

The Lean Startup as an Actionable Theory of Entrepreneurship

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Academic theories of entrepreneurship and applied theories of entrepreneurship have historically been siloed. In this article, we connect the Lean Startup, a widely used and applied approach toward entrepreneurship, with selected academic theories of entrepreneurship. In doing so, we clarify the assumptions and terminology within the Lean Startup. We observe that while the Lean Startup and selected theories of entrepreneurship are compatible in assumptions and central challenges, scholarship and the practice of entrepreneurship are likely to benefit from a closer connection between the academic literature and the Lean Startup. We propose several areas of potential integration between the Lean Startup and the academic literature and suggest potential areas of future research.

Keywords: entrepreneurship; entrepreneurial/new venture strategy; entrepreneurship theory

The Lean Startup, a practitioner-oriented method of establishing new business ventures, was developed by Steve Blank (an author of this article) and his student Eric Ries. At its core, the Lean Startup is a decision framework that favors interaction with customers and prototyping over extensive planning before taking action. The latter method was long taught in business schools and had the costly, adverse impact of leading many entrepreneurs to develop organizations ill-suited to actual market needs. The Lean Startup flips the old paradigm on its head and recommends that nascent entrepreneurs and investors get to know their customers

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and iterate on products before investing in building the organization; it favors rapid information gathering over investing large sums of money shipping products that customers might not want. Several books describe the Lean Startup method in detail, including *The Four Steps to the Epiphany* (Blank, 2003), *The Startup Owner's Manual* (Blank & Dorf, 2012), and *The Lean Startup* (Ries, 2011). The Lean Startup has inspired related works, such as Bill Aulet's (2013) *Disciplined Entrepreneurship*, and is similar in concept to Mullins and Komisar's *Getting to Plan B* (2009). A more recent addition to the Lean Startup method is Gruber and Tal's (2017) *Where to Play*.

Since the original publication of Blank's customer discovery model (hereafter, the Lean Startup), the methodology has been widely adopted by practitioners. For example, General Electric hired Ries to help integrate the Lean Startup into its global organization (Egusa, 2013). In 2015, the Obama administration called for incorporating the Lean Startup methodology to improve how government services are delivered (National Economic Council 2015). In 2017, Congress passed the American Innovation and Competitiveness Act, which expanded the initiative now known as the National Science Foundation Innovation Corps program, currently in use at >99 universities in the United States as a means to expedite the commercialization of new technologies (Córdova, 2019). Despite its prevalence in applied settings, the Lean Startup has not been integrated into the theoretical literature in entrepreneurship. This is surprising for several reasons. First, there are strong parallels between the Lean Startup methodology and how scholars approach scientific investigation. The Lean Startup might be best viewed as an application of the scientific method to entrepreneurship; the Lean Startup emphasizes building a theory of a business and empirically testing the validity of hypotheses derived from the theory. Second, the Lean Startup is synergistic with opportunity-centric approaches toward entrepreneurship, which, despite its critiques (Davidsson, 2015; Foss & Klein, 2020; Garud & Giuliani, 2013), has provided a foundation for the academic study of entrepreneurship (Alvarez & Barney, 2007; Eckhardt, 2019; Short, Ketchen, Shook, & Ireland, 2009; Venkataraman, 1997). Third, there are potential links between the Lean Startup and other theories of entrepreneurship and innovation, such as bricolage, effectuation, and organizational learning.

In this article, we connect the Lean Startup to central academic theories in entrepreneurship for the purpose of advancing theory, hoping to encourage empirical research in entrepreneurship and narrow the research-practice divide. The focus of our review is on two types of theories in the entrepreneurship literature. First, we examine the opportunity literature because of its centrality to entrepreneurship theory and the similar assumptions and mechanisms between the Lean Startup and theory about opportunity. Second, because the Lean Startup is action-oriented and innovation-focused, we also examine how it relates to selected actionable theories of entrepreneurship and innovation, such as bricolage, effectuation, organizational learning, and corporate innovation. When we refer to actionable theory, we refer to management theories that can be easily applied to guide managerial action, such as effectuation (Sarasvathy, 2009), in addition to helping to advance our scholarly understanding of entrepreneurship.

We start with a concise summary of the Lean Startup as a management theory. Our summary of the Lean Startup includes minor improvements, such as the identification of assumptions behind the approach and clarification of key constructs and mechanisms.

The Lean Startup: A Theory of Entrepreneurial Innovation

The core of the Lean Startup is based primarily on the initial contributions of Steve Blank, Eric Ries, and Alex Osterwalder (Blank, 2021), and a more recent extension, the Market Opportunity Navigator, was introduced by Marc Gruber and Sharon Tal (2017). The development of the Lean Startup was influenced by works produced by academic scholars, including McGrath and MacMillan (2000), Christensen (1997), and von Hippel (1988).

Blank's initial inference, based on decades of experience as an entrepreneur and a review of the scholarly literature, was that while the business and academic literature had long recognized startups as vehicles of creative destruction that drive innovation in the economy (Acs & Audretsch, 1988; Davidow, 1986; Haltiwanger, Jarmin, & Miranda, 2013; Moore, 1991; Schumpeter, 1934), the literature lacked a theory of innovation for startups. Instead, the literature, management frameworks, and courses focused on teaching entrepreneurs how to build organizations. Topics covered in entrepreneurship courses included intellectual property management, business planning, venture financing, entity selection, and hiring.

Despite important deviations such as effectuation (Sarasvathy, 2009) and debate in the academic literature on the usefulness of business planning for startups (Brinckmann, Grichnik, & Kapsa, 2010; Kirsch, Goldfarb, & Gera, 2009; e.g., Shane & Delmar, 2004), the dominant intellectual framework taught in business schools to manage the startup process was the business plan. As a management framework, the business plan describes a business model as if it exists with known customer segments, channels, resources, activities, costs, revenue sources, staffing, and structure. Entrepreneurs raise funds based on the plan and learn whether the business model is viable only after the business has been built. The problem with the business plan-focused approach is that it emphasizes organization building over customer discovery. In doing so, this approach implicitly assumes either that the business model for a venture is known at the time a startup was formed or that the right way to test the validity of the business insights of the founding team is to form a company and execute on the idea until it works or fails. By building an organization before resolving key unknowns, the business plan-focused approach guides entrepreneurs and inventors to risk more capital than necessary in the early stages of business development. Entrepreneurs following this approach have often built organizations ill-suited to meet the needs of markets that were not anticipated in the original business plan. In contrast, the Lean Startup emphasizes minimizing organization building to the extent possible until central business model questions are resolved (Blank, 2012).

From the perspective of organizational theory, the business plan approach toward startup development does not fully leverage the advantages of startup companies as vehicles of learning and innovation (Freeman & Engel, 2007; Murraray & Tripsas, 2004; Zenger & Lazzarini, 2004). For example, organizational learning theory emphasizes the need for managers to be responsive to the dynamic nature of industries and markets and the potential performance benefits of closely coupling planning and action to a greater extent than what is generally practiced in the business plan-focused entrepreneurship approach (Baker & Nelson, 2005; Ciuchta, O'Toole, & Miner, 2021). While scholars had long recognized the benefit of high-powered incentives to enable learning in startup organizations, such as equity (Zenger & Lazzarini, 2004), the literature lacked theory and frameworks to guide innovation in startup companies from inception through organization building.

Blank aspired to develop a theoretical framework to guide entrepreneurs on how to best operate startup companies as vehicles of innovation. In his approach, customer discovery and business model development are just as important as technology and product development. This insight was based on a belief that most startup companies fail not because of technical issues but because entrepreneurs do not discover a viable business model before running out of funds. Blank's view is consistent with the works of Felin, Zenger, Lazzarini, and others (Felin & Zenger, 2009; Kamien & Schwartz, 1982; Zenger & Lazzarini, 2004). For example, Zenger and Lazzarini (2004) find that startup companies are able to provide high-powered incentives to innovators that encourage risk-taking in ways that larger companies cannot. The Lean Startup was also inspired by prior research in entrepreneurship and innovation, including McGrath and MacMillan's (2000) *Entrepreneurial Mindset*, Christensen's (2013) *The Innovator's Dilemma*, Vesper's (1993) *New Venture Mechanics*, von Hippel's (1988) *Sources of Innovation*, and other work (Blank, 2013). Blank took this work further by building a normative theory of how high-performing startups should innovate and, in particular, how innovation conducted within new companies might differ from innovation conducted in large firms.

Blank first taught an entrepreneurship decision framework in a course called Customer Development at the University of California, Berkeley in 2003. He started by treating a business model as a theory to be tested and the startup as a vehicle to test the theory. Eric Ries and Alex Osterwalder built on Blank's initial framework. Eric Ries, now an entrepreneur and management consultant, was a student in Blank's Berkeley Customer Development course in 2004. In his bestselling book *The Lean Startup*, Ries named and popularized the approach and drew on concepts from agile software development to improve upon the methodology. Alex Osterwalder, a PhD student in Switzerland, developed the Business Model Canvas (BMC; Osterwalder & Pigneur, 2010). The BMC, an important decision tool in the Lean Startup (Blank, 2013), helps entrepreneurs develop a testable theory of the core customer-product hypothesis underlying the business model. Gruber and Tal (2017) extend the Lean Startup in their book *Where to Play*. Their framework, developed through original scholarship informed in part by the IO Nexus (ION; Dencker & Gruber, 2015; Gruber, MacMillan, & Thompson, 2008, 2012, 2013), contributes to the Lean Startup by providing a framework to help entrepreneurs assess the best industries, markets, or situations to start a new business (Blank, 2019).

The works of Blank, Ries, Osterwalder, Gruber, and Tal form the foundation of the Lean Startup approach of startup management. This canon consists of a common language, set of principles, and tools that have gained widespread adoption among practicing entrepreneurs. In congruence with the authors' aspiration to build an actionable theory, the Lean Startup is much more detailed about the process of entrepreneurship than academic theories, which tend to focus on describing the process of entrepreneurship.

Overview of the Model

According to the Lean Startup, the primary task for the entrepreneur is knowledge generation. Entrepreneurs are advised on (1) how to uncover knowledge that helps them determine if a market exists that they can serve profitably by introducing a product or service and (2) how to build an organization to serve a market, if discovered. Entrepreneurs generate

knowledge on demand feasibility and organization design by following a process that includes theory development, hypothesis generation, and testing—pillars of empirical science with close ties to specific models of organizational learning.

The Lean Startup assumes that the primary constraints that cause startup companies to fail are investing time and resources in building a product or service that customers do not want or discovering viable opportunities only after equity financing runs out. While entrepreneurs often need to create demand for novel products and services (Blank, 2003: 121), the Lean Startup argues that entrepreneurs cannot create demand for every product that they want to sell. The characteristics of customer preferences and resources, or latent market demand, place a constraint on entrepreneurs' ability to succeed. The Lean Startup focuses on reducing information asymmetries between entrepreneurs and customers. This includes taking actions to discover ways to create demand in situations where customers may not know that they might have an interest in a new product or service. In this case, the information asymmetries between entrepreneurs and customers include a belief in the mind of the entrepreneur that a customer might be excited about purchasing a product, even products that customers might not yet be able to imagine or understand.

Importantly, the Lean Startup does not emphasize reducing information asymmetries between entrepreneurs and investors, which the finance literature tends to emphasize as perhaps the most important problem for entrepreneurs to solve (e.g., Amit, Glosten, & Muller, 1990). Practically, the goal of the Lean Startup methodology is to efficiently discover a market for a new product or service.

The Lean Startup is a process theory in which outcomes are determined by not only activities but also the ordering of these activities (Mohr, 1982). For example, within the Lean Startup, building organizational capabilities before determining the characteristics of customer demand, the nature of customer relationships, and the best channels to reach customers dramatically increases the chance of failure. Organizational resources and capabilities are context—and process—dependent—they should be customized to serve the needs of specific customer segments, distribution channels, and production processes. Investments made to build capabilities before customers are known can be costly if these investments must be reconfigured later to serve new customer segments (Blank, 2003; Butter & Pogue, 2002). At times, the Lean Startup has been described as a learning-by-doing methodology, in contrast to a learning-by-thinking method. This is likely an oversimplification given the model's focus on generating theory and testable predictions before taking action and in light of empirical research indicating that a strength of the model may be activities undertaken before the doing phase occurs (Leatherbee & Katila, 2020). We discuss the Lean Startup's conception of the entrepreneurship process in detail in the next section.

Assumptions and Model

The assumptions of the Lean Startup are centered on the idea that entrepreneurs are agents who can use decision-making processes to navigate an uncertain decision-making environment (Blank, 2021). Prior to this article, the core assumptions of the Lean Startup were implied.

Information. The Lean Startup assumes that prices alone do not provide sufficient information to guide the actions of entrepreneurs and that information is not evenly distributed

in the economy. Information asymmetries between entrepreneurs and customers are just as important to manage in the startup process as asymmetries between founders and investors.

Agents. Individual agents, such as entrepreneurs, investors, customers, and employees, are imperfect decision makers who suffer from biases in decision-making (Kahneman, 2011; Kahneman & Tversky, 2012; Simon, 1955). With appropriate training and discipline, agents can at best become boundedly rational decision agents, meaning that entrepreneurs can be trained to practically optimize within the information set that they cultivate. Entrepreneurs can increase their performance by systematically developing information about the feasibility of proposed products and services.

Uncertainty. Uncertainty is defined as an event where no probability distribution can be assigned to the likelihood of an event occurring (Pearce, 1992). In the Lean Startup, uncertainty is driven by the likely gap between an entrepreneur's vision for a product or service and realizable customer demand as described by the Three Horizon Framework (Baghai, Coley, & White, 1999). Horizon 1 businesses are launched to serve existing customers in existing product or service markets. Horizon 2 businesses are emerging opportunities where markets do not exist or are in the process of forming. Horizon 3 businesses are ideas for new products and services where the technology to support products or services is nascent or nonexistent. Uncertainty increases from horizon 1 through horizon 3.

Market types. In the Lean Startup, startups are classified into one of four market types (Blank, 2012: 38). Startups can offer a new product in an existing market (existing), offer a new product in a new market (new market), create a new market segment at the bottom of the price point (cost-differentiated resegmentation), or target a niche group of customers within an existing market that may prefer a product targeted at a narrow set of needs (existing niche resegmentation). Market type influences all aspects of the implementation of the Lean Startup, including company positioning, product positioning, launch communications, demand creation activities, and goals.

The Lean Startup Process

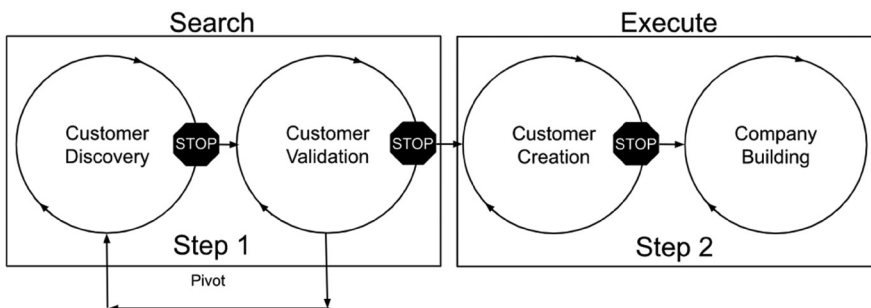
The Lean Startup begins with the premise that, at inception, most startups are best conceived as a bundle of untested ideas and assumptions about a business model. The goal is to transform these ideas from unknowns to knowns such that the startup can then turn activities into profits. Ultimately, the Lean Startup is a learning theory where activities at certain stages are often focused on knowledge development (as opposed to profits) and, importantly, failure is embedded as a necessary, expected part of the process. Being open to fundamentally changing major objectives or processes (termed *pivots*), including restarting the process, is essential (Blank, 2003, 2012).

After the domain of search is determined, such as a specific industry or problem space, the Lean Startup process is divided into two steps: search and execution¹ (Figure 1). Tools to determine the best domain of search include Gruber and Tal's (2017) Market Opportunity Navigator.

Search

The purpose of the search step is to achieve product-market fit. This step is divided into two phases: customer discovery and customer validation. A central premise of the search

Figure 1
The Lean Startup process is divided into search and execution steps



Source: Modified from Blank and Dorf (2012: 53).

step is that the task of the entrepreneur is to discover previously unknown latent demand for a product or service. The metrics of success in the search phases are learning metrics, not financial metrics.

Customer discovery. Customer discovery starts with theory building, during which the goals of the management team are to develop a theory of the business, including testable hypotheses. Theory building is guided, codified, and tracked by using the BMC (Osterwalder & Pigneur, 2010). Testable hypotheses are derived from the BMC and represent key unknowns in the business model, such as the existence of demand, the fit between the proposed solution and potential demand, and how to effectively reach customers (e.g., customer relationships and channels). Theorizing can include the development of business models that might support first-to-market, extremely novel products and services.

An element that scholars often overlook is that the Lean Startup is theory-driven and customer tested, as the theory of a potential business is developed before customer testing occurs (Felin, Gambardella, Stern, & Zenger, 2019). Within the framework, entrepreneurs start with a theory—one that can be quite innovative or disruptive—before testing its feasibility.

Once theory building is complete, the entrepreneur transitions to problem testing. Problem testing starts with ethnographic interviews of those with potential insight into aspects of the business theory articulated in the BMC, such as potential customers or suppliers. In some cases, founders resolve unknowns through experimentation, testing the validity of hypotheses by creating prototypes, market testing, and observing results. Unknowns can also be resolved through data collection efforts, such as interviewing suppliers to examine the feasibility of producing products in a cost-effective manner.

Entrepreneurs are advised to test theory and assumptions by developing and selling prototypes with limited features and reliability, termed the minimum viable product (MVP). The purpose of the MVP is to reduce information asymmetries between the entrepreneur and customers. The MVP is sold to customers most interested in a solution, termed *early-vangelists*. Interactions with earlyvangelists provide information to entrepreneurs regarding important features, potential distribution channels, and value propositions. The customer discovery phase is complete once entrepreneurs have established product-market fit, identified

specific customer segments and a means to sell and market to them, and developed a predictable and repeatable sales process. In short, customer discovery is complete when the entrepreneur knows who will buy (customers), what they will buy (product), why they will buy (value propositions), how they will buy (channels), and at what price they will buy.

The idea that entrepreneurs can reduce risk in their startups by working with early adopters to guide product development builds on the work of Moore (1991) and is similar in concept, in some cases, to von Hippel's (1978, 1986) research on how customers with the most acute need for a specific solution can be an important source of information to guide product innovation.

Customer validation. The goal of customer validation is to convert initial insights from the customer discovery process into a scalable, repeatable sales process. Important questions include the following (Blank, 2012: 281): Who are the key decision makers? How long and costly is the sales cycle? What is the selling strategy? What value propositions should be used in marketing? What is the generic profile of earlyvangelists? Developing a sales process includes taking the answers to these questions and developing positioning statements, refining the MVP, refining the positioning and marketing materials, selling, and developing metrics to manage the sales process.

Execution

The execution step consists of two core activities: customer creation and company building. Customer creation focuses on building organizational sales and marketing processes to support growth. Company building focuses on building the internal organization to fit the specific sales and marketing strategy.

Customer creation. Customer creation is the process that a startup uses to systematically acquire new customers through marketing after completing customer validation. Like all aspects of a new business in the Lean Startup, a startup's customer creation process must be designed in response to interacting with the intended customers. If the marketing business function is created before management has learned how to best market the firm's product, management runs the risk of building a marketing function that is not tailored to the best-fit value propositions and customer segments, thus increasing the chances that the organization will fail.

In this stage of the process, work is focused on the development of essential marketing activities necessary to help customers learn about a product or service—and to foster demand (Blank, 2003). Creation is used to describe the fact that, within each startup, these activities are occurring for the first time.² This means that a marketing strategy, marketing materials, and marketing processes must be created from scratch to reach the specific customers targeted via specific channels. According to Blank (2012), copying marketing strategies and marketing routines mostly adopted from other organizations will likely lead to failure.

Company building. In the fourth and final phase of the Lean Startup, startups create fast-response, mission-centric functional departments. The marketing department is the first mission-centric functional department created. The company-building stage transitions the customer base from earlyvangelists to other customers (e.g., "pragmatists" and "conservatives") who will benefit from the value proposition (Moore, 1991). Other activities included in the company-building stage are developing processes to reach mainstream customers and developing an organization-wide mission and culture (Table 1).

Table 1
Lean Startup: Key Concepts and Constructs

Item	Type	Concise Description	Source
Entrepreneur	Construct	Manager of a startup.	Blank (2003)
Startup	Construct	Temporary organization designed to search for a repeatable and scalable business model.	Blank and Dorf (2012)
Customer	Construct	Individual or business who purchases a product or service produced by the startup.	Blank (2003)
Investors	Construct	Individuals or firms that provide financial resources to support the startup.	Blank (2003)
Customer discovery	Process	Process to discover who customers are and if the problem entrepreneurs are trying to solve is important to them.	Blank (2003)
Customer validation	Process	Process of discovering and building a repeatable sales process.	Blank (2003)
Company building	Process	Internally focused process of building formal departments and roles.	Blank (2003)
Customer development	Process	Process of discovering and building a business model.	Blank and Dorf (2012)
Customer validation	Concept	A four-phase process to determine if there is a strong-enough product-market fit to justify scaling sales and marketing spending.	Blank (2003) and Blank and Dorf (2012)
Business model	Concept	How an organization creates, delivers, and captures value.	Osterwalder and Pigneur (2010)
Value propositions	Construct	Why a customer segment purchases a bundle of products and services.	Osterwalder and Pigneur (2010)
Minimum viable product (MVP)	Construct	An initial version of a product or service, with a minimal feature set, provided to customers to generate information to help find product-market fit. MVP was coined by Frank Robinson of SyncDev and was originally referred to as the minimal feature set by Blank (2003).	Blank (2003) Ries (2011)
Customer relationships	Construct	The types of relationship that a company has with each customer segment.	Osterwalder and Pigneur (2010)
Channels	Construct	How a company communicates with and reaches its customer segments	Osterwalder and Pigneur (2010)
Customer segments	Construct	Groups of people that a company aims to serve, defined by common needs, behaviors, or other attributes.	Osterwalder and Pigneur (2010)
Revenue streams	Construct	Cash generated by serving each customer segment.	Osterwalder and Pigneur (2010)
Key partners	Construct	Suppliers and partners required to operate the business model.	Osterwalder and Pigneur (2010)
Key activities	Construct	What a company does to operate the business model.	Osterwalder and Pigneur (2010)
Key resources	Construct	The financial, physical, intellectual, or human resources to operate the business model.	Osterwalder and Pigneur (2010)
Cost structure	Construct	Fixed and variable costs in currency to operate a business model.	Osterwalder and Pigneur (2010)
	Concept	Framework used to measure progress of alignment	Ries (2011)

(continued)

Table 1 (continued)

Item	Type	Concise Description	Source
Innovation accounting		between the MVP and customer demand in the customer discovery process.	
Pivot	Construct	Returning to step 1 of customer discovery or changing major aspects of the business in response to knowledge acquired.	Blank, (2003)
Actionable metrics	Concept	Learning milestones used to judge a business.	Ries (2011)
Validated learning	Concept	Knowledge acquired scientifically by running frequent experiments designed to enable entrepreneurs to test each element of their vision.	Ries (2011)

Shortcomings

The Lean Startup was novel at the time of its introduction and is now in widespread use as the doctrine of modern applied entrepreneurship. However, the Lean Startup is not without its critics, including those who say that the framework is constrained in imaginative scope by its iterative approach and may limit or even misguide entrepreneurs through its emphasis on customer feedback—an issue addressed in part by the Market Opportunity Navigator (Gruber & Tal, 2017). Despite such criticism, the Lean Startup has the potential to improve scholarship on entrepreneurship and innovation. In the section that follows, we discuss connections to the academic literature while taking the opportunity to highlight some potential shortcomings.

Connection to Academic Theories of Entrepreneurship

The primary goal of most academic theories of entrepreneurship is to understand and describe entrepreneurship as a human endeavor with the hope that such knowledge has implications for practice (Eckhardt, 2019; Venkataraman, 1997). In contrast, the Lean Startup is an applied framework for entrepreneurs and innovators to use in practice with the goal of increasing the effectiveness of entrepreneurs. While these goals are different, they are synergistic.

Importantly, the Lean Startup has several attributes that warrant the attention of scholars. First, the Lean Startup has many parallels to the existing scientific literature. The Lean Startup describes entrepreneurship as a process driven by individuals interacting with their environment, with a goal of reducing uncertainty through the purposeful production and analysis of knowledge. In this regard, the Lean Startup is a quasi-scientific approach that emphasizes testable hypotheses and empirical data to generate knowledge regarding market feasibility. The scientific approach toward entrepreneurship that is central to the Lean Startup is compatible with many theoretical approaches toward entrepreneurship in the academic literature.

Second, due to its widespread use in practice, the Lean Startup provides academics with a conduit to rapidly implement research findings into practice by facilitating communication with practicing entrepreneurs. Incorporating the Lean Startup into academic entrepreneurship research provides academics and practitioners with common terminology, frameworks, and knowledge to guide and facilitate the communication of research insights. One successful

example of how research can be integrated into practice through the Lean Startup is Gruber and Tal's (2017) Market Opportunity Navigator framework, which integrates concepts from entrepreneurship and strategy scholarship into the Lean Startup.

Third, there appear to be strong conceptual linkages between the Lean Startup and entrepreneurship theory. In the Lean Startup and opportunity-centric theories of entrepreneurship, entrepreneurs will not succeed if they create products or services that customers do not wish to purchase or cannot be convinced to purchase (Alvarez & Barney, 2007; Blank, 2003; Eckhardt & Shane, 2003; Ries, 2011; Sarason, Dean, & Dillard, 2006; Shane, 2003). Furthermore, academic theories stress the existence of information gaps and knowledge generation as central to the process of entrepreneurship (Casson, 1982; Eckhardt & Shane, 2003; Sarason et al., 2006; Venkataraman, 1997), which are fundamentally similar to the Lean Startup's emphasis on customer interviews and prototyping to generate knowledge. We discuss the Lean Startup's conception of the entrepreneurship process in detail in the next section.

In this section, we examine how selected academic theories of entrepreneurship relate to the Lean Startup. We organize our summary around two themes. First, we focus on how the Lean Startup as a framework relates to the opportunity-focused literature in entrepreneurship and the possible ways that the Lean Startup might fill in gaps in academic frameworks and vice versa. Second, we examine how the Lean Startup relates to actionable theories of entrepreneurship and innovation, such as bricolage, effectuation, organizational learning, and corporate innovation. Our review complements Shepherd and Gruber's (2020) description of research ideas based on the Lean Startup. Our goal is not to be comprehensive—we suspect that our review omits important theories in entrepreneurship that might be closely related to the Lean Startup. Instead, we provide a concise summary for the purpose of further stimulating inquiry.

IO Nexus

The primary purpose of the ION literature is to provide an intellectual framework to explain entrepreneurship and guide scholarly research (Eckhardt, 2019; Venkataraman, 1997). The central construct is an entrepreneurial opportunity—often shortened to opportunity—which is defined as a situation in which new goods, services, raw materials, and organizing methods can be introduced and sold at a price greater than their cost of production (Casson, 1982; Shane & Venkataraman, 2000). Opportunities are bounded by what is technically and demand feasible. Technical feasibility describes the set of all means–ends relationships known (Klevorick, Levin, Nelson, & Winter, 1995), and demand feasibility is defined as the set of all products and services that potential customers can be convinced to purchase at a given point in time (Priem, Li, & Carr, 2012).

The discovery and exploitation of opportunities are driven by entrepreneurs and occur in an almost infinite number of ways and sequences, at times driven by purposeful actions and at other times not. Individual insight is termed a *conjecture*, defined as a conception that exists in the mind of an agent based on one's understanding of the characteristics of a technology at a specific point in time (Eckhardt & Ciuchta, 2008; Felin & Zenger, 2009; Kaish & Gilad, 1991). This understanding includes insights into a technology's potential commercial viability (Eckhardt, Ciuchta, & Carpenter, 2018). Conjectures can lead to action. The formation of a

conjecture is theorized to be driven by the nexus of three individual-level factors: an individual's retained stock of prior knowledge, the receipt of new information, and an individual's intention to act on that information. A more complete summary of the ION, which continues to be refined and extended, is described in several works, including those by Shane (2003), Eckhardt and Shane (2003), and McMullen and Shepherd (2006).

If the focus of interest is narrowed to individuals purposefully pursuing entrepreneurship, the ION and the Lean Startup represent compatible approaches. First, the assumptions of the two frameworks are aligned. Both frameworks assume that prices do not provide sufficient information to guide the actions of entrepreneurs; that individuals are imperfect, biased decision makers; and that entrepreneurship is a risky and uncertain endeavor. Importantly, success in both approaches is determined by a need to generate revenue and profits. Second, knowledge gathering is central to both approaches. In the language of the ION, entrepreneurs must develop means-ends frameworks that connect what is possible (technology) to what customers want (demand). In the terminology of the Lean Startup, means-ends frameworks are business models (Osterwalder & Pigneur, 2010), and knowledge production is focused on the search for demand with technology taken as given (Blank, 2012). Third, the Lean Startup is built on a scientific approach with testable hypotheses and the collection and analysis of data. The scientific approach toward entrepreneurship that is central to the Lean Startup is compatible with the scientific approach and empirical research that has developed in the opportunity literature. The basic model of the ION has been extended by various scholars, and these extensions have important implications for the Lean Startup. We turn to each of these before addressing potential areas of future research.

Structuration View and Opportunity Creation View

The Structuration View (Sarason et al., 2006) and the Opportunity Creation View (Alvarez & Barney, 2007) seek to improve on the ION by emphasizing situations where entrepreneurs fundamentally alter their context instead of searching for an alignment between technology and potential demand. In other words, they postulate that the ION underemphasizes the ability of entrepreneurs to drive fundamental change. Similar observations have been made about the Lean Startup. For example, in a critique of the Lean Startup, Felin et al. (2019) note that with an emphasis on observable feedback and short-term validated learning, the Lean Startup may bias entrepreneurs toward developing businesses that focus on incremental improvements and hence incremental value instead of novel ideas that might yield greater value.

These critiques overlook the fact that the ION explicitly incorporates Schumpeter's disruptive model of innovation and Kirzner's more incremental approach (Eckhardt & Shane, 2003; Venkataraman, 1997) and that the Lean Startup has been adopted by the National Science Foundation to guide the commercialization of novel and potentially disruptive scientific technologies (Satell, 2017). Zahra's (2008) framework, which balances different search perspectives within the opportunity literature, may provide a helpful foundation for integration.

Another conceptualization of this discussion empirically examined by Gruber, MacMillan, and Thompson (2013) is to theoretically frame the issue as attributes of search. In this framing, the question is which factors drive entrepreneurs to expand their conceptual choice set of new business models. Factors may include characteristics of startup teams,

such as their technical experience (Gruber et al., 2013), or the types of information that entrepreneurs might respond to even if they are not necessarily engaged in purposeful search (Eckhardt et al., 2018).

New Firm Formation Versus Opportunities

Scholars writing from different perspectives have focused on shifting the emphasis away from opportunities as the primary unit of analysis. Two notable examples are the works of Foss and Klein (2012, 2020) and Davidsson (2015). Foss and Klein, in their theory of entrepreneurial judgment, focus on integrating entrepreneurship with the theory of the firm. Central to their approach is the entrepreneur, a residual claimant who creates opportunities, evaluates opportunities, and makes decisions regarding resource assembly with the goal of creating a new organization. Foss and Klein (2012) provide a framework to more fully consider all aspects of entrepreneurial decision making and firm formation—such as raising funds, hiring, and contracting—which are not directly addressed by the Lean Startup. In contrast, when it comes to the ordering of key activities and the specifics of how to pursue market discovery—both important aspects of entrepreneurial judgment—the Lean Startup can help provide a path toward adding precision to the theory of entrepreneurial judgment. As it stands, entrepreneurial judgment theory is, in many instances, probably not sufficiently precise in mechanisms or activities to help guide either practicing entrepreneurs or empirical researchers. In contrast, the Lean Startup is quite precise regarding the relative benefits of investing in market discovery activities versus firm creation activities at different stages in the process.

Davidsson's (2015) approach replaces the opportunity construct with new venture ideas, opportunity confidence, and external enablers—all of which are relevant to the Lean Startup. New venture ideas, similar to conjectures, represent an individual's perception of new means and ends that might be combined to produce a product or service. Opportunity confidence represents an individual's subjective confidence that a situation may support new venture creation. Both constructs have implications for how knowledge is created and interpreted within the Lean Startup, an important issue carefully examined by Shepherd and Gruber (2020).

Importantly, Davidsson treats new venture ideas as objective, codifiable inferences. This is consistent with the Lean Startup, which includes process documents and worksheets that are used to codify the business model, attributes of the MVP, and customer discovery activities. However, it appears as if the Lean Startup could be used to add greater specificity, causal mechanisms, and testable hypotheses to the model proposed by Davidsson (2015), including when specific organization-building activities should occur. In contrast, an aspect of the Lean Startup that could benefit from Davidsson's work is further development of theoretical and empirical considerations of external factors that create circumstances favorable to entrepreneurship and the implications of different circumstances. Davidsson's external enablers construct provides a foundation to develop this aspect of the Lean Startup.

Effectuation

Effectuation is a five-principle theory of entrepreneurial action derived from research and personal experience (Sarasvathy, Simon, & Lave, 1998; Sarasvathy, 2009). Mansoori and

Lackéus (2020) provide an excellent integration and comparison of effectuation with the Lean Startup that we will not repeat here. However, there is a fundamental difference between the approaches that is often overlooked. Effectuation and the Lean Startup have very different starting positions and hence approaches toward the entrepreneurial process. Effectuation's Bird in the Hand principle advises entrepreneurs to start with available means, or what the entrepreneur can do. In contrast, the Lean Startup presents a logic that advises entrepreneurs first to use a process to discover market demand and, once market demand is discovered, to develop the means to meet the demand. The Lean Startup guides entrepreneurs toward understanding what needs to be done, instead of what is proximate and most possible for an entrepreneur to accomplish. An unknown at this point is which approach leads to superior outcomes or whether the relative performance of each approach is context or resource dependent. This tension suggests a fruitful area of research that would likely advance both approaches.

Bricolage

Bricolage is an academic theory of entrepreneurship with clear practical implications for entrepreneurs. Similar to effectuation, bricolage views the starting position of entrepreneurship as the existing resource base instead of customer problems (Baker & Nelson, 2005). Hence, the same conceptual and empirical tension that exists between the Lean Startup and Effectuation exists for the Lean Startup. However, with its focus on existing resources and how they can be deployed to address new problems, bricolage provides an evidenced-based approach for how to link existing resources to entrepreneurial success, an aspect of the entrepreneurial process that is not addressed by the Lean Startup. Because bricolage appears to be associated with superior performance, especially for nascent ventures (Steffens, Baker, Davidsson, & Senyard, 2022), bricolage research may provide a means to incorporate entrepreneurs' initial resource endowments more formally into the Lean Startup approach. For example, the Lean Startup does not provide entrepreneurs with a framework to assess the relative favorability of two opportunities with very different resource requirements. Developing work on bricolage, if integrated into the Lean Startup framework, might provide useful insights regarding how to incorporate resource endowments into the framework.

Organizational Learning

Central to the Lean Startup is a normative theory of organizational learning that advocates that innovators and entrepreneurs test theories about demand feasibility of new products and services. The framework is not a theory of improvisation or reactive bricolage. It is a theory of purposeful learning that embraces learning from knowledge generated from controlled experimentation (Miner, Bassof, & Moorman, 2001).

The literature on organizational learning is mostly descriptive and, according to Bingham and Davis (2012), focused on three types of learning: experiential, trial-and-error, and improvisational. Much of the research is focused on knowledge produced by organizational processes that are not guided by explicit experimentation, termed *unintentional variation*, and the potential benefits to organizations that learn from the unexpected. The organizational learning literature does include research on purposeful learning, but the connection to the

scientific process of hypothesis generation and testing is often obfuscated, in part because scholars working in this area often use different terminologies, such as probing (Ozcan & Eisenhardt, 2009), instead of the language of theory development, hypothesis testing, and experimentation.

The Lean Startup provides an opportunity to guide organizational learning scholarship through the theory-driven customer discovery framework. Perhaps one opportunity to make the connection is Dimov's (2003) framework that links opportunity theory to learning during opportunity discovery through individuals' experiential knowledge. In contrast, with its strong theoretical foundations, especially in the area of interorganizational learning (Miner, Gong, Ciuchta, & Sadler, 2012; Miner & Haunschild, 1995), the organizational learning literature has the opportunity to broaden the mechanisms and sources of information used by the Lean Startup beyond customers. One potential area of potential synergy may be to integrate Lean Startup methods with learning structures within large organizations, such as skunk works projects (Michael, Renee, & James, 2002; Yayavaram & Ahuja, 2008), to provide metrics and management frameworks that might enhance the performance of these units.

Corporate Innovation

The literature on the benefits of working with customers to guide innovation has received mixed support in the corporate innovation literature. Research suggests that customers (von Hippel, 1976, 1986, 1988) or even hobbyist users (Franke & Shah, 2003; Shah & Tripsas, 2007) provide important insights regarding the future needs of customers that are likely valuable to firms. The compatibility between this research and the customer-focused Lean Startup is clear.

Some scholars have warned of potential pitfalls of relying on the preferences of customers to guide the direction of innovation (Christensen, 2013; Christensen & Bower, 1996). This observation is similar to concerns raised by Sarason et al. (2006) and Alvarez and Barney (2007), who propose that the most innovative forms of entrepreneurship start with ideas generated by entrepreneurs that are not guided by expectations of demand. Despite methodological critiques by King (2017) and King and Baatartogtokh (2015), Christensen's viewpoint has gained a large following among the practitioner community. Yet it is often overlooked that the Lean Startup process does not start with experimentation. Instead, the Lean Startup starts with entrepreneurs developing a theory of their business, including a potentially heretofore unimagined technology, which is then tested for validity by interacting with potential customers. Hence, the Lean Startup may provide a means of building theory to better understand when customers or managers should guide innovation. Alternatively, perhaps the Lean Startup suffers from the same challenges faced by other customer-centric theories of innovation. This tension suggests a fruitful area for additional research.

Advancing the Lean Startup

The Lean Startup is a relatively new theory. There are opportunities to deploy research as a means to test and strengthen the Lean Startup as a practitioner-focused theory of entrepreneurship. Scholars have begun to conduct research that compares the effectiveness of the Lean Startup approach to alternatives, including planning and agile models for guiding entrepreneurs (Camuffo, Cordova, & Gambardella, 2020; Koning, Hasan, & Chatterji, 2022;

Leatherbee & Katila, 2020; Sońta-Drączkowska & Mrożewski, 2020). In addition to conducting research to test the relative effectiveness of the Lean Startup, there are opportunities for scholars to improve the Lean Startup. We touch on potential areas of development.

Improvements to Theorizing

The development of theory and hypothesis testing within the Lean Startup is guided by Osterwalder and Pigneur's (2010) BMC. The framework has two important attributes. First, it provides a way of building a complete, falsifiable theory of a business that helps the entrepreneur avoid omitting an activity essential to new business formation. This is particularly helpful for first-time entrepreneurs or for entrepreneurs who are entering an unfamiliar market. Second, the BMC emphasizes the importance of building a strategy that meets the needs of identifiable groups of customers that can support a business.

The BMC is not a framework that forces internal consistency in theorizing. It is perfectly possible within the BMC to propose a business and a series of hypotheses that, while all independently logical, are incompatible when combined. Without evidence produced by costly experimentation and other activities, the BMC does not help entrepreneurs avoid potentially costly mistakes caused by inconsistent theorizing. As a contrasting example, many entrepreneurs use financial spreadsheets to build business theory, and financial spreadsheets do reveal internal inconsistencies in logic. If a particular marketing strategy is too expensive based on the economics of the marketed product, financial spreadsheets will predict losses. In this case, financial spreadsheets would guide the entrepreneur to adjust one's theorizing by either reducing marketing costs or increasing prices. In addition, unlike financial spreadsheets, the BMC does not lend itself well as a means of communicating a theoretical business model to potential partners such as investors and customers. For example, the BMC is rarely used in startup pitches. Researchers may find ways to improve the BMC or produce superior frameworks for startup theorizing that could increase the effectiveness of the Lean Startup.

Business Models

The Lean Startup has the potential to improve management theory on entrepreneurship, as observed by others (Shepherd & Gruber, 2020). One such example is academic research on business models.

A business model shows how an enterprise earns profits by delivering value to its customers (Teece, 2010). Given that the purpose of the Lean Startup is to provide entrepreneurs with an actionable framework to develop, discover, and build business models, there seems to be a natural connection between scholarly research on business models and the applied literature. While these connections are already forming, there continue to be opportunities for further development by integrating the applied and scholarly literature on business models. For example, Osterwalder, Pigneur, and Tucci (2005) observed that research on business models has grown rapidly in recent years, despite the lack of consistent terminology, constructs, and purpose. They connect business models as a concept to the academic literature through transaction costs economics, which remains a potential area for additional conceptual and empirical development.

Most scholarship on business models is not integrated with the Lean Startup, which creates barriers between important academic research and practice. For example, in their review of

research on business models, Wirtz, Göttel, and Daiser (2016) mostly overlook the applied literature on the topic, which in some dimensions is more advanced than the academic literature. An integration with George and Bock's (2012) insights on the interrelatedness of business model development and narratives with the Lean Startup is likely to yield benefits for entrepreneurs and scholars alike. Similarly, Foss and Saebi (2018) provide great conceptual rigor and clarity to scholarly research on business models—an approach that would have likely been more impactful if constructs and concepts from the Lean Startup had been integrated into their insightful work. Overlooked in much of the academic literature on business models is the claim by Blank (2003) and others that the development of new business models is fundamentally different in startups than in established firms. Not surprising, much of the empirical scholarly research on business models has been on established companies (Zott & Amit, 2008), which suggests that this tenet of the Lean Startup remains an untested claim and perhaps an opportunity for future research.

Competitive Strategy

The Lean Startup framework is universally applicable to many forms of entrepreneurship—from entrepreneurs with modest business aspirations to those attempting to start high-growth companies that might ultimately secure millions of dollars in investment capital and earn billions of dollars in annual revenue. Because of this inclusive focus, the Lean Startup is mostly silent on how competitive strategy can drive enterprise value. This might limit the effectiveness of the Lean Startup for entrepreneurs who seek to build large high-growth companies. For example, a fundamental insight from competitive strategy is that economic uniqueness—whether it be driven by selecting markets with favorable characteristics (Porter, 1980), internal capabilities (Barney, 1991), intellectual property protections such as patents (Hsu & Ziedonis, 2013), or adaptability (Teece, Peteraf, & Leih, 2016)—is likely essential in developing high-value enterprises. Felin et al. (2019) observe that the Lean Startup framework does not guide entrepreneurs to build economic uniqueness, especially in the early experimentation stages where opportunities to build unique value may be more prevalent than emphasized by the Lean Startup. There are likely opportunities for scholars to enhance the Lean Startup framework by integrating work from the fields of competitive strategy and innovation management to guide entrepreneurs toward building enterprise value (Abernathy & Clark, 1985; Teece, 1986, 2018). Gruber and Tal's (2017) Market Opportunity Navigator is one example of a beneficial contribution to the applied literature.

Boundary Conditions of the Lean Startup

Scholars have noted that it may not be appropriate to apply the Lean Startup to manage all types of opportunities (Felin et al., 2019). For example, is the Lean Startup applicable to situations that are not able to be classified into one of the four market types defined in the Lean Startup? The boundary conditions of the Lean Startup have not been sufficiently researched.

Teece et al. (2016) suggests that the Lean Startup may be best applied to opportunities where product development costs are low and product adjustments can be made quickly. Felin et al. (2019) postulate that the Lean Startup may not be an appropriate approach for exploiting opportunities that are more novel, less incremental, and perhaps more contrarian

than other opportunities. Perhaps the Lean Startup might not be the best framework for an entrepreneur building a business based on an application of biotechnology. This viewpoint is an open question, in part because the National Science Foundation uses the Lean Startup to manage the commercialization of technical, science-based ideas that are novel, less incremental, and perhaps more contrarian than other opportunities (Batova, Clark, & Card, 2016; Satell, 2017). Hence, it appears that additional research is warranted to test the boundary conditions of the Lean Startup and how the characteristics of specific opportunities may influence how the Lean Startup is applied (Felin et al., 2019).

Improvements to Methodology

The Lean Startup encourages entrepreneurs and innovators to approach entrepreneurship as an exercise to build and test theory. While other methods of experimentation are not explicitly excluded, the primary methods of testing business theory in the Lean Startup are the use of interviews with potential customers and experts, product testing with an MVP, and customer surveys (Blank, 2003; Münch et al., 2013). However, because systematic learning is central to the Lean Startup, research design is important and will likely affect the performance of the Lean Startup as a decision framework in practice. Scholars know that a well-designed experiment will produce reliable information, while a poorly designed experiment has the potential to produce information that may appear useful but ultimately misguides. Importantly, atheoretical experimentation can lead to scientific apophenia—the belief that a false pattern detected in a sample does in fact exist in the population (Goldfarb & King, 2016).

Empirical scholars are highly trained in the use and interpretation of methods of inference, including interviews, focus groups, experimentation, asymptotic statistics, and data science. There are likely opportunities for scholars to increase the positive outcomes in the Lean Startup by translating research methods, through teaching or the creation of training materials, to practitioners of the Lean Startup.³ Importantly, this suggests that the curriculum of undergraduate and graduate entrepreneurship programs might be enhanced by the inclusion of courses in research methods.

A potential area of tension in the Lean Startup, as well as an opportunity for further research, is striking an appropriate balance between speed and the quality of research design. Developing and conducting a single high-quality scholarly study can take years. In contrast, entrepreneurs believe that speed is beneficial to startups (Altman, 2013; Wheelwright & Clark, 1992). By working with entrepreneurs, scholars may be able to develop research processes that are reliable and fast. Scholars may be able to identify situations where simultaneous experimentation may be superior to the sequential learning framework, which is often an attribute of the MVP methodology (Andries, Debackere, & Van Looy, 2013).

Conclusion

In this article, we make the case for integrating the Lean Startup with the scholarly literature on entrepreneurship. This integration indicates that the Lean Startup is a framework that can be developed by entrepreneurship scholars in directions that are of use to practicing entrepreneurs and academics. In addition, the Lean Startup has the opportunity to focus and extend scholarly theories on entrepreneurship, strategy, and organizational theory.

We propose a new domain of inquiry in management scholarship focused on the development of the Lean Startup and the integration of the Lean Startup into the scholarly literature in business, for two purposes. First, this literature should be focused on improving the Lean Startup to increase the success of entrepreneurs and innovators. Second, this body of research has the potential to yield new discoveries that might enhance entrepreneurship theory. In particular, empirical research guided by the Lean Startup has the opportunity to increase the prevalence of research on the process of entrepreneurship into the academic literature.

We are not the first to observe the potential for practical theory to improve our scholarly understanding of entrepreneurship. For example, Sarasvathy and Venkataraman (2011) draw a strong link between the power and usefulness of the scientific method and the potential to refine the entrepreneurial method. The scientific method transformed knowledge development from something often described as magical, mysterious, and dangerous to institutions into a profession. Today, even elementary school students are taught the once-magical powers of the scientific method (Sarasvathy & Venkataraman, 2011). The development of an entrepreneurial method, well-researched and widely taught, would give many tools to manage an uncertain process effectively. Doing so has potentially large benefits to society through the more rapid development and dissemination of solutions to problems, large and small, facing humanity. Research on the Lean Startup may provide a path toward building a practically relevant, effective, evidence-based method of entrepreneurship.

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Notes

1. The terminology in the Lean Startup literature can at times be confusing due to inconsistent use of terms. For example, Blank and Dorf (2003) often used the term *customer discovery* interchangeably to refer to the first step of the search process and at other times refer to both steps of the search process (*customer discovery* and *customer validation*). In this article, we start with the terminology articulated in the figure that appears on page 53 of Blank and Dorf's (2003) work, as this figure contains distinct terms for each part of the model. An updated version of this figure appears as Figure 1 in this article.

2. The term *customer creation* should not be confused with the creation opportunity concept described by Alvarez and Barney (2007). The creation opportunity concept refers to business ideas conceived and contained in the minds of individual entrepreneurs, while customer creation within the Lean Startup refers to marketing processes within organizations designed to build demand for products and services after customer validation is completed (Blank, 2003).

3. We thank the editor for the observation that improving inference in the Lean Startup is likely to be more about the translation of research methods to practice than the development of new research methods.

References

- Abernathy, W., & Clark, K. B. 1985. Innovation: Mapping the winds of creative destruction. *Research Policy*, 14: 3-22.
- Acs, Z. J., & Audretsch, D. 1988. Innovation in large and small firms: An empirical analysis. *The American Economic Review*, 78: 678-690.
- Altman, S. 2013. Startup advice. Retrieved from <http://blog.samaltman.com/startup-advice>.

- Alvarez, S. A., & Barney, J. 2007. Discovery and creation: Alternative theories of entrepreneurial action. *Strategic Entrepreneurship Journal*, 1: 11-26.
- Amit, R., Glosten, L., & Muller, E. 1990. Entrepreneurial ability, venture investments, and risk sharing. *Management Science*, 36: 1232-1245.
- Andries, P., Debackere, K., & Van Looy, B. 2013. Simultaneous experimentation as a learning strategy: Business model development under uncertainty. *Strategic Entrepreneurship Journal*, 7: 288-310.
- Aulet, B. 2013. *Disciplined entrepreneurship: 24 steps to a successful startup*. John Wiley & Sons.
- Baghai, M., Coley, S., & White, D. 1999. *The alchemy of growth: Kickstarting and sustaining growth in your company*. London, UK: Orion Business Books.
- Baker, T., & Nelson, R. E. 2005. Creating something from nothing: Resource construction through entrepreneurial bricolage. *Administrative Science Quarterly*, 50: 329-366.
- Barney, J. 1991. Firm resources and sustained competitive advantage. *Journal of Management*, 17: 99-121.
- Batova, T., Clark, D., & Card, D. 2016. Challenges of lean customer discovery as invention. In *2016 IEEE International Professional Communication Conference*: 1-5. Piscataway, NJ: IEEE.
- Bingham, C. B., & Davis, J. P. 2012. Learning sequences: Their emergence, evolution, and effect. *Academy of Management Journal*, 55: 611-641.
- Blank, S. 2003. *The four steps to the epiphany: Successful strategies for products that win*. Pescadero, CA: K&S Ranch.
- Blank, S. 2012. *The startup owner's manual: The step-by-step guide for building a great company*. Pescadero, CA: Self-published.
- Blank, S. 2013. Why the Lean Start-up changes everything. *Harvard Business Review*. Retrieved from <https://hbr.org/2013/05/why-the-lean-start-up-changes-everything>.
- Blank, S. 2019. How to stop playing "target market roulette": A new addition to the Lean toolset. Retrieved from <https://steveblank.com/2019/05/07/how-to-stop-playing-target-market-roulette-a-new-addition-to-the-lean-toolset/>.
- Blank, S. 2021. Interview with Steve Blank.
- Blank, S., & Dorf, B. 2012. *The startup owner's manual: The step-by-step guide for building a great company*. Pescadero, CA: K&S Ranch, Inc.
- Brinckmann, J., Grichnik, D., & Kapsa, D. 2010. Should entrepreneurs plan or just storm the castle? A meta-analysis on contextual factors impacting the business planning-performance relationship in small firms. *Journal of Business Venturing*, 25: 24-40.
- Butter, A., & Pogue, D. 2002. *Piloting palm*. New York, NY: John Wiley & Sons.
- Camuffo, A., Cordova, A., & Gambardella, A. 2020. A scientific approach to entrepreneurial decision-making: Evidence from a randomized control trial. *Management Science*, 66: 564-586.
- Casson, M. 1982. *The entrepreneur*. Totowa, NJ: Barnes & Noble Books.
- Christensen, C. M. 1997. *The innovator's dilemma*. Boston, MA: Harvard University Press.
- Christensen, C. M. 2013. *The innovator's dilemma: When new technologies cause great firms to fail*. Boston, MA: Harvard Business Review Press.
- Christensen, C. M., & Bower, J. 1996. Customer power, strategic investment, and the failure of leading firms. *Strategic Management Journal*, 17: 197-218.
- Ciuchta, M. P., O'Toole, J., & Miner, A. S. 2021. The organizational improvisation landscape: Taking stock and looking forward. *Journal of Management*, 47: 288-316.
- Córdova, F. A. 2019. *Innovation Corps (I-Corps) biennial report*. National Science Foundation. Retrieved from https://www.nsf.gov/news/special_reports/i-corps/pdf/I-CorpsReport-6_4_19FINAL_508.pdf.
- Davidow, W. H. 1986. *Marketing high technology*. New York, NY: Simon and Schuster.
- Davidsson, P. 2015. Entrepreneurial opportunities and the entrepreneurship nexus: A re-conceptualization. *Journal of Business Venturing*, 30: 674-695.
- Dencker, J. C., & Gruber, M. 2015. The effects of opportunities and founder experience on new firm performance. *Strategic Management Journal*, 36: 1035-1052.
- Dimov, D. 2003. *The nexus of individual and opportunity: Opportunity recognition as a learning process*. Babson Park, MA: Babson College, Babson Kauffman Entrepreneurship. Retrieved from <https://papers.ssrn.com/abstract=1783742>.

- Eckhardt, J. T. 2019. The distinctive domain as a durable way forward. In J. Katz, & A. Corbett (Eds.), *Seminal ideas for the next twenty-five years of advances: Advances in entrepreneurship, firm emergence and growth*: 21-33. Bingley, UK: Emerald Publishing Limited.
- Eckhardt, J. T., & Ciuchta, M. P. 2008. Selected variation: The population-level implications of multistage selection in entrepreneurship. *Strategic Entrepreneurship Journal*, 2: 209-224.
- Eckhardt, J. T., Ciuchta, M. P., & Carpenter, M. 2018. Open innovation, information, and entrepreneurship within platform ecosystems. *Strategic Entrepreneurship Journal*, 12: 369-391.
- Eckhardt, J. T., & Shane, S. A. 2003. Opportunities and entrepreneurship. *Journal of Management*, 29: 333-349.
- Egusa, C. 2013. Beyond lean startups: Eric Ries' movement heads to Fortune 500, government, and beyond. *VentureBeat*. Retrieved from <https://venturebeat.com/2013/12/17/beyond-lean-startups-eric-ries-movement-heads-to-fortune-500-government-and-beyond/>.
- Felin, T., Gambardella, A., Stern, S., & Zenger, T. 2019. Lean startup and the business model: Experimentation revisited. *Long Range Planning*, 53: 1-6.
- Felin, T., & Zenger, T. R. 2009. Entrepreneurs as theorists: On the origins of collective beliefs and novel strategies. *Strategic Entrepreneurship Journal*, 3: 127.
- Foss, N. J., & Klein, P. G. 2012. *Organizing entrepreneurial judgment: A new approach to the firm*. Cambridge, UK: Cambridge University Press.
- Foss, N., & Klein, P. 2020. Entrepreneurial opportunities: who needs them? *Academy of Management Perspectives*. Retrieved from <https://journals.aom.org/doi/abs/10.5465/amp.2017.0181>.
- Foss, N. J., & Saebi, T. 2018. Business models and business model innovation: Between wicked and paradigmatic problems. *Long Range Planning*, 51: 9-21.
- Franke, N., & Shah, S. K. 2003. How communities support innovative activities: An exploration of assistance and sharing among end-users. *Research Policy*, 32: 157-178.
- Freeman, J., & Engel, J. S. 2007. Models of innovation: Startups and mature corporations. *California Management Review*, 50: 94-119.
- Garud, R., & Giuliani, A. P. 2013. A narrative perspective on entrepreneurial opportunities. *Academy of Management Review*, 38: 157-160.
- George, G., & Bock, A. J. 2012. *Models of opportunity: How entrepreneurs design firms to achieve the unexpected*. Cambridge, UK: Cambridge University Press.
- Goldfarb, B., & King, A. A. 2016. Scientific apophenia in strategic management research: Significance tests and mistaken inference. Scientific apophenia in strategic management research. *Strategic Management Journal*, 37: 167-176.
- Gruber, M., MacMillan, I. C., & Thompson, J. D. 2008. Look before you leap: Market opportunity identification in emerging technology firms. *Management Science*, 54: 1652-1665.
- Gruber, M., MacMillan, I. C., & Thompson, J. D. 2012. From minds to markets: How human capital endowments shape market opportunity identification of technology start-ups. *Journal of Management*, 38: 1421-1449.
- Gruber, M., MacMillan, I. C., & Thompson, J. D. 2013. Escaping the prior knowledge corridor: What shapes the number and variety of market opportunities identified before market entry of technology start-ups? *Organization Science*, 24: 280-300.
- Gruber, M., & Tal, S. 2017. *Where to play*. Upper Saddle River, NJ: FT Publishing International.
- Haltiwanger, J., Jarmin, R. S., & Miranda, J. 2013. Who creates jobs? Small versus large versus young. *The Review of Economics and Statistics*, 95: 347-361.
- Hsu, D. H., & Ziedonis, R. H. 2013. Resources as dual sources of advantage: Implications for valuing entrepreneurial-firm patents. *Strategic Management Journal*, 34: 761-781.
- Kahneman, D. 2011. *Thinking, fast and slow*. New York, NY: Macmillan.
- Kahneman, D., & Tversky, A. 2012. Choices, values, and frames. In *Handbook of the fundamentals of financial decision making*: 269-278. World Scientific. *World Scientific Handbook in Financial Economics Series*, vol. 4. Singapore.
- Kaish, S., & Gilad, B. 1991. Characteristics of opportunities search of entrepreneurs versus executives: Sources, interests, general alertness. *Journal of Business Venturing*, 6: 45-61.
- Kamien, M. I., & Schwartz, N. L. 1982. *Market structure and innovation*. Cambridge, UK: Cambridge University Press.
- King, A. 2017. The theory of disruptive innovation: Science or allegory? *Entrepreneur and Innovation Exchange*. Retrieved from <https://eiexchange.com/content/299-the-theory-of-disruptive-innovation-science-or-a>.

- King, A., & Baatartogtokh, B. 2015. How useful is the theory of disruptive innovation? *MIT Sloan Management Review*, 57: 77-90.
- Kirsch, D., Goldfarb, B., & Gera, A. 2009. Form or substance: The role of business plans in venture capital decision making. *Strategic Management Journal*, 30: 487-515.
- Klevorick, A., Levin, R., Nelson, R., & Winter, S. 1995. On the sources and significance of interindustry differences in technological opportunities. *Research Policy*, 25: 185-205.
- Koning, R., Hasan, S., & Chatterji, A. 2022. Experimentation and startup performance: Evidence from A/B testing. *Management Science*, 68: 6434-6453.
- Leatherbee, M., & Katila, R. 2020. The lean startup method: Early-stage teams and hypothesis-based probing of business ideas. *Strategic Entrepreneurship Journal*, 14: 570-593.
- Mansoori, Y., & Lack  us, M. 2020. Comparing effectuation to discovery-driven planning, prescriptive entrepreneurship, business planning, lean startup, and design thinking. *Small Business Economics*, 54: 791-818.
- McGrath, R. G., & MacMillan, I. C. 2000. *The entrepreneurial mindset: Strategies for continuously creating opportunity in an age of uncertainty*. Boston, MA: Harvard Business Press.
- McMullen, J. S., & Shepherd, A. 2006. Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *Academy of Management Review*, 31: 132.
- Michael, B., Renee, D., & James, H. 2002. Skunkworks approach to project management. *Journal of Management in Engineering*, 18: 21-28.
- Miner, A. S., Bassof, P., & Moorman, C. 2001. Organizational improvisation and learning: A field study. *Administrative Science Quarterly*, 46: 304-337.
- Miner, A. S., Gong, Y., Ciuchta, M. P., & Sadler, A. 2012. Promoting university startups: International patterns, vicarious learning and policy implications. *The Journal of Technology Transfer*, 37: 213-233. Retrieved from <https://link.springer.com/article/10.1007/s10961-010-9194-3>.
- Miner, A. S., & Haunschild, P. R. 1995. Population-level learning. In B. Staw, & L. Cummings (Eds.), *Research in organizational behavior*: 17: 155-166. Greenwich, CT: JAI Press.
- Mohr, L. B. 1982. *Explaining organizational behavior*. Washington, DC: Jossey-Bass Publishers.
- Moore, G. A. 1991. *Crossing the chasm*. New York, NY: HarperBusiness.
- Mullins, J., & Komisar, R. 2009. *Getting to plan B: Breaking through to a better business model*. Boston, MA: Harvard Business Press.
- M  nch, J., Fagerholm, F., Johnson, P., Pirttil  hti, J., Torkkel, J., & J   rvinen, J. 2013. Creating minimum viable products in industry-academia collaborations. *Lean Enterprise Software and Systems*, 167: 137-151.
- Murray, F., & Tripsas, M. 2004. The exploratory processes of entrepreneurial firms: The role of purposeful experimentation. In J. Baum, & A. McGahan (Eds.), *Advances in strategic management*: 21: 45-75. San Diego, CA: Elsevier.
- National Economic Council and Office of Science and Technology Policy. 2015. A strategy for American innovation. *The White House*. Retrieved from: https://obamawhitehouse.archives.gov/sites/default/files/strategy_for_american_innovation_october_2015.pdf
- Osterwalder, A., & Pigneur, Y. 2010. *Business model generation*. Hoboken, NJ: John Wiley & Sons.
- Osterwalder, A., Pigneur, Y., & Tucci, C. L. 2005. Clarifying business models: Origins, present, and future of the concept. In *Communications of the ACM*, 16: 1-25.
- Ozcan, P., & Eisenhardt, K. M. 2009. Origin of alliance portfolios: Entrepreneurs, network strategies, and firm performance. *Academy of Management Journal*, 52: 246-279.
- Pearce, D. W. (Ed.). 1992. *The MIT dictionary of modern economics*. Cambridge, MA: MIT Press.
- Porter, M. 1980. *Competitive strategy: Techniques for analyzing industries and competitors*. New York, NY: Free Press.
- Priem, R. L., Li, S., & Carr, J. C. 2012. Insights and new directions from demand-side approaches to technology innovation, entrepreneurship, and strategic management research. *Journal of Management*, 38: 346-374.
- Ries, E. 2011. *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*. New York, NY: Crown Business.
- Sarason, Y., Dean, T., & Dillard, J. F. 2006. Entrepreneurship as the nexus of individual and opportunity: A structuration view. *Journal of Business Venturing*, 21: 286-305.
- Sarasvathy, D. K., Simon, H. A., & Lave, L. 1998. Perceiving and managing business risks: Differences between entrepreneurs and bankers. *Journal of Economic Behavior & Organization*, 33: 207-225.
- Sarasvathy, S. D. 2009. *Effectuation: Elements of entrepreneurial expertise*. Cheltenham, UK: Edward Elgar Publishing.

- Sarasvathy, S. D., & Venkataraman, S. 2011. Entrepreneurship as method: Open questions for an entrepreneurial future. *Entrepreneurship Theory and Practice*, 35: 113-135.
- Satell, G. 2017. This program uses Lean Startup techniques to turn scientists into entrepreneurs. *Harvard Business Review*. Retrieved from <https://hbr.org/2017/03/this-program-uses-lean-startup-techniques-to-turn-scientists-into-entrepreneurs>.
- Schumpeter, J. A. 1934. *The theory of economic development: An inquiry into profits, capital, credit, interest and the business cycle*. Cambridge, MA: Harvard University Press.
- Shah, S. K., & Tripsas, M. 2007. The accidental entrepreneur: The emergent and collective process of user entrepreneurship. *Strategic Entrepreneurship Journal*, 1: 123-140.
- Shane, S. 2003. *A general theory of entrepreneurship: The individual-opportunity nexus*. In *New Horizons in Entrepreneurship*: 352. Northampton, MA: Edward Elgar.
- Shane, S., & Delmar, F. 2004. Planning for the market: Business planning before marketing and the continuation of organizing efforts. *Journal of Business Venturing*, 19: 767-785.
- Shane, S., & Venkataraman, S. 2000. The promise of entrepreneurship as a field of research. *Academy of Management Review*, 26: 13-17.
- Shepherd, D. A., & Gruber, M. 2020. The Lean Startup framework: Closing the academic-practitioner divide. *Entrepreneurship Theory and Practice*, 45: 967-998.
- Short, J. C., Ketchen, D. J., Jr., Shook, C. L., & Ireland, R. D. 2009. The concept of "opportunity" in entrepreneurship research: Past accomplishments and future challenges. *Journal of Management*, 36: 40-65.
- Simon, H. 1955. A behavioral model of rational choice. *The Quarterly Journal of Economics*, 69: 99-118.
- Sołta-Drączkowska, E., & Mrożewski, M. 2020. Exploring the role of project management in product development of new technology-based firms. *Project Management Journal*, 51, 294-311.
- Steffens, P. R., Baker, T., Davidsson, P., & Senyard, J. M. 2022. When is less more? Boundary conditions of effective entrepreneurial bricolage. *Journal of Management*, 49: 1277-1311.
- Teece, D. J. 1986. Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research Policy*, 15: 285-305.
- Teece, D. J. 2010. Business models, business strategy, and innovation. *Long Range Planning*, 43: 172-194.
- Teece, D. J. 2018. Profiting from innovation in the digital economy: Enabling technologies, standards, and licensing models in the wireless world. *Research Policy*, 47: 1367-1387.
- Teece, D., Peteraf, M., & Leih, S. 2016. Dynamic capabilities and organizational agility: Risk, uncertainty, and strategy in the innovation economy. *California Management Review*, 58: 13-35.
- Venkataraman, S. 1997. The distinctive domain of entrepreneurship research. In J. Katz, & R. Brockhaus (Eds.), *Advances in entrepreneurship, firm emergence and growth*: 119-138. Greenwich, CT: JAI Press.
- Vesper, K. H. 1993. *New venture mechanics*. Englewood Cliffs, NJ: Prentice Hall.
- von Hippel, E. 1976. The dominant role of users in the scientific instrument innovation process. *Research Policy*, 5: 212-239.
- von Hippel, E. 1978. Users as innovators. *Technology Review*, 80: 30-39.
- von Hippel, E. 1986. Lead users: A source of novel product concepts. *Management Science*, 32: 791-805.
- von Hippel, E. 1988. *The sources of innovation*. New York, NY: Oxford University Press.
- Wheelwright, S. C., & Clark, K. B. 1992. *Revolutionizing product development: Quantum leaps in speed, efficiency, and quality*. New York, NY: Simon and Schuster.
- Wirtz, B., Göttel, V., & Daiser, P. 2016. Business model innovation: Development, concept and future research directions. *Journal of Business Models*, 4(1): 1-28.
- Yayavaram, S., & Ahuja, G. 2008. Decomposability in knowledge structures and its impact on the usefulness of inventions and knowledge-base malleability. *Administrative Science Quarterly*, 53: 333-362.
- Zahra, S. A. 2008. The virtuous cycle of discovery and creation of entrepreneurial opportunities. *Strategic Entrepreneurship Journal*, 2(3): 243-257.
- Zenger, T. R., & Lazzarini, S. G. 2004. Compensating for innovation: Do small firms offer high-powered incentives that lure talent and motivate effort? *Managerial and Decision Economics*, 25: 329-345.
- Zott, C., & Amit, R. 2008. The fit between product market strategy and business model: Implications for firm performance. *Strategic Management Journal*, 29(1): 1-26.