategy (Guo, 2019; Hauser, Eggers, & Guldenberg, 2020; Zahra, Sapienza, & Davidsson, 2006), business model innovation (Futterer, Schmidt, & Heidenreich, 2018), social innovation (Corner & Ho, 2010), sustainability (Keskin, Wever, & Brezet, 2020; Sarasvathy & Ramesh, 2019), operations (Golicic & Sebastiao, 2011), design thinking (Abrell, 2016; Mansoori & Lackeus, 2020), lean startup methods (Ghezzi, 2019; Mansoori & Lackeus, 2020; Roach, Ryman, & Makani, 2016), and project management and agile project management approaches (Hansen & Svejvig, 2018; Xu & Koivumäki, 2019).

In addition to embracing multiple disciplines, research on effectuation now spans the globe – Africa (see for example Lingelbach et al., 2015), the Middle East (Jisr & Maamari, 2017), Russia (Laine & Galkina, 2017), Brazil (Nelson & Lima, 2020), New Zealand (Corner & Ho, 2010), Australia (Miles & Morrison, 2020), Spain (Ortega, García, & Santos, 2017), the Netherlands (Keskin et al., 2020; Reymen et al., 2015) and other European nations, as well as the UK, USA and Canada.

Most recently, publications have identified effectuation in practice in response to the COVID-19 pandemic. Especially in times of great change and turmoil, effectual logic is proposed to be more appropriate than using causation logic since detailed plans quickly become obsolete (Giones et al., 2020). Effectuation logic has underpinned the ability to respond to previous crises, such as the 2012 Earthquakes in Italy (Kuckertz et al., 2020). Early research on the COVID-19 pandemic demonstrates effectuation in practice for business model innovation (Harms, Alfert, Cheng, & Kraus, 2021), in supporting entrepreneurship by educators as they respond to the rapid change (Langston, 2020), and in the use of ‘frugal’ innovation approaches (Corsini, Dammico, & Moultrie, 2021). Effectual thinking and the development of dynamic capabilities supported small business entrepreneurs cope with the COVID-19 (Rashid & Ratten, 2021). The ability to respond quickly was highlighted in a study on the ways that businesses adjusted to the turmoil of COVID-19 pandemic; while incumbents found it more difficult than startups to respond quickly, the study suggests that adopting effectuation logic will assist incumbents to improve response time (Ebersberger & Kuckertz, 2021).

The increasing volume and quality of research suggests that effectuation is a “healthy and growing theoretical perspective that represents a major shift” in the ways that innovation and entrepreneurship are understood (McKelvie et al., 2020, p. 659). Suggestions for future development of the field include understanding and clarifying the scope and assumptions underpinning each research study – and ensuring that methods and measurements suit the context.

### *Effectuation research - questions and methods*

The methods used to conduct research on effectuation are overviewed here to provide context for the findings on effectuation and implications for innovation management that are presented in the following sections. The growing number of empirical studies on effectuation draw upon a wide range of research methodologies, including quantitative, qualitative and mixed method studies. Methods include case studies, surveys, interviews, ‘think aloud’ protocols, process analyses, simulations and experiments. Each study has unique aims, often exploring these types of questions:

- Is effectuation used – and if so, is effectuation used more often in certain types of environments or conditions at conditions (antecedents and contexts for effectuation)
- What are the outcomes from the use of effectuation?

Qualitative studies are most useful for exploring new areas and gaining insights into questions about ‘how’ and ‘why’. The original work by Sarasvathy (2001) used a ‘think aloud’ protocol to provide insights into the decision-making thought processes and logic used as the participants considered scenarios about business opportunities. Other methods include case studies, document analysis, content analysis and alternate templates. The alternate template approach (Fisher, 2012; Ortega et al., 2017) applies multiple theoretical perspectives to interpret what is known about a situation. In such cases, “the different interpretations are less like true ‘tests’ of theory and more like alternate complementary readings that focus on different variables and levels of analysis and reveal different types of dynamics” (Langley, 1999, p. 699).

Quantitative studies on effectuation often employ surveys to capture perceptions and determine statistical relationships between concepts, such as the relationship between the use of effectuation principles and innovation outcomes. Effectuation is a relatively new concept, and the modes of questioning on surveys are still maturing. Survey items are generally statements that are rated on a five-point Likert scale ranging from “Strongly agree” to “Strongly disagree”. Alternatively, respondents may be asked to provide a rating along a scale anchored by two endpoints – for example between ‘desired goals have been the starting point for this project’ (to represent causation) and ‘available resources and capabilities have been the starting point for this project’ (to represent the ‘available means’ principle of effectuation). Using these approaches, survey items measure the degree to which effectuation or causation behaviours were used and other input on innovation processes and outcomes. Each aspect is measured by multiple related items (usually 3–4 items for each factor). Table 2 provides examples of selected survey items.

**Table 2: Example survey items on the use of effectuation logic. Items measured in a 5-point Likert scale (selected from Table 2 in Chandler, DeTienne, McKelvie, & Mumford, 2011, p. 382)**

<b>Items on use of effectuation-based logic:</b>
We evaluated the set of resources and means we had at our disposal and thought about different options (related to ‘available means’)
We were careful not to commit more resources than we could afford to lose (related to ‘affordable loss’)
We allowed the business to evolve as opportunities emerged (related to ‘flexibility’/‘adaptability’)
<b>Items on the use of causation-based logic:</b>
We designed and planned business strategies
We organized and implemented control processes to make sure we met objectives
We researched and selected target markets and did meaningful competitive analysis

Research on effectuation is in the early stages, and a wide variety of methods are being used to learn more about whether and how effectuation is used in practice. Other methods for research on effectuation include experimentation and simulations (Welter & Kim, 2018) and process trajectory analysis (Berends et al., 2014). The wide variety of research methods support broad exploration of the concept; however, each method requires further use and refinement to improve the rigor and reliability of effectuation research. There are ongoing debates “on the more detailed aspects of the use of effectuation and how we, as scholars, can, and should, examine it empirically”. (McKelvie et al., 2020, p. 690).

### **What do we know about effectuation in innovation practice?**

This chapter highlights the effectuation research that is related to innovation management (beyond entrepreneurship). Studies of effectuation in the field of entrepreneurship have consistently shown that effectuation provides entrepreneurs with a new lens to broaden opportunity identification. Effectuation principles are found to reflect entrepreneurial thinking on risk (or affordable loss) and provide new insights into the processes of entrepreneurship (Grégoire & Cherchem, 2020; McKelvie et al., 2020). Entrepreneurship studies have also explored the new venture creation processes, including setting up business models and business model innovation (Futterer et al., 2018; Xu & Koivumäki, 2019). Studies in entrepreneurship have developed scales for measuring the aspects of effectuation and causation (Chandler et al., 2011; Roach et al., 2016), and have repeatedly demonstrated that effectuation is used alongside causation – in different proportions depending on context (Hauser et al., 2020).

Innovation management is a wide field and, although it is quite distinct from entrepreneurship, the two fields are strongly associated with one another. Using the broad definition of innovation as ‘creating value from something new’, entrepreneurship with its focus on the creation of new value-producing ventures represents a specific aspect of innovation. The escalating interest in effectuation in the field of innovation management emphasises its role in processes for developing new products and services from the initial idea through to launch. Effectuation concepts influence research on approaches to new product and service development, including design thinking, agile project management and concepts such as the ‘lean startup’ that bridge innovation management and entrepreneurship. Effectuation is also aligned with the movement to ‘rethink’ the project management discipline, moving away from the ‘hard’ rational or positivist perspectives to embrace subjective ‘soft’ perspectives (Svejvig & Andersen, 2015). As part of this move, effectuation is of interest in project management (Blauth, Mauer, & Brettel, 2014; Brettel et al., 2012; Huff, 2016; Midler & Silberzahn, 2008) and the strategic decision processes that constitute project portfolio management (Nguyen et al., 2018).

#### *The role of effectuation principles in innovation management*

To determine whether and how effectuation is used, research studies generally look for behaviours across some or all of the effectuation principles, and some also measure causation behaviours. This section briefly overviews findings on the use of each principle and the impact.

**Available means:** Although some studies have identified distinct ‘available means’ behaviours (Brettel et al., 2012), measuring such behaviours has been difficult in some settings (Nguyen et al., 2018). About half of the survey-based studies did not measure or did not find evidence of distinct behaviours related to available means (see, for example, Chandler et al., 2011; Guo, 2019). However, two studies focused strongly on available means, producing findings that highlight the importance of tacit knowledge (what I know) and its positive influence on innovative outcomes (Jisr & Maamari, 2017), and the resulting strategic advantages (Svensrud & Åsvoll, 2012).

**Affordable loss:** Research has consistently confirmed the existence of ‘affordable loss’ as a distinct aspect of an effectuation mindset (Brettel et al., 2012; Chandler et al., 2011; Guo, 2019). Affordable loss behaviours had a positive impact on projects with high levels of innovativeness, while causation behaviours focusing on expected returns were more effective for projects with low levels of innovativeness (Brettel et al., 2012). The affordable loss concept has been linked to the ‘innovation funnel’ concept, where multiple ideas are initially considered, with the intention of culling most ideas at early stages once the best ideas can be determined (Svensrud & Åsvoll, 2012). The ‘affordable loss’ can be considered the investment in ideas that will be culled to make way for the selected idea(s).

**Adaptability - exploiting contingencies through flexibility and experimentation:** Behaviours related to these themes are strongly represented in the research; however, the emphasis differs among studies. Some studies have focused on flexibility and experimentation (Cai, Guo, Fei, & Liu, 2017; Chandler et al., 2011; Guo, 2019), while others have looked at a contingency orientation (Szambelan, Jiang, & Mauer, 2020) or iteration (Berends et al., 2014; Nguyen et al., 2018). Adaptability has been proposed to enhance an organisation’s exploration capabilities (Svensrud & Åsvoll, 2012), and to reduce perceptions of market-based innovation barriers (Szambelan et al., 2020).

**Partnerships:** Effectuation research has extensively explored the partnerships theme. Some studies have focused on the use of pre-commitments from customers, and the degree to which partners commit resources to the shared endeavour. Such pre-commitments were associated with improved performance in new ventures (Cai et al., 2017; Guo, 2019), and were shown to solidify the supply chain (Golicic & Sebastiao, 2011). Partnerships that become strategic alliances can become important dynamic capabilities, providing advantages through additional opportunities to adjust the resource base in response to change in the environment (Svensrud & Åsvoll, 2012).

**Control an unpredictable future:** Most of the effectuation studies consider this principle as an underlying condition or perspective, such as the entrepreneurial control orientation mindset (Szambelan et al., 2020) that is reflected in the other principles. This mindset underpins the ability to create opportunities with respect to uncertainties in the future (Svensrud & Åsvoll, 2012). Acknowledging the unexpected in highly innovative environments is associated with increased innovation output and efficiency (Brettel et al., 2012), and (along with available means and the use of partnerships), supports increased levels of creativity in new product development under high uncertainty (Blauth et al., 2014).

### *Primary themes and findings on effectuation and innovation*

Effectuation research aligns with some of the major innovation management themes. This section overviews findings related to strategy and context.

## Strategy, dynamic capabilities, and emergence

Strategic concepts about competition, differentiation, organisational capabilities, and the development of competitive advantage underpin much of the innovation management research. From a strategic perspective, questions about what underpins organisational success generally take an external or internal perspective (Barney, 1991). The external perspective focuses on how organisations compete by differentiating their offerings and analyse the environment in order to succeed in a competitive environment (Porter, 1980). In contrast, the internal perspective takes a ‘resource-based view’ and focuses on the resources and capabilities within the organisation, and how those resources enable superior performance (Barney, 2001). Effectuation research from a strategic perspective is aligned with the internal ‘resource-based view’ and the associated ‘dynamic capabilities’ perspective. Dynamic capabilities are specific organisational capabilities that enable organisations to effectively respond to changes in the environment (Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997). Dynamic capabilities are not valuable by themselves – the benefits are achieved through the ability afforded by the dynamic capability to update, extend or otherwise modify other resources and capabilities to meet changing requirements.

The dynamic capability concept is an emerging theme in contemporary innovation management. Effectuation has been proposed to act as a dynamic capability in large organisations, prompting a call for further research at the strategy level in that context (Svensrud & Åsvoll, 2012). Effectuation is also proposed to support the higher use of experimentation in growing organisations as resource constraints ease, and in this way to lead to competitive advantage through dynamic capability (Zahra et al., 2006). Tacit knowledge is linked to the effectuation principle of available means (what I know), and proposed to lead to dynamic capabilities, with gut feeling proposed to be a valuable type of tacit knowledge (Svensrud & Åsvoll, 2012). The role of effectuation in venture creation is also thought to contribute advantages as a dynamic capability (Corner & Wu, 2012); however, very little research has explored these concepts. One study found that the degree of innovativeness in a project was associated with increased use of effectuation in strategic PPM decision making, and suggested that effectuation enhances the ability of project portfolio management to act as a dynamic capability (Nguyen et al., 2018).

The strong level of interest in dynamic capabilities reflects the increasing levels of uncertainty and change in innovation management environments, and the importance of strategy. However, further research is required to better understand whether and how effectuation can act as a dynamic capability or enhance other dynamic capabilities.

Effectuation has also been linked to emergent strategy. Strategic management concepts have evolved to recognise that strategy is not a one-way (top-down) process, and that emergent strategies have an important role to play in informing future strategic directions (Mintzberg & Waters, 1985). Deliberate strategy is planned – and implemented as planned. In contrast, emergent strategy is not initially planned, but instead represents strategic actions that ‘emerge’ in the course of doing business. These emergent strategies are increasingly recognised as important indicators of changes in circumstance, opportunity and response. The counterintuitive concept of ‘planned emergence’ suggests that organisations can improve their ability to recognise and even to promote and build on emergent strategies, and that effectuation

may have a role to play (Kopmann, Kock, Killen, & Gemuenden, 2017). Chandler et al. (2011) align the concept of causation logic with deliberate strategy implementation – such as through business planning processes, and effectuation logic with emergent strategy processes – for example, where experiments are used to identify alternatives to be considered in the context of potential affordable loss.

### Ambidexterity and effectuation

Effectuation contributes to organisational ambidexterity, the ability to successfully pursue both exploitative innovation and explorative innovation (O'Reilly & Tushman, 2004). Exploitative innovation uses existing resources and methods to create incremental innovation that involves low levels of change and risk. Explorative innovation is a higher risk endeavour that offers the potential for high reward through the development of radical or breakthrough innovations. Effectuation, as a decision logic for uncertain contexts, is associated with explorative innovation, while causation is aligned primarily with exploitative innovation. The mindful and strategic combination of the two decision logics (Agogué, Lundqvist, & Middleton, 2015) builds understanding, and the repeatedly observed combination of effectuation and causation is considered a form of organisational ambidexterity (Brettel et al., 2012; Midler & Silberzahn, 2008; Yu, Tao, Tao, Xia, & Li, 2018). Such ambidextrous use of both causation and effectuation provides advantages, as deficiencies in one approach are filled by strengths in the other approach (Yu et al., 2018). The complementary combination of clear goals with opportunities to improvise and explore supports strategic decisions for both the short and long term, providing a balanced information base that avoids extremes (Villani, Linder, & Grimaldi, 2018).

Another perspective on effectuation, causation and ambidexterity builds on the regularly reported shift in the emphasis on effectuation to causation over time (Evers & Andersson, 2020). Sequential ambidexterity is a recognised form of ambidexterity where, instead of simultaneous exploration and exploration, an organisation does both in succession (O'Reilly & Tushman, 2013). This temporal separation is observed when effectuation is used to provide advantages in early explorative stages of innovation, while causation is considered more appropriate for the later development and commercialisation stages (exploitation) (Evers & Andersson, 2020).

### Contextual influences on effectuation use

Research findings repeatedly emphasise that the innovation management approach should be tailored to suit the context. Studies of effectuation reinforce the role of context in guiding whether and how effectuation is used alongside causation, and how the balance changes according to the context and over time.

Managing under uncertainty is at the core of effectuation logic. While uncertainty is inherent in innovative endeavours, the level of uncertainty is heightened for radical or breakthrough innovation. In contrast, incremental innovation often follows 'tried and tested' methods and entails a low level of uncertainty. Therefore, effectuation is seen as especially important for the sought-after radical innovations or when uncertainty is high (Fisher, 2012; Hauser et al., 2020; Reymen et al., 2015). Growth speed is also associated with the choice and balance of decision logics. Effectuation is found to be more appropriate in high-growth contexts, whereas lower

growth is associated with causation (Futterer et al., 2018). In a simulation-based study, effectuation was shown to perform better under risky and uncertain contexts (Welter & Kim, 2018). While some researchers suggest that effectuation-based approaches are more effective for smaller organisations (Berends et al., 2014), others propose that the decision context is more important than the size of the organisation (Hauser et al., 2020).

The relationship between the degree of innovation and effectuation goes both ways. Highly innovative projects or environments are more likely to use effectuation-based decision processes and, when effectuation is used, the innovative outcomes are enhanced (Ortega et al., 2017). One study found that exploratory learning was the link between effectuation use and improved performance; when effectuation was used, exploratory learning was enhanced, which in turn led to better performance of new ventures (Cai et al., 2017).

Time-based shifts in effectuation use are often tied to the stage of the innovation process. Higher levels of effectuation are generally effective for decision making related to the iteration and experimentation associated with early-stage product and process development, while causation is more effective during later stages of development (Berends et al., 2014; Ortega et al., 2017; Reymen et al., 2015; Svensrud & Åsvoll, 2012). In emerging economies, changes in resource constraints were the main triggers for a shift between the use of effectuation and causation; more effectuation was used when resources were constrained, whether early or late in the process. (Lingelbach et al., 2015). Aligned with the concept of ambidexterity, the ability to switch between the two decision logics to suit the evolving context provides strategic advantages (Hauser et al., 2020).

#### Effectuation and innovation management methods

Interest in effectuation is particularly strong in innovation management, new product and service development, and project management research. These three overlapping areas share a range of management approaches that were traditionally underpinned by causative concepts, along with a series of contemporary innovation management practices that prompt new ways of thinking. In these disciplines, effectuation is repeatedly identified as a suitable approach for uncertain and risky endeavours – and there is a push to explore alternative decision-making approaches because “deeply rooted beliefs in causal logic are an impediment in intrinsically unpredictable environments” (Huff, 2016, p. 8). The following sections outline some of the findings on effectuation related to methods used in innovation management, new product and service development, and project management.

**Phased and gated processes** (also called stage-gate™ processes) are prevalent in guiding projects from idea to completion in innovation management, new product and service development, and project management disciplines. Such processes employ a rational sequence of phases (idea generation, business planning, development, testing, etc) with gating criteria used to control the progression to the next phase. Phased and gated processes are associated with better innovation outcomes (Cooper, Edgett, & Kleinschmidt, 1999; Killen, Hunt, & Kleinschmidt, 2008), but they are less beneficial when there are high levels of uncertainty, such as in radical innovations (Loch, 2000). Duening, Shepherd, and Czaplewski (2012) recognise the value of the commonly used phased and gated processes, but propose that the incorporation of effectuation logic could improve effectiveness. Their model demonstrates how effectuation

could be incorporated through actions such as promoting consideration of available resources during the screening/scoping phases, or by seeking partnerships to extend resources flexibly in later phases.

**Lean startup and design thinking methods** (Blank, 2013; Brown, 2008) guide entrepreneurs and innovators through customer-focused, iterative methods for managing innovation. Evidence of the use of effectuation practices was revealed in a large-scale survey-based study on lean startups (Yang, Sun, & Zhao, 2019). Mansoori and Lackéus (2020) analysed effectuation as an ‘entrepreneurial method’ rather than a decision logic, and found that methods associated with effectuation (such as evaluating means and estimating affordable loss) were closely aligned to the Lean startup and design thinking methods. Design thinking has been shown to support entrepreneurial thinking and action (Abrell, 2016), and a range of studies have emphasised links between effectuation and the ways that lean startup and design thinking create value in an iterative, knowledge- and learning-focused, connected environment (Ghezzi, 2019; Mansoori & Lackéus, 2020; Roach et al., 2016; Xu & Koivumäki, 2019).

### Agile Project Management and effectuation

Traditionally project management approaches have taken a causative perspective; up-front planning has been emphasised to clearly define the desired outcomes and the ways the project will unfold in a top-down fashion, referred to as a ‘waterfall’ approach. In situations of change and uncertainty, traditional ‘waterfall’ project management approaches make it difficult to adjust goals and plans, resulting in outcomes that can be expensive and irrelevant. In response, agile project management methods enable organisations to respond quickly and efficiently. Agile project management promotes incremental planning, where the goal will be determined iteratively in a process that continually assesses customer needs and available resources. It has proven difficult to shift organisational ways of working to embrace agile methodologies; these agile methodologies need a cultural shift or a ‘new way of thinking’ for effective transition from traditional methods (Conforto et al., 2014).

An effectuation mindset is proposed to offer a ‘new way of thinking’ to support the ‘new ways of working’ required to implement agile project management methods. Research in this area is only just beginning. The close association of agile project management, lean startups and effectuation is explored in conceptual papers (Frederiksen & Brem, 2017; Mansoori & Lackéus, 2020), revealing high alignment between the concepts, but lacking empirical evidence to demonstrate whether and how effectuation is used in agile project management practice. In a mixed method study involving 227 digital startups, Ghezzi (2019) built on the empirical findings that link agile project management with lean principles to propose a model combining effectuation, bricolage and opportunity-creation approaches for lean and agile environments; however, the relationships have not been explored through targeted research. In a similar vein, a conceptual paper proposes a model for effectuation principles in a digital context to support emerging IT technology development using ‘frugal’ innovation approaches (Khanal, 2018), and suggest how the spread of agile and lean approaches make this type of digital effectuation particularly important. Similarly, effectuation is linked to frugal innovation practices that support digital fabricators’ ability to respond to the challenges of COVID-19 (Corsini et al., 2021),

In a slightly different area, an empirical study extends agile software development concepts to business model development, employing a case study on digital business models that showed how effectuation principles can provide benefits and align with the agile approach (Xu & Koivumäki, 2019). Another study on business model innovation demonstrated how effectuation and causation work together to enable organisations to adapt and respond to COVID-19; organisations employed ‘hybrid’ decision logics where the balance of effectual and causal logics was aligned with the organisation’s strategic approach. (Harms et al., 2021).

Finally, alignment between effectuation and agile project portfolio management practices is suggested, with similar mechanisms that support strategy emergence (Kaufmann, Kock, & Gemünden, 2020). Current organisations adopt ‘agile at scale’ to become more adaptable but must make a transition from a hierarchical mindset to one that is more flexible (Rigby, Sutherland, & Noble, 2018). However, agile practices have not worked well at the project portfolio level and a radical new way of thinking may be required (Sweetman & Conboy, 2018). Adopting an effectuation mindset (alongside causation) may assist organisations transition to agile methods.

#### Effectuation and multi-project perspectives

##### – lineage management and project portfolio management

In addition to its role in agile project portfolio management, effectuation principles support other multi-project perspectives on innovation management and contribute to strategic dynamic capabilities. Project lineage management concepts are shown to be aligned with and supported by effectuation principles (Midler & Silberzahn, 2008). Project lineage concepts take a longitudinal project portfolio perspective and recognise the connectedness between projects as components of longer-term strategic innovation trajectories (Kock & Gemünden, 2019). In innovative contexts, research at the project portfolio management level also suggest benefits from the use of effectuation logic, along with causation (Nguyen et al., 2018). Project portfolio management is an important dynamic capability associated with improving innovation outcomes (Killen & Hunt, 2010), and further studies are recommended to better understand the role of effectuation in these multi-project management capabilities. Multi-project perspectives and the use of effectuation are associated with the sought-after ability for organisations to recognise emerging strategies and improve agility and responsiveness to succeed in dynamic times (Kaufmann et al., 2020).

## Conclusion

The challenge of innovation management is intensified as organisations cope with uncertainty, change and increasing competition. In such environments, organisational strategies must be responsive and adaptive; organisations need innovation capabilities that can shift and change to meet evolving needs. To meet these challenges, new innovation management approaches encourage iterative, open and dynamic ways of working. The emerging interest and research on effectuation provide insights on how ‘new ways of thinking’ can support these ‘new ways of working’ for managing innovation under uncertainty.

Sarasvathy’s (2001) identification of effectuation as an alternate decision logic has implications for innovation management beyond entrepreneurship. From initial observations in startups and entrepreneurial environments, effectuation is now shown to support new ways of working in

established organisations. This chapter has overviewed a range of research studies that show how innovation managers use effectuation logic in combination with causation logic, highlighting situations where effectuation logic is particularly useful.

Effectuation logic provides advantages in uncertain, fast changing environments, with increasing interest in the application of effectuation for innovation management, new product and service development, and project management. The emerging research on effectuation provides examples of how effectuation is applied in a variety of environments, and evidence on how it can provide performance advantages. Effectuation logic is used in combination with causation logic to support innovation management approaches such as design thinking, lean startup, and agile project management. Decisions in the early stages of innovation processes benefit from a stronger emphasis on effectuation logic, whereas a balance of the decision logics that is weighted toward causation is better aligned for decisions later in the innovation process.

Importantly, effectuation may have relevance for organisational strategy and competitiveness beyond its influence on innovation management methods. The use of effectuation logic is also associated with organisational ambidexterity, strategy emergence, and the development of dynamic capabilities. Overturning traditional thinking about the need for high-level long-term strategic planning, effectuation logic promotes a more adaptable approach. Effectuation logic recognises the value of tacit knowledge and ‘gut feelings’ (‘what I know’), which are often ignored or downplayed in traditional strategic planning approaches (Svensrud & Åsvoll, 2012).

Organisations that are able to harness an effectuation mindset for innovation management stand to possess a dynamic capability that enables them to succeed in times of change and uncertainty. The ability to apply effectuation logic in combination with causation logic, and to shift the balance between the two logics when appropriate, will enhance organisational ambidexterity and improve competitiveness. The emerging research on effectuation repeatedly highlights the benefits of effectuation in highly innovative contexts and suggests that effectuation can enhance an organisation’s flexibility, adaptability and creativity in an increasingly uncertain and dynamic environment.

#### *Implications for innovation management*

The concept of effectuation and the emerging body of research provide new insights that may assist management to incorporate contemporary innovation management approaches into their organisations. The alternate logic represented by effectuation principles can help promote the ‘new ways of thinking’ needed to support the implementation of ‘new ways of working’ to meet contemporary innovation management challenges.

Organisations may benefit from programs that help managers recognise and apply effectuation logic in conjunction with causation logic to support open, iterative and creative innovation management and the development of organisational dynamic capability. Such programs may assist organisations gain the best advantages from innovation practices, especially in uncertain and dynamic environments.

Managers also will benefit from learning how to evaluate the context and determine when effectuation may be more beneficial than causation in supporting decision making. As effectuation is almost always used in combination with causation, decision makers that can

shift the balance between the two logics in response to the environment and context will improve their ability to manage innovation effectively.

Organisations implementing culture-change programs could use the example of effectuation as an alternate decision logic to raise awareness of how different ways of thinking support different behaviours and decisions. Similarly, effectuation principles could be promoted to support the introduction of new ways of working, such as design thinking or agile project management approaches. Effectuation principles can be used to demonstrate the types of ‘new ways of thinking’ that support these approaches; for example, the emphasis on iteration experimentation in these innovation management approaches is supported by effectuation principles of affordable loss, adaptability and concepts about control of an unpredictable future.

Research findings on the positive influence of effectuation on innovation outcomes also have implications for education to prepare students for management, especially innovation management. Awareness of the benefits of integrating effectuation into entrepreneurial studies has been increasing since Sarasvathy (2001) posed a question about whether, and what, MBA students need to learn about effectuation. Others have also highlighted the role of education in developing awareness of both causative and effectual decision making to prepare students to operate across both sides when managing innovation. Students need to develop the ability to plan but also to adapt; skills to pursue competitive strategies when appropriate, while also embracing collaborative partnerships; and the ability to consider projected returns while also valuing and accepting some risks inherent in innovation (Fisher, 2012; Reymen et al., 2015). There is strong support for innovation management education that raises awareness of the existence and influence of the underlying decision logic on organisational performance. Innovation management educators should consider including modules that explain the principles of effectuation and causation decision logics and demonstrate how and when such decision-making logics are best applied. This includes highlighting how to apply a combination of both decision-making logics, and how to evaluate the context and shift the balance between the logics for effective innovation management.

#### *Future research on effectuation and innovation management*

Effectuation research, while growing strongly, is still at an early stage. Many avenues for future research relate to contemporary innovation management. Research on the use of effectuation decision logic in specific innovation management contexts will add further insights to build on findings from existing studies. Such research should explore whether and how effectuation logic is applied in a range of environments, and identify the impact on outcomes. Such research could focus on specific types or stages of innovation, targeted innovation approaches, or focus on certain industries or types of organisations. This section outlines a few avenues for such future research.

Agile project management is making a strong impact across a wide range of industry sectors and sizes of organisations. Adaptation to change is highlighted in recent research on the potential for effectuation logic as an aid for innovation management. Studies on ‘agile’ methodologies have emphasised the need for a cultural shift in order to effectively transition from traditional methods, (Conforto et al., 2014) and recent research (Hansen, Rode, Sommer,

& Svejvig, 2019) has highlighted that effectuation may play a role in the evolution of strategic approaches for long term innovation management.

Future research should aim to better understand the role of effectuation in agile project management, and identify whether, where and how effectuation principles can best support agile practices and the related 'new ways of thinking'. Research is currently being planned to build upon the early studies on the role of effectuation for agile project management. Early findings suggest that, although the label 'effectuation' is not known in industry, the effectuation principles may align with agile project management goals and 'ways of working'.

Longitudinal research is also suggested to explore the use and benefits of effectuation during different stages of the innovation process, with the aim of identifying the stages and environments where effectuation is most helpful. There could be additional benefits from conducting such research in large organisations to explore whether effectuation enables these large organisations to be "more experimental in their opportunity practice to assure a higher number of successes" (Svensrud & Åsvoll, 2012, p. 84) by exploring multiple projects quickly and cheaply before moving to larger project investments.

Finally, future research could explore the role of effectuation as an agent for organisational agility and the development of dynamic capabilities. Further studies are recommended to explore the role of effectuation in strategic decision making. Such studies could build on earlier findings on the use of effectuation in project portfolio management and the ways that project portfolio management can provide advantages as a dynamic capability (Killen & Hunt, 2010; Nguyen et al., 2018). Future research is also suggested to explore the role of effectuation in fostering emergent strategy recognition and the ability to respond to emergence (Kopmann et al., 2017).

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